Educational Courses

104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RSNA 2018
TOMORROW'S RADIOLOGY TODAY

SPPH01

AAPM/RSNA Physics Tutorial Session 1

Saturday, Nov. 24 12:00PM - 2:00PM Room: E351

BQ GI MR NM PH

AMA PRA Category 1 Credits ™: 2.00
ARRT Category A+ Credits: 2.25

FDA Discussions may include off-label uses.

Participants
Thaddeus A. Wilson, PhD, Madison, WI (*Moderator*) Nothing to Disclose

Sub-Events

SPPH01A PET/CT Introduction and Clinical Applications

Participants
Osama R. Mawlawi, PhD, Houston, TX (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG

For information about this presentation, contact:

omawlawi@mdanderson.org

LEARNING OBJECTIVES

1) Describe the latest advances in hardware and software for PET/CT imaging. 2) Explain how these advances affect PET image quality and quantification. 3) Describe novel PET/CT clinical applications using new radiopharmaceuticals. 4) Discuss future developments and clinical applications of PET/CT imaging.

SPPH01B PET/MR Introduction and Clinical Applications

Participants
Robert A. Pooley, PhD, Jacksonville, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

pooley.robert@mayo.edu

LEARNING OBJECTIVES

1) Describe reasons for combining PET and MR into a single scanner. 2) Explain how PET instrumentation can affect MR, and how MR instrumentation can affect PET. 3) Identify PETMR protocol acquisition strategies. 4) Describe clinical applications of PETMR.

SPPH01C Quantitative SPECT

Participants
Benjamin M. Tsui, PhD, Baltimore, MD (*Presenter*) Researcher, Koninklijke Philips NV; License agreement, General Electric Company;

For information about this presentation, contact:

btsui1@jhmi.edu

LEARNING OBJECTIVES

1) Define quantitation and quantitative SPECT. 2) List and describe the image degrading factors of SPECT. 3) Describe methods to compensate for the SPECT image degrading factors. 4) Assess quality and quantitative accuracy improvements of quantitative SPECT images. 5) Apply quantitative SPECT to clinical practices.

ABSTRACT

Recent development and application of quantitative SPECT have provided significantly improved image quality and quantitative accuracy that aid in clinical diagnosis and treatment of diseases. In this educational course, we will define quantitation, quantitative SPECT and its goals. The image degrading factors of SPECT will be listed and described. Methods that compensates for the image degradation factors will be presented and explained. Examples of improvements in image quality and quantitative accuracy in various clinical applications will be presented.

Active Handout:Benjamin M. Tsui

http://abstract.rsna.org/uploads/2018/18000347/RSNA-QuantitatveSPECT HandoutSPPH01C.pdf

SPGW01

NIH Grantsmanship Workshop

Saturday, Nov. 24 1:00PM - 5:00PM Room: E253AB

RS

AMA PRA Category 1 Credits ™: 4.00
ARRT Category A+ Credit: 0

Participants
Gayle E. Woloschak, PhD, Chicago, IL (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Gain greater understanding of the NIH grants process: a. Understand the process for preparing a research or training grant application. b. Learn the elements of a competitive grant application. 2) Gain insight into the new features of the NIH review process. 3) View the review process in action through a mock study section.

Sub-Events

SPGW01A Welcome and Introductory Remarks

Participants
Gayle E. Woloschak, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title.

SPGW01B Preparing an R01 Research Application

Participants
Maryellen L. Giger, PhD, Chicago, IL (*Presenter*) Stockholder, Hologic, Inc; Shareholder, Quantitative Insights, Inc; Shareholder, QView Medical, Inc; Co-founder, Quantitative Insights, Inc; Royalties, Hologic, Inc; Royalties, General Electric Company; Royalties, MEDIAN Technologies; Royalties, Riverain Technologies, LLC; Royalties, Mitsubishi Corporation; Royalties, Canon Medical Systems Corporation

For information about this presentation, contact:

m-giger@uchicago.edu

LEARNING OBJECTIVES

View Learning Objectives under main course title.

SPGW01C Preparing K Awards

Participants
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Ruth C. Carlos, MD, MS - 2015 Honored EducatorRuth C. Carlos, MD, MS - 2018 Honored Educator

SPGW01D Clinical Trials in Applications

Participants
Michael W. Vannier, MD, Crete, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title.

Honored Educators

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SPGW01E Program Perspectives

Participants
Manana Sukhareva, PhD, Bethesda, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title.

ABSTRACT

SPGW01F The Process of Review

Participants
Gayle E. Woloschak, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title.

SPGW01G Mock Study Section

Participants
Gayle E. Woloschak, PhD, Chicago, IL (*Presenter*) Nothing to Disclose
Maryellen L. Giger, PhD, Chicago, IL (*Presenter*) Stockholder, Hologic, Inc; Shareholder, Quantitative Insights, Inc; Shareholder, QView Medical, Inc; Co-founder, Quantitative Insights, Inc; Royalties, Hologic, Inc; Royalties, General Electric Company; Royalties, MEDIAN Technologies; Royalties, Riverain Technologies, LLC; Royalties, Mitsubishi Corporation; Royalties, Canon Medical Systems Corporation
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Michael W. Vannier, MD, Crete, IL (*Presenter*) Nothing to Disclose
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ekrupin@emory.edu

m-giger@uchicago.edu

LEARNING OBJECTIVES

1) Understand how an NIH review session takes place.

Honored Educators

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SPGW01H Questions to the Faculty

Participants
Gayle E. Woloschak, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title.

SPGW01I Summary

Participants
Gayle E. Woloschak, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title.

SPGW01J Adjourn

SPPH02

AAPM/RSNA Physics Tutorial Session 2

Saturday, Nov. 24 2:15PM - 4:15PM Room: E351

NM PH

AMA PRA Category 1 Credits ™: 2.00
ARRT Category A+ Credits: 2.25

FDA Discussions may include off-label uses.

Participants
Thaddeus A. Wilson, PhD, Madison, WI (*Moderator*) Nothing to Disclose

Sub-Events

SPPH02A The Nuts and Bolts of Dosimetry in Nuclear Medicine and its Application

Participants
Michael G. Stabin, PhD, Nashville, TN (*Presenter*) Software, Vanderbilt University

LEARNING OBJECTIVES

1) Understand current models and methods used in radiation dosimetry for radiopharmaceuticals. 2) Understand methods for new drug approval with the FDA. 3) Understand current experience with radiopharmaceuticals used in therapy: types of compounds, clinical experience, biological effects.

SPPH02B Theranostics Introduction and Applications

Participants
Hossein Jadvar, MD, PhD, Pasadena, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jadvar@med.usc.edu

LEARNING OBJECTIVES

1) Define theranostisc. 2) Review the history and current clinical applications of theranostics. 3) Describe potential outlook for theranostics in the era of precision medicine.

ABSTRACT

Advances in the understanding of cancer biology, developments in diagnostic technologies, and expansion of therapeutic options have all contributed to the concept of personalized cancer care. Theranostics is the systematic integration of targeted diagnostics and therapeutics. The theranostic platform includes an imaging component that 'sees' the lesions followed by administration of the companion therapy agent that 'treats' the same lesions. This strategy leads to enhanced therapy efficacy, manageable adverse events, improved patient outcome, and lower overall costs. In this lecture, I review the the concept, history, recent developments, current challenges, and outlook for radiotheranostics (use of radionuclides in theranostics) in the management of patients with cancer (Jadvar H et al. Radiotheranostics in Cancer Diagnosis and Management. Radiology 2018; 286:388-400).

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SPOI11

Oncodiagnosis Panel: Oropharyngeal Cancer (Interactive Session)

Sunday, Nov. 25 10:45AM - 12:15PM Room: E451B

HN NR OI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

James S. Welsh, MD, Aurora, IL (*Moderator*) Nothing to Disclose
Christine M. Glastonbury, MBBS, San Francisco, CA (*Presenter*) Author with royalties, Reed Elsevier
Upendra Parvathaneni, MBBS,FRANZCR, Seattle, WA (*Presenter*) Nothing to Disclose
Michael K. Gibson, MD,PhD, Nashville, TN (*Presenter*) Advisory Board, Amgen Inc; Speaker, Bristol-Myers Squibb Company; ;
Pierre Lavertu, MD, Cleveland, OH (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mike.gibson.1@vanderbilt.edu

christine.glastonbury@ucsf.edu

pierre.lavertu@uhhospital.org

LEARNING OBJECTIVES

1) To present the rationale for changes in oropharyngeal cancer staging in the AJCC/UICC 8th edition. 2) To reinforce the necessity of a team approach to cancer management and the utility of the radiologist for aiding staging. 3) Be able to understand the relative roles of surgery and radiotherapy in the management of oropharyngeal cancer. 4) Be able to understand the role of transoral surgery (TORS) in the management of early oropharyngeal lesions. 5) To review and understand the roles of chemotherapy and biological therapy as radiosensitizers in treatment of orophryngeal cancer.

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VSPD01

Pediatric Series: Neuroradiology

Sunday, Nov. 25 10:45AM - 12:15PM Room: S406A

NR PD

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Manu S. Goyal, MD, MSc, Saint Louis, MO (*Moderator*) Nothing to Disclose
Arastoo Vossough, MD,PhD, Philadelphia, PA (*Moderator*) Consultant, Banyan Biomarkers, Inc

For information about this presentation, contact:

goyalm@wustl.edu

Sub-Events

VSPD01-01 Pediatric Brain Imaging in Neurofibromatosis-1

Sunday, Nov. 25 10:45AM - 11:05AM Room: S406A

Participants
Manu S. Goyal, MD, MSc, Saint Louis, MO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

goyalm@wustl.edu

LEARNING OBJECTIVES

1) Learn the clinical role and indications for brain MRI in children with suspected NF1. 2) Identify the typical features of optic pathway gliomas in NF1. 3) Identify the typical features of non-optic pathway gliomas in NF1. 4) Identify the typical non-neoplastic findings on brain MRI in NF1.

VSPD01-02 White Matter Microstructural Changes in the Cases of Tuberous Sclerosis: Evaluation by Neurite Orientation Dispersion and Density Imaging (NODDI) Compared with Conventional Diffusion Tensor Method

Sunday, Nov. 25 11:05AM - 11:15AM Room: S406A

Participants
Toshiaki Taoka, MD, PhD, Nagoya, Japan (*Presenter*) Nothing to Disclose
Noriko Aida, MD, Yokohama, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuta Fujii, Yokohama, Japan (*Abstract Co-Author*) Nothing to Disclose
Hisashi Kawai, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose
Toshiki Nakane, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose
Shinji Naganawa, MD, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Neurite orientation dispersion and density imaging (NODDI) is an advanced diffusion imaging technique that provides detailed information on tissue microstructure of the brain. Intracellular volume fraction (Ficv) image is one of the products of NODDI which is a marker of neurite density. We accessed the Ficv images in the tuberous sclerosis (TS) cases and evaluated the changes in the white matter microstructure in comparison with fractional anisotropy (FA) images by conventional diffusion tensor method.

METHOD AND MATERIALS

Twelve cases of TS and eight controls were evaluated. Diffusion datasets of 20 axes motion proving gradients were acquired with b=1000 and 2000 s/mm2 by a 3T clinical scanner, and analyzed with NODDI Matlab toolbox. Ficvf images were accessed as well as FA images. We analyzed (1) qualitative scoring method comparing the areas with and without cortical tuber, (2) quantitative analysis to acquire VoxTh ratio which is a ratio of the number of voxels lower than the value of thalamus to the total voxels, and (3) Tract-Based Spatial Statistics (TBSS) method compared to controls.

RESULTS

(1) On qualitative analysis, Ficv images showed lower value especially in the areas with cortical tuber. These changes could be seen not only in the area with cortical tuber, but the area without them. While, FA images showed hyperintensity in the white matter regardless of the existence of cortical tuber. (2) On histogram analysis, VoxTh ratio were smaller on Ficv images than on FA images. (3) On TBSS analysis, Ficv images of TS complex showed statistically significant lower values compared to controls in the area with subcortical or gyral white matter.

CONCLUSION

In conventional diffusion tensor method, decreases of FA, which might represent lower packing density of unmyelinated axonal fibers, were not prominent in the TS cases. While, Ficvf from NODDI showed significant decrease, which might reflect the lack of maturation with thin non-myelinated fibers, especially in the areas with cortical tuber in the TS cases.

CLINICAL RELEVANCE/APPLICATION

In conventional diffusion tensor method, decreases of FA, which might represent lower packing density of unmyelinated axonal fibers, were not prominent in the TS cases. While, Ficvf from NODDI showed significant decrease, which might reflect the lack of maturation with thin non-myelinated fibers, especially in the areas with cortical tuber in the TS cases.

VSPD01-03 Can Advanced MR Imaging predict Molecular Subgroups of Medulloblastoma?

Sunday, Nov. 25 11:15AM - 11:25AM Room: S406A

Participants
Nadezhda Plakhotina, MD, Saint-Petersburg, Russia (*Presenter*) Nothing to Disclose
Elida Vazquez, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Ignacio Delgado, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Angel Sanchez-Montanez, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Elena Martinez, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Anna Llort, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Gemma Burcet Rodriguez, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose

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evazquez@vhebron.net

PURPOSE

As preoperative MR characterization of medulloblastoma into groups parallel to those established by molecular diagnosis may be valuable for oncologists, our purpose was to determine whether advanced MR imaging patterns of medulloblastoma can correlate with the diverse molecular groups used as a basis for treating this condition.

METHOD AND MATERIALS

Twenty-nine patients, mean age 4.74 (1-15 years), 10 (34.5%) female and 19 (65.5%) male, with a confirmed diagnosis of medulloblastoma, underwent structural and advanced pretreatment MRI of the brain and spine (1.5 or 3T magnets), including diffusion imaging, MR spectroscopy, ASL perfusion, and dynamic enhanced perfusion, in our tertiary pediatric center (January 2010-December 2017) and were retrospectively reviewed. One neuroradiology research fellow and 2 experienced pediatric neuroradiologists reviewed the MR images. The MRI findings of each tumor were recorded on a structured list of possible features (eg, location, morphology, enhancement, type of perfusion, diffusion restriction, ADC measurements, spectroscopy metabolite abnormalities).

RESULTS

In accordance with the new molecular classification, these tumors are now being assigned to molecular subgroups: wingless (WNT), sonic hedgehog (SHH), group 3, and group 4. As a work in progress, the MRI features from the advanced techniques, mainly perfusion and spectroscopy, are undergoing statistical analysis to determine which parameters are useful for predicting the various medulloblastoma molecular subgroups. As an example, the figure shows four different patients with medulloblastoma demonstrating diverse cerebral blood volumes and spectroscopy patterns.

CONCLUSION

Advanced MRI techniques, together with the conventional findings, contribute to assessing the diagnosis of medulloblastoma; in addition, our findings to date suggest that some MRI features can predict a particular molecular subgroup, with implications for management.

CLINICAL RELEVANCE/APPLICATION

Advanced MRI techniques may be useful to classify medulloblastoma patients into molecular subgroups, which are relevant for therapy strategies, with tailored subgroup-specific treatments.

VSPD01-04 Differentiation of High-Grade and Low-Grade Pediatric Brain Tumors Using Mono-exponential, Biexponential, and Stretched Exponential Diffusion-weighted Imaging

Sunday, Nov. 25 11:25AM - 11:35AM Room: S406A

Participants
Stephen F. Kralik, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose
Jeremy S. Cardinal, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose
Sean C. Dodson, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose
Chang Y. Ho, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

steve.kralik@gmail.com

PURPOSE

The purpose of this study was to assess the diagnostic performance of parameters obtained from mono-exponential, biexponential, and stretched exponential diffusion-weighted imaging (DWI) for differentiating low-grade and high-grade pediatric brain tumors.

METHOD AND MATERIALS

Pediatric patients with brain tumors were evaluated at initial presentation with diffusion-weighted imaging using 8 b values (0-800

s/mm2) at 3T. The apparent diffusion coefficient (ADC), true diffusion coefficient (D), pseudo-diffusion coefficient (D*), perfusion fraction (f), and alpha were calculated by fitting the mono-exponential, bi-exponential model and stretched exponential methods. Histogram analysis of ADC, D, D*, f, and alpha values from tumor volumetric region of interest were compared between low-grade tumors, World Health Organization (WHO) grade 1 and 2, and high-grade tumors, WHO grade 3 and 4.

RESULTS

A total of 36 patients (mean age 7.4 years, range 0-17 years; 23 males, 9 females) were evaluated. There were 17 low grade tumors and 19 high grade tumors. The volumetric mean tumor ADC (1.45 +/- 0.36 vs 1.01 +/- 0.33 x 10-3 mm2/s, P=0.001), D (1.32 +/- 0.31 vs 0.90 +/- 0.29 x 10-3 mm2/s, P<0.001), D* (6.21 +/- 3.59 vs 17.1 +/- 6.97 x 10-3 mm2/s, P<0.0001), and alpha (0.93 +/- 0.03 vs 0.86 +/- 0.04, P<0.0001) were significantly different between the low grade group compared to the high grade group. The f was not statistically significant (0.07 +/- 0.02 vs 0.08 +/- 0.03, P=0.49). Receiver operating characteristic analysis for the mean volumetric tumor demonstrated maximum area under the curve, sensitivity and specificity of 0.85, 83%, 79% for ADC, 0.84, 87%, 79% for D, 0.91, 87%, 93% for D*, 0.57, 20%, 100% for f, and 0.90, 89%, 86% for alpha.

CONCLUSION

Biexponential, and stretched exponential diffusion parameters obtained from multiple b value DWI may outperform the ADC for differentiation of low-grade and high-grade pediatric brain tumors.

CLINICAL RELEVANCE/APPLICATION

The addition of multiple b value diffusion weighted imaging may improve diagnosis of low grade versus high grade tumors in pediatric patients with brain tumors.

VSPD01-05 Histogram Analysis of Apparent Diffusion Coefficients May Predict Molecular Subgroups of Medulloblastoma in Children

Sunday, Nov. 25 11:35AM - 11:45AM Room: S406A

Participants
Weijian Wang, Zhengzhou, China (*Presenter*) Nothing to Disclose
Jingliang Cheng, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yong Zhang, DO, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

weijianwang520@163.com

PURPOSE

The aim is to verify if ADC histogram is able to predict new subgroups of medulloblastoma.

METHOD AND MATERIALS

Sixty-five patients with diagnosis of medulloblastoma(30 classic, 8 desmoplastic/nodular, 7 extensive nodularity, 20 large cell/anaplastic), with pretreatment MR imaging, histologic, genomic characterisation after surgery, were retrospectively selected. ADC maps were coregistered with T1WI post-contrast and T2WI images. Drawing the region of interest(ROI) on the maximum level of ADC maps and going on histogram analysis,these two steps are all performed on the software named Mazda.We used the Mann-Whitney test to evaluate the capacity of histogram parameters to discriminate among paired medulloblastoma subgroups.

RESULTS

Desmoplastic/nodular and extensive nodularity were detected no statistical significance. A trend in differences was found between classic and large cell/anaplastic. 9 texture parameters using histogram extracted, with statistical significance (mean,variance,1 percent,10 percent). ROC curve analysis of the 10th percentile yielded the best area under the ROC curve (AUC; 0.96), sensitivity of 98%, and specificity of 96%, with a cutoff value of 90.

CONCLUSION

The study shows histograms analysis of apparent diffusion coefficient can provide reliably objective basis for molecular subgroups of medulloblastoma in children.

CLINICAL RELEVANCE/APPLICATION

Histogram is a kind of the texture analysis which is non-invasive,ROI can include the entire range of tumor, we can get a histogram data by calculating all the voxel of the tumor volume , the results is more objective and has less error.

VSPD01-06 Cerebral Blood Flow and Marrow Diffusion Alterations in Children with Sickle Cell Anemia After Bone Marrow Transplant and Transfusion

Sunday, Nov. 25 11:45AM - 11:55AM Room: S406A

Participants
Matt Whitehead, MD, Washington, DC (*Presenter*) Nothing to Disclose
Anilawan Smitthimedhin, Bangken Bangkok, Thailand (*Abstract Co-Author*) Nothing to Disclose
Jennifer Webb, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
Eman S. Mahdi, MD, MBChB, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
Zarir P. Khademian, MD, PhD, Washington , DC (*Abstract Co-Author*) Nothing to Disclose
Jessica Carpenter, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
Bonmyong Lee, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Allistari Abraham, Washington, DC (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

MWhitehe@childrensnational.org

PURPOSE

Hematopoietic bone marrow hyperplasia and hyperperfusion are compensatory mechanisms in sickle cell anemia (SCA). We have observed changes in marrow diffusion and ASL perfusion values in SCA following bone marrow transplant (BMT), potentially representing biomarkers of a favorable therapeutic response. We aim to compare ASL perfusion and marrow diffusion/ADC values in SCA patients prior to and after BMT or transfusion.

METHOD AND MATERIALS

All consecutive brain MRIs performed over 6 years at an academic children's hospital in SCA patients were reviewed. Those lacking ASL and cases with disease processes that would affect ASL perfusion values were excluded. Quantitative marrow diffusion values were obtained from the occipital and sphenoid bones. Quantitative pseudo-continuous ASL perfusion values (ml/100g tissue/min) were determined by interrogating each of the following bilateral territories: MCA, ACA, and PCA. Thereafter, average whole brain perfusion was estimated. Each territory, whole brain average CBF, and marrow ADC values were compared for changes in the same patient prior to and after either BMT or transfusion, and over time. BMT and transfusion groups were then compared to one another. Two-tailed paired and unpaired student T tests were utilized where appropriate; P <0.05 was considered significant.

RESULTS

Fifty-three exams from 17 BMT patients (follow-up 0-4 years) and 29 brain MR examinations from 9 transfusion patients (follow-up 1-5 years) were included. ADC values significantly increased in the sphenoid wing (0.97x10-3 to 1.59x10-3; P=0.025) and occipital marrow following BMT in contrast to transfusion patients (P>0.83). Whole brain mean CBF significantly decreased following BMT, from 77.39+/-13.78 to 60.39+/-13.62 (1st scan; P=0.00004), and did not significantly change thereafter. CBF did not significantly change following the 1st transfusion (81.11+/-12.23 to 80.25+/-8.27, P=0.47) or after subsequent transfusions. There was no significant difference in mean CBF between the BMT and transfusions groups prior to intervention (P=0.22).

CONCLUSION

Improved CBF and marrow diffusion eventuate following bone marrow transplantation in children with SCA. In contrast, no significant alteration in CBF or marrow diffusion was found in SCA patients that underwent transfusion therapy.

CLINICAL RELEVANCE/APPLICATION

ASL perfusion and quantitative marrow diffusion values are useful post-therapeutic imaging biomarkers.

VSPD01-07 Pediatric Neuroimaging in Vascular Neurocutaneous Syndromes

Sunday, Nov. 25 11:55AM - 12:15PM Room: S406A

Participants
Arastoo Vossough, MD,PhD, Philadelphia, PA (*Presenter*) Consultant, Banyan Biomarkers, Inc

LEARNING OBJECTIVES

1) Classify the various pediatric vascular neurocutaneous syndromes. 2) Identify the major clinical features of select vascular neurocutaneous syndromes. 3) Describe the main imaging features and differential diagnoses of select vascular neurocutaneous syndromes.

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RCA11

Radiology Search and Analytics Software Tools for Clinical and Practice Quality Optimization (Hands-on)

Sunday, Nov. 25 11:00AM - 12:30PM Room: S401AB

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Safwan Halabi, MD, Stanford, CA (*Moderator*) Nothing to Disclose
Safwan Halabi, MD, Stanford, CA (*Presenter*) Nothing to Disclose
Matthew P. Lungren, MD, Palo Alto, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Become familiar with available search and analytics tools that can be used to promote clinical and practice quality optimization. 2) Apply common search and analytics techniques to extract meaningful clinical and practice data. 3) Understand the tools and resources needed to develop your practice's search and analytics strategy for performance improvement.

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RCB11

Teaching Congenital Heart Morphology with 3D Print Models II: Understanding Surgical Procedures in Congenital Heart Diseases with Illustrations and 3D Print Models (Hands-on)

Sunday, Nov. 25 11:00AM - 12:30PM Room: S401CD

CA ED IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Shi-Joon Yoo, MD, Toronto, ON (*Presenter*) Owner, 3D HOPE Medical; CEO, IMIB-CHD; Spouse, CEO, 3D PrintHeart;
Cynthia K. Rigsby, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Rajesh Krishnamurthy, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Whal Lee, MD, PhD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Andreas Giannopoulos, MD, Zurich, Switzerland (*Presenter*) Nothing to Disclose
Hyun Woo Goo, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Lorna Browne, MD, FRCR, Aurora, CO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

crigsby@luriechildrens.org

LEARNING OBJECTIVES

1) Understand the terms used in describing the pathology of criss-cross heart and related conditions. 2) Understand the pathologic and surgical anatomy of various forms of criss-cross heart and related conditions. 3) Develop ideas how to image the patients with criss-cross heart and related conditions for surgical management.

ABSTRACT

Congenital heart diseases are the most common significant birth defects requiring surgical treatment in the majority of cases. Understanding of pathologic anatomy is crucial in surgical decision and performing optimal surgical procedures. Learning cardiac morphology has relied on the pathologic specimens removed from dead patients or at the time of transplantation. However, the pathologic specimens are rare and hardly represent the whole spectrum of diseases. 3D print models from the CT and MR angiograms of the patients with congenital heart disease are great resources for teaching and can revolutionize education. In this hands-on session, 3D print models of hearts will be used for comprehensive understanding of comlex morphology of criss-cross or twisted hearts, superofinferior ventricles and topsy-turvy hearts. The session will consist of 15-minute introductory lecture, 60-minute hands-on observation and 15-minute discussion and evaluation. Experts on congenital heart disease pathology will be available for guidance and answering questions throughout the session.

Honored Educators

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RCC11

Case Review: Lung-RADS - Bring Your Own Device (Hands-on)

Sunday, Nov. 25 11:00AM - 12:30PM Room: S402AB

CH OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Ella A. Kazerooni, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Elizabeth Lee, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Jared D. Christensen, MD, Durham, NC (*Presenter*) Advisory Board, Riverain Technologies, LLC
Maria D. Martin, MD, Madison, WI (*Presenter*) Nothing to Disclose
Brett M. Elicker, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe patient risk factors for lung cancer and current requirements for patients to be eligible for lung cancer screening based on the coverage decision outlined by the Centers for Medicare and Medicaid Services. 2) Explain the rational for each category used in Lung-RADS. 3) Apply Lung-RADS to case examples and recommend appropriate follow up.

ABSTRACT

Participants will review cases on their own devices and answer questions. The cases will then be reviewed by the presenters. Note: this activity is best done on a laptop or tablet. Although phones will work, their small size limits optimal image view. Lung-RADS was established in 2014 as a means to standardized reporting and management in high-risk patients undergoing screening for lung cancer with low dose CT. This workshop will begin with an approximately 20 minute review of the National Lung Screening Trial (NLST) and other supporting evidence for the efficacy of screening, recommendations for screening as per the U.S. Preventative Services Task Force and the coverage decision by the Centers for Medicare and Medicaid Services. Additionally, concepts regarding the structure and rational for Lung-RADS will be highlighted. After a didactic portion, participants will review cases independently on their own devices. Faculty support will be available throughout the room to answer individual questions. Following this, cases will be reviewed by the presenters in order to highlight key concepts in the use of Lung-RADS. This session will focus on the application of Lung-RADS including: recognizing important imaging features and applying findings to assign the correct Lung-RADS category. Attendees will be given tips and tools to help with use of Lung-RADS and requirements for establishments of a lung cancer screening program.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Ella A. Kazerooni, MD - 2014 Honored Educator

VSIO11

Interventional Oncology Series: Lung, Kidney and Bone

Sunday, Nov. 25 1:30PM - 6:00PM Room: S405AB

CH GU IR MK

ARRT Category A+ Credits: 5.00
AMA PRA Category 1 Credits ™: 4.25

FDA Discussions may include off-label uses.

Participants
Christos S. Georgiades, MD, PhD, Baltimore, MD (*Moderator*) Consultant, Galil Medical Ltd
Sean M. Tutton, MD, Milwaukee, WI (*Moderator*) Medical Director, Benvenue Medical, Inc; Consultant, Benvenue Medical, Inc; Researcher, Siemens AG; Consultant, BTG International Ltd

For information about this presentation, contact:

g_christos@hotmail.com

LEARNING OBJECTIVES

1) To understand the physics and physiology relevant to the main ablation modalities as applied to different target organs. 2) To become updated on the currrent evidence for kidney, lung and MSK tumor ablation. 3) To learn how to anticipate and mitigate potential complications related tolung, kidney and MSK ablations. 4) To learn techniques (including tackling challenging cases) that maximize oncologic outcomes.

Sub-Events

VSIO11-01 Keynote and Series Opening: Interventional Oncology-The 4th Pillar of Cancer Care

Sunday, Nov. 25 1:30PM - 1:55PM Room: S405AB

Participants
William S. Rilling, MD, Milwaukee, WI (*Presenter*) Research support, B. Braun Melsungen AG; Research support, Sirtex Medical Ltd; Research support, Siemens AG; Consultant, B. Braun Melsungen AG; Consultant, Cook Group Incorporated ; Consultant, Terumo Corporation; Advisory Board, Terumo Corporation

VSIO11-02 Physics of MW, RF and Cryoablation: Clinically Relevant Parameters

Sunday, Nov. 25 1:55PM - 2:15PM Room: S405AB

Participants
Christos S. Georgiades, MD, PhD, Baltimore, MD (*Presenter*) Consultant, Galil Medical Ltd

LEARNING OBJECTIVES

To understand the physical principles behind the common ablation modalities (RFA, Microwave, Cryoablation, HIFU, IRE etc)To understand how physiological parameters can affect the efficacy of the ablation modalityTo be able to select the appropriate ablation modality for each specific case and optimize outcomes

LEARNING OBJECTIVES

1) Comprehend clinically relevant physical parameters of microwave, radiofrequency, and cryoablation technologies. 2) Apply the most appropriate thermal ablative technique for a patient.

VSIO11-03 Lung Cancer Ablation: Techniques to Optimize Outcome and Current Evidence

Sunday, Nov. 25 2:15PM - 2:35PM Room: S405AB

Participants
William H. Moore, MD, Port Washington, NY (*Presenter*) Consultant, Merck & Co, Inc; Consultant, BTG International Ltd;

LEARNING OBJECTIVES

1) Discuss Ablative Mechanism Understand Patient/Lesion selection Comparison of RFA/MVA/Cryo. 2) Review and describe outcomes including adverse events, local control, and survival abscopal effect.

VSIO11-05 Complications of Lung Ablation and Mitigating Actions

Sunday, Nov. 25 2:45PM - 3:05PM Room: S405AB

Participants
Stephen B. Solomon, MD, New York, NY (*Presenter*) Research Grant, General Electric Company; Consultant, Johnson & Johnson; Consultant, BTG International Ltd;

LEARNING OBJECTIVES

1) To review the complications associated with lung ablation and offer suggestions and approaches that would mitigate them.

VSIO11-06 XRT versus Ablation with Curative Intent: Patient Selection and Outcomes

Sunday, Nov. 25 3:05PM - 3:25PM Room: S405AB

Participants
Kelvin K. Hong, MD, Baltimore, MD (*Presenter*) Scientific Advisory Board, Boston Scientific Corporation Scientific Advisory Board, BTG International Ltd Research support, Merit Medical Systems, Inc

LEARNING OBJECTIVES

1) The current available data will be reviewed and contextualized.

ABSTRACT

Patients with early stage, non operable lung cancers suffer from local progression as the primary cause of failure. SBRT and thermal ablation (such as RFA) are promising non operative therapeutic options. At present, there are no radomized comparisons between SBRT or RFA, nor direct clinical comparisons- and no prospective trial is underway. It is difficult for cancer specialists to decide between the two, and it is not definitive whcih provides superior undisputable outcomes.

VSIO11-07 Renal Cancer Ablation: Patient, Tumor Selection, Techniques and Current Evidence

Sunday, Nov. 25 3:25PM - 3:45PM Room: S405AB

Participants
Debra A. Gervais, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review selection criteria for renal tumor ablation cases. 2) To review reported effectiveness of the most common renal tumor ablation modalities and techniques.

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VSIO11-08 Percutaneous Microwave Ablation versus Laparoscopic Partial Nephrectomy for cT1a Renal Cell Carcinoma: A 12-Year Inception Cohort Study with 1955 Patients

Sunday, Nov. 25 3:45PM - 3:55PM Room: S405AB

Participants
Jie Yu, Beijing, China (*Presenter*) Nothing to Disclose
Ping Liang, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xiaoling Yu, Md, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Zhigang Cheng, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Zhiyu Han, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Fangyi Liu, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

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jiemi301@163.com

PURPOSE

While partial nephrectomy (PN) is considered the standard approach for cT1a renal cell carcinoma (RCC).Objective of the study is to compare outcomes between percutaneous MWA (PMWA) and laparoscopic PN (LPN) for cT1a RCC.

METHOD AND MATERIALS

We performed a prospective study of patients who underwent either PMWA or LPN for cT1a RCC (<=4cm) between April 2006 and November 2017. To reduce the inherent biases of the study, PMWA and LPN groups were matched on the basis of key variables: tumor size and number, Charlson comorbidity index (CCI), age, pathology, preoperative serum creatinine, preoperative estimated glomerular filtration rate (C) and gender. The matching algorithm was 1:1 genetic matching with no replacement. The risk of having a post-treatment complication and percent drop in eGFR, as well as the risks of local tumor progress (LTP), distant metastasis, and cancer-specific mortality, were compared between groups using logistic, linear, and Fine-and-Gray competing risk regression models.

RESULTS

The cohort included 1955 patients (PMWA: 185; LPN: 1770) with a median follow-up of 40.6 mo (interquartile range 25.1, 63.4). After matching, there was no significant difference between the PMWA and LPN groups for tumor size (2.3 vs 2.3 cm; $p = 0.86$), age (63.2 vs 60.4 yr; $p = 0.07$), tumor location ($p = 0.68$) and pathology classification ($p = 1.0$). But PMWA group had higher CCI (4 vs 1; $p<0.001$), preoperative creatinine (84.4 vs 74.2 mg/dl; $p<0.001$) and preoperative eGFR (119.5 vs 106.8 ml/min/1.73m2; $p = 0.002$). There were significant differences between PMWA and LPN in percentage drop in eGFR at discharge (mean: 6% vs 17.9%; $p = 0.002$) and major complication (mean: 2.2% vs 4.9%; $p = 0.16$). Likewise, no significant differences were noted in LTP (3.2% vs 0.5%; $p = 0.06$), distant metastases (4.3% vs 4.3%; $p = 1.0$), or 5-year cancer-specific mortality ($p = 0.68$). But LPN group needed longer operative time(29.4 vs 108.1 min; $p<0.001$), more estimated blood loss(4.0 vs 50 ml; $p<0.001$).

CONCLUSION

Our study found no significant difference in complications, renal function outcomes, and oncologic outcomes between PMWA and LPN for patients with cT1a RCC. Validation in a larger multi-institutional analysis may be warranted.

CLINICAL RELEVANCE/APPLICATION

PMWA with less invasion should be reserved for patients with imperative indications for nephron-sparing surgery who cannot be subjected to the risks of more invasive LPN.

VSIO11-09 Complications of Renal Ablation and Mitigating Actions

Sunday, Nov. 25 4:05PM - 4:25PM Room: S405AB

Participants
Shane A. Wells, MD, Madison, WI (*Presenter*) Consultant, Johnson & Johnson

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swells@uwhealth.org

LEARNING OBJECTIVES

1) Differentiate expected imaging findings and complications on imaging performed immediately after renal mass ablation. 2) Differentiate expected imaging findings and complications on follow-up imaging. 3) Develop strategies to mitigate procedure-related complications.

VSIO11-10 Usefulness of a Modified RENAL Nephrometry Score in Predicting Renal Function after Cryotherapy for Renal Mass

Sunday, Nov. 25 4:25PM - 4:35PM Room: S405AB

Participants
Yoshiki Asayama, MD, Fukuoka, Japan (*Presenter*) Nothing to Disclose
Akihiro Nishie, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasuhiro Ushijima, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Koichiro Morita, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Seiichiro Takao, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroshi Honda, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Daisuke Kakihara, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Keisuke Ishimatsu, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Kousei Ishigami, MD, Fukuoka City, Japan (*Abstract Co-Author*) Nothing to Disclose
Nobuhiro Fujita, MD,PhD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

We investigated the application of the modified RENAL nephrometry (MRN) score system for predicting post-cryotherapy renal function in T1 renal mass patients.

METHOD AND MATERIALS

A total of 75 patients with a T1 renal mass were enrolled. The MRN score is based on the tumor size (radius, R), the tumor's exophytic/endophytic properties (E), the tumor's nearness to the collecting system (N), the anterior/posterior location of the kidney (A), and the location relative to the polar lines (L). The change in the estimated glomerular filtration rate (ΔeGFR) was calculated as follows: ΔeGFR= 100 ([pretreatment eGFR - eGFR at 6 months after cryotherapy]/pretreatment eGFR). Based on the ΔeGFR results, we classified the patients into two groups: the preserved renal function group (ΔeGFR <10%, n=44) and the impaired group (ΔeGFR >=10%, n=31). We analyzed the relationship between the MRN score and the ΔeGFR and the chronic kidney disease (CKD) stage.

RESULTS

The mean ΔeGFR for all patients was 5.5%. The preserved group's MRN scores (5.8±0.3) were significantly lower than those of the impaired group (7.4±0.3) ($p<0.001$). With the MRN score cutoff value set at 7 points, the following values for predicting impaired status were obtained: 67.7% sensitivity, 72.7% specificity, 61.8% positive predictive value (PPV), 76.1% negative predictive value (NPV), and 70.7% accuracy. Those of predicting a down-stage of CKD status were 92.9% sensitivity, 67.2% specificity, 39.4% PPV, 97.6% NPV, and 72% accuracy.

CONCLUSION

The modified RENAL nephrometry score may be useful in predicting renal function after renal cryotherapy.

CLINICAL RELEVANCE/APPLICATION

(dealing with renal function after cryoablation for renal mass) Our newly proposed modified RENAL nephrometory score may be useful for predicting impairment of renal function (especially in CKD down-stages) with high sensitivity and a high negative predictive value and is recommended as a part of a pretreatment workup.

VSIO11-11 Bone Ablation and Augmentation Outside the Spine

Sunday, Nov. 25 4:35PM - 4:55PM Room: S405AB

Participants
Sean M. Tutton, MD, Milwaukee, WI (*Presenter*) Medical Director, Benvenue Medical, Inc; Consultant, Benvenue Medical, Inc; Researcher, Siemens AG; Consultant, BTG International Ltd

LEARNING OBJECTIVES

1) Better understand the various ablative modalities available including their specific differences and relative benefits and limitations in certain clinical scenarios. 2) Be familiarized with the existing literature supporting ablative therapies.

VSIO11-12 Interventional Oncology Palliative Treatment for Bone Metastases: Technique and Outcomes

Sunday, Nov. 25 4:55PM - 5:15PM Room: S405AB

Participants
Steven Yevich, MD, MPH, Houston, TX (*Presenter*) Scientific Advisory Committee, Siemens AG; Scientific Advisor, Endocare, Inc

VSIO11-13 Advanced Image Optimization Using Metal Artifact Reduction and Dual-Energy Processing to Improve Visualization of Therapeutic Ice Ball Margins During Cryoablation of Musculoskeletal Metastases

Sunday, Nov. 25 5:15PM - 5:25PM Room: S405AB

Participants
Ethan Y. Lin, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Gouthami Chintalapani, Hoffman Estates, IL (*Abstract Co-Author*) Nothing to Disclose
Rahul A. Sheth, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Steven Y. Huang, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Steven Yevich, MD, MPH, Houston, TX (*Presenter*) Scientific Advisory Committee, Siemens AG; Scientific Advisor, Endocare, Inc

For information about this presentation, contact:

SYevich@mdanderson.org

PURPOSE

Evaluate combined metal artifact reduction (MAR) and monoenergetic spectral analysis by dual energy computed tomography (DECT) for assessment of ice ball ablation margins during cryoablation of musculoskeletal (MSK) metastases.

METHOD AND MATERIALS

We retrospectively evaluated image with greatest cryoprobe metallic artifact from CT-guided cryoablation of MSK metastases (Somatom Edge 128 slice, Siemens Healthineers, Germany) in 9 patients (11 lesions, 8:3 bone:soft tissue adjacent to bone) from November 2017 to March 2018. Low and high KV images from DECT acquisition were first reconstructed with iterative MAR, then processed by monoenergetic spectral analysis. MAR+DECT monoenergetic images at 60KeV, 90KeV, and 120KeV were compared to corresponding DECT-only monoenergetic images, MAR-only composite CT images, and composite CT images at 120KV. All images were qualitatively ranked by 3 board-certified radiologists for visualization of ice ball margins and least amount of metal artifact in front of and adjacent to cryoprobe. Quantitative evaluation of contrast to noise ratio (CNR) was measured between ice adjacent to probes and soft tissue or bone at DECT 60, 90, and 120 KeV with and without MAR. Wilcoxon Signed Ranks test was used to compare CNR at the same KeV setting.

RESULTS

The combined MAR+DECT at 120KeV and 90KeV were first and second most preferred for least metal artifact in front of and adjacent to probe respectively, with DECT-only at 120KeV ranked third. For ice ball margin assessment, MAR+DECT at 90KeV and 120KeV and DECT-only at 120KeV were most preferred in order. Overall, both DECT-only at 120KeV and MAR+DECT at 120KeV were most preferred images, followed by MAR-only images. Composite CT image at 120KeV that mimics standard CT acquisition was least preferred image. CNR in soft tissue at 90KeV showed a significant difference between DECT with and without MAR (DECT + MAR 2.6 ± 1.8 vs. DECT 2.0 ± 1.3, $p < 0.05$).

CONCLUSION

Combination of MAR and DECT analysis shows improved visualization for MSK cryoablation compared to standard CT acquisition, MAR-only, or DECT-only images.

CLINICAL RELEVANCE/APPLICATION

Advanced image processing with combination of metal artifact reduction and dual energy CT may provide a real clinical advantage to delineate ice ball margins during MSK cryoablation.

VSIO11-14 Specific Augmentation Choices and Examples for Malignant Bone Lesions

Sunday, Nov. 25 5:25PM - 5:45PM Room: S405AB

Participants
Alexios Kelekis, MD, PhD, Athens, Greece (*Presenter*) Medical Advisory Board, BTG International Ltd; Medical Advisory Board, Merit Medical Systems, Inc; Research Grant, Mindray Medical

For information about this presentation, contact:

akelekis@med.uoa.gr

LEARNING OBJECTIVES

1) Identify the different type of malignant bone lesions associated with Augmentation. 2) Classify the available support systems for Augmentation. 3) Assess and recomend proper lesion management and Augmentation technique.

VSIO11-15 Tumor Board: Techniques and Challenging Cases in Lung, Kidney and Bone

Sunday, Nov. 25 5:45PM - 6:00PM Room: S405AB

RC101

Interstitial Lung Disease: Update 2018

Sunday, Nov. 25 2:00PM - 3:30PM Room: S406A

CH CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
David A. Lynch, MBBCh, Denver, CO (*Moderator*) Research support, Siemens AG; Research Consultant, PAREXEL International Corporation; Research Consultant, Boehringer Ingelheim GmbH; Research Consultant, F. Hoffmann-La Roche Ltd; Research Consultant, Veracyte, Inc;

Sub-Events

RC101A Pulmonary Fibrosis

Participants
David A. Lynch, MBBCh, Denver, CO (*Presenter*) Research support, Siemens AG; Research Consultant, PAREXEL International Corporation; Research Consultant, Boehringer Ingelheim GmbH; Research Consultant, F. Hoffmann-La Roche Ltd; Research Consultant, Veracyte, Inc;

LEARNING OBJECTIVES

1) Understand the radiologic differential diagnosis of fibrotic lung disease. 2) Become familiar with the most recent diagnostic criteria for usual interstitial pneumonia (UIP) on CT. 3) Understand the significance of 'early interstitial abnormality' on CT.

RC101B Hypersensitivity Pneumonitis

Participants
Santiago E. Rossi, MD, Buenos Aires City, Argentina (*Presenter*) Advisory Board, Boehringer Ingelheim GmbH; Speaker, Boehringer Ingelheim GmbH; Royalties, Springer Nature

For information about this presentation, contact:

santirossi@cdrossi.como

LEARNING OBJECTIVES

1) Review the most common imaging findings of hypersensitivity pneumonitis (HP) (case-based). 2) Describe clinical manifestations of HP. 3) Identify proposed classification of HP.

Honored Educators

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RC101C Smoking-Related Interstitial Lung Diseases

Participants
Carolina A. Souza, MD, Ottawa, ON (*Presenter*) Consultant, Pfizer Inc; Consultant, Boehringer Ingelheim GmbH ; Consultant, AstraZeneca PLC; Speaker, Pfizer Inc; Speaker, Boehringer Ingelheim GmbH; Speaker, F. Hoffmann-La Roche Ltd; Speaker, AstraZeneca PLC; Advisory Board, AstraZeneca PLC

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csouza@toh.on.ca

LEARNING OBJECTIVES

1) Describe the spectrum of smoking-related interstitial lung diseases and their clinical manifestations. 2) Recognize the high-resolution CT appearances of smoking-related lung diseases. 3) Identify the most common imaging differential diagnoses of smoking-related interstitial lung diseases.

RC101D Sarcoidosis

Participants
Lacey Washington, MD, Durham, NC (*Presenter*) Consultant, Novartis AG

LEARNING OBJECTIVES

1) Review the classic clinical and imaging manifestations and common complications of thoracic sarcoidosis. 2) Review less well known clinical features and imaging findings.

RC101E Quantification of Interstitial Lung Diseases

Participants
Joseph Jacob, MBBS, MRCP, London, United Kingdom (*Presenter*) Consultant, Boehringer Ingelheim GmbH; Consultant, F. Hoffmann-La Roche Ltd

For information about this presentation, contact:

j.jacob@ucl.ac.uk

LEARNING OBJECTIVES

1) Understand why computer analysis of CT imaging has relevance in interstitial lung diseases. 2) Understand the limitations of visual CT scoring. 3) Understand the various quantitative analytic techniques/tools. 4) Become aware of the latest results achieved by quantitative tools in predicting outcome across the various interstitial lung diseases.

RC102

Radiology Stewardship in the Transition to High-Value Practice: A Primer for Resident and Faculty Education, Engagement, and Effectiveness

Sunday, Nov. 25 2:00PM - 3:30PM Room: S502AB

ED SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Pamela T. Johnson, MD, Baltimore, MD (*Moderator*) Consultant, Oliver Wyman

For information about this presentation, contact:

PamelaJohnson@jhmi.edu

LEARNING OBJECTIVES

1) Education: Understand the principles of healthcare value and how to design a curriculum for radiology trainees; a) Understand what is value and why it is important; b) Understand the 3Cs: cost, charges, and collections; c) Introduction to CMS quality driven reimbursement; d) Introduction to a value-driven outcomes model. 2) Engagement: Learn about how to engage residents and faculty in quality improvement; a) Explain principles of QI initiatives; b) Define value in QI initiatives; c) Detect QI opportunities that improve value; d) Apply QI principles to initiatives. 3) Effectiveness: design & assessment of a successful value-based performance improvement initiative; a) Understand the importance of cross-specialty consensus for appropriate use criteria; b) Recognize the role of cross-specialty education and resources (online modules, lectures, cases conferences, etc.); c) Learn how to create and distribute provider feedback reports and they drive performance; d) Understand how to create and distribute provider feedback reports and they drive performance improvement; e) Learn about the pre- and post-interventional variables to measure (utilization, appropriateness, safety outcomes, cost reductions, charge reductions, etc.)

Sub-Events

RC102A Education: Value Economics Curriculum to Integrate into Healthcare Economics Milestone

Participants
Yoshimi Anzai, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

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yoshimi.anzai@hsc.utah.edu

LEARNING OBJECTIVES

1) To learn difference in changes, collection, and cost. 2) Determine the cost of care from various perspective. 3) To learn how to measure the internal cost of patient care and imaging services.

Active Handout:Yoshimi Anzai

http://abstract.rsna.org/uploads/2018/18001108/2018 high value education rc102a.pdf

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RC102B Engagement: Proposed Resident Quality Improvement Initiatives to Improve Value

Participants
Annemarie Relyea-Chew, JD,MS, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

archew@uw.edu

LEARNING OBJECTIVES

1) Explain principles of QI initiatives. 2) Define value in QI initiatives. 3) Detect QI opportunities that improve value. 4) Apply QI principles to initiatives.

RC102C Effectiveness: Value-based Quality Improvement Plan for Residents, Fellows, and Faculty

Participants
Pamela T. Johnson, MD, Baltimore, MD (*Presenter*) Consultant, Oliver Wyman

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PamelaJohnson@jhmi.edu

LEARNING OBJECTIVES

1) Effectiveness: design & assessment of a successful value-based performance improvement initiative; a) Understand the importance of cross-specialty consensus for appropriate use criteria; b) Recognize the role of cross-specialty education and resources (online modules, lectures, cases conferences, etc.); c) Learn how to create and distribute provider feedback reports and they drive performance; d) Understand how to create and distribute provider feedback reports and they drive performance improvement; e) Learn about the pre- and post-interventional variables to measure (utilization, appropriateness, safety outcomes, cost reductions, charge reductions, etc.)

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RC103

Rapid Fire: 80 Cardiac Cases in 80 Minutes

Sunday, Nov. 25 2:00PM - 3:30PM Room: S406B

CA CH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Suhny Abbara, MD, Dallas, TX (*Moderator*) Royalties, Reed Elsevier; Institutional research agreement, Koninklijke Philips NV; Institutional research agreement, Siemens AG

Sub-Events

RC103A Thoracic Vascular: 20 Cases

Participants
Sachin S. Saboo, MD, FRCR, Dallas, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

saboo_100@yahoo.com

LEARNING OBJECTIVES

1) Describe key imaging features of twenty interesting thoracic vascular cases. 2) Assess significance of these imaging findings with respect to management.

Honored Educators

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RC103B Cardiothoracic Oncology: 20 Cases

Participants
Eric E. Williamson, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

williamson.eric@mayo.edu

LEARNING OBJECTIVES

1) Describe the imaging features seen in the most common benign and malignant cardiac masses.

RC103C Pericardium: 20 Cases

Participants
Seth J. Kligerman, MD, Denver, CO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

skligerman@ucsd.edu

LEARNING OBJECTIVES

1) Review various acute and chronic inflammatory conditions that involve the pericardium on CT and MRI. 2) Show various benign and malignant masses that involve the pericardial on CT and MRI. 3) Discuss differential diagnosis and methods of differentiation.

RC103D Coronary Arteries and Myocardium: 20 Cases

Participants
Jacobo Kirsch, MD, Weston, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kirschj@ccf.org

LEARNING OBJECTIVES

1) To review the imaging manifestations of common and uncommon ischemic and non-ischemic cardiac pathologies.

Honored Educators

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RC104

Opportunistic CT Screening for Osteoporosis, Sarcopenia, and Adiposity

Sunday, Nov. 25 2:00PM - 3:30PM Room: E450B

CT MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Robert D. Boutin, MD, Davis, CA (*Director*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Discuss proposed CT-based definitions of osteoporosis, sarcopenia, and adiposity. 2) Review the potential for clinical impact when using routine CT to screen for osteoporosis, sarcopenia, and adiposity. 3) Highlight practical pearls and pitfalls for diagnostic imagers using opportunistic CT.

ABSTRACT

Non-communicable diseases are now "the world's main killer" [WHO, 2011]. The pandemics of osteoporosis, sarcopenia, and adiposity continue to grow globally as populations age. With more than 100 million CT exams performed annually worldwide, how might CT be used to screen patients efficiently for body composition derangements? This course focuses on the rapidly evolving field of "opportunistic" CT screening for the value-added diagnosis of osteoporosis, sarcopenia, and adiposity, with an emphasis on the clinical consequences of diagnostic imaging, as well as practical pearls and pitfalls.

Sub-Events

RC104A Opportunistic CT: Boom or Bust

Participants
Leon Lenchik, MD, Winston-Salem, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

llenchik@wakehealth.edu

LEARNING OBJECTIVES

1) Define opportunistic CT screening.

RC104B Muscle CT: Value-added Assessment for Sarcopenia

Participants
Robert D. Boutin, MD, Davis, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss clinical and CT-based definitions of sarcopenia. 2) Review the potential clinical impact of screening for sarcopenia at the point of imaging care. 3) Highlight practical pearls and pitfalls for diagnostic imagers using opportunistic CT to screen for sarcopenia.

ABSTRACT

This session will focus on the state-of-art imaging of sarcopenia and provide a clinical context by discussing the epidemiology, pathophysiology, consequences, and future directions in the field of sarcopenia. Our goal is to provide radiologists with the foundation needed to help evaluate patients affected by this clinically relevant and increasingly common diagnosis.

RC104C Bone CT: Opportunities for Osteoporosis

Participants
Robert J. Ward, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

robert.ward@tufts.edu

LEARNING OBJECTIVES

1) To apply currently available CT technologies, both retrospective and prospective, for the identification of patients at risk for osteoporosis in their daily practice.

RC104D Fat CT: From Research to Patient Care

Participants
Miriam A. Bredella, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mbredella@mgh.harvard.edu

LEARNING OBJECTIVES

1) Be familiar with assessment of abdominal and intermuscular fat compartments and fat depots in the head and neck using CT. 2) Understand the effects of different fat compartments on cardiometabolic risk. 3) Be familiar with the bone-fat connection.

RC104E Machine Learning for Body Composition

Participants
Martin Torriani, MD, Lincoln, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mtorriani@mgh.harvard.edu

LEARNING OBJECTIVES

1) Understand basic concepts of artificial intelligence and machine learning. 2) Understand how such techniques can extract body composition data from images. 3) Discuss other applications of machine learning in body composition.

RC104F Osteosarcopenic Obesity: Why Bother

Participants
Leon Lenchik, MD, Winston-Salem, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

llenchik@wakehealth.edu

LEARNING OBJECTIVES

1) Define osteosarcopenic obesity.

RC105

Update on Imaging in Dementia

Sunday, Nov. 25 2:00PM - 3:30PM Room: E451A

MR NR NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Cyrus Raji, MD,PhD, St. Louis, MO (*Moderator*) Consultant, Brainreader ApS
Jody L. Tanabe, MD, Aurora, CO (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

cyrusraji@gmail.com

jody.tanabe@ucdenver.edu

LEARNING OBJECTIVES

1) Enhance radiologist understanding in current clinical applications of structural and functional hippocampal imaging in Alzheimer's disease. 2) Overview MR imaging findings in non-Alzheimer's causes of dementia such as Creutzfeldt-Jakob disease and normal pressure hydrocephalus. 3) Update radiologists about neuronuclear techniques in Alzheimer's disease such as FDG PET and amyloid PET. 4) Overview correlative structural and functional neuroimaging findings in the neuropsychological characterization of dementia with a focus on non-Alzheimer's dementia such as frontal temporal dementia.

Sub-Events

RC105A Advanced Hippocampal Neuroimaging in Alzheimer's Disease

Participants
Michael M. Zeineh, PhD, MD, Stanford, CA (*Presenter*) Research funded, General Electric Company; Consultant, Biogen Idec Inc

LEARNING OBJECTIVES

1) Describe the benefits of advanced forms of imaging (e.g. 7T MRI, DTI, fMRI). 2) Identify major issues around neuroimaging in AD. C) Appraise potential benefits of advanced neuroimaging in AD.

RC105B Non-Alzheimer's Causes of Dementia: Focus on CJD and NPH

Participants
Leo P. Sugrue, MD, PhD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To use clinical history to narrow the dementia differential. 2) To identify imaging findings in CJD. 3) To recognize CJD mimics. 4) To identify imaging findings in NPH. 5) To explain the difference between NPH and communicating hydrocephalus.

RC105C Neuronuclear Imaging in Alzheimer's with FDG and Amyloid PET

Participants
James M. Mountz, MD, PhD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mountzjm@upmc.edu

LEARNING OBJECTIVES

1) To describe the physiologic characteristics of F-18 FDG and Amyloid imaging binding agents as it's related to imaging findings in dementia. 2) To explain the imaging methods and scan findings that are obtained in normal and Alzheimer's disease patients as compared to normal controls. 3) To show imaging characteristics in other dementias that have cognitive symptomatology which are similar to those of patients with Alzheimer's disease.

RC105D The Clinical Classifications, Diagnostic Dilemmas, and the Impetus for Imaging Biomarkers in Dementia

Participants
John L. Ulmer, MD, Milwaukee, WI (*Presenter*) Stockholder, Prism Clinical Imaging, Inc; Medical Advisory Board, General Electric Company

For information about this presentation, contact:

julmer@mcw.edu

LEARNING OBJECTIVES

1) To familiarize with current classification of Alzheimer's Disease and Frontotemporal Lobe Degeneration. 2) Come to know the challenges faced by Neurologist and Neuropsychologist in diagnosing dementias. 3) Understand potential for imaging biomarkers in supporting diagnosis of Alzheimer's Disease and Frontotemporal lobe dementias.

Active Handout:John L. Ulmer

http://abstract.rsna.org/uploads/2018/18002521/Clinical Classifications, Diagnostic Dilemmas RC105D.pdf

RC106

The Cranial Nerves

Sunday, Nov. 25 2:00PM - 3:30PM Room: S402AB

HN NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

For information about this presentation, contact:

shatzkes@hotmail.com

Sub-Events

RC106A Cranial Nerves 1 through 6 Minus 5

Participants
Ilona M. Schmalfuss, MD, Gainesville, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

schmai@radiology.ufl.edu

LEARNING OBJECTIVES

1) Describe the location and course of cranial nerves 1, 2, 3, 4, and 6 and their relation to pertinent adjacent anatomical structures. 2) Analyze CT or MR imaging studies to determine the most likely diagnosis causing the neuropathy.

RC106B The Trigeminal Nerve

Participants
Deborah L. Reede, MD, Brooklyn, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the location of the trigeminal nerve on cross-sectional imaging. 2) Describe clinical and imaging findings of common pathologies that involve the nerve. 3) Recommend imaging protocols based on clinical findings.

RC106C Cranial Nerves 7 and 8

Participants
Phillip R. Chapman, MD, Birmingham, AL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the relevant anatomy of the 7th (Facial) and 8th (Vestibulocochlear) cranial nerves, particularly in the cerebellopontine angle and internal auditory canal. 2) Outline the relatively complex course of the facial nerve through the temporal bone. 3) Briefly describe function of the facial nerve and vestibulocochlear nerves. 4) Present clinical cases that demonstrate the utilization of MRI and CT in pathologic conditions of the 7th and 8th cranial nerves.

RC106D Cranial Nerves 9 through 12

Participants
Ashok Srinivasan, MD, Canton, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ashoks@med.umich.edu

LEARNING OBJECTIVES

1) To review applied anatomy and imaging techniques pertaining to cranial nerves 9 through 12. 2) To discuss imaging features of pathologies involving cranial nerves 9 through 12.

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RC107

Advances in Imaging of Small Incidental Renal Masses (Including Cancers): Implications for Management

Sunday, Nov. 25 2:00PM - 3:30PM Room: E353B

GU OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Matthew S. Davenport, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose
Nicole M. Hindman, MD, New York, NY (*Presenter*) Nothing to Disclose
Matthew S. Davenport, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Nicola Schieda, MD, Ottawa, ON (*Presenter*) Nothing to Disclose
Stuart G. Silverman, MD, Brookline, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

nschieda@toh.on.ca

sgsilverman@partners.org

matdaven@med.umich.edu

nicole.hindman@nyumc.org

LEARNING OBJECTIVES

1) Recommend appropriate management for the incidental renal mass using the latest guidelines. 2) Generate a comprehensive evaluation of indeterminate renal masses using a novel structured report. 3) Predict malignant subtypes of renal cancers (and differentiate from benign masses) using new developments in CT and MRI. 4) Manage small renal masses, including select renal cancers, with active surveillance based on imaging and biopsy.

RC108

Imaging of Musculoskeletal Injuries (Interactive Session)

Sunday, Nov. 25 2:00PM - 3:30PM Room: E451B

ER MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Manickam Kumaravel, MD, FRCR, Houston, TX (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) The learner will be exposed to a wide gamut of common and uncommon presentation of soft tissue and subtle bony injuries of the ankle and hind foot. Injuries will be elucidated with CT and MRI. 2) Understand in depth the normal anatomy of the ankle and hind foot on CT and MRI. 3) Appreciate subtle and catastrophic injury patterns of the ankle and hind foot. 4) Evaluate post-operative imaging. 5) Effectively utilize CT and MRI in management of patients with ankle and hind foot injuries. 6) To understand the anatomy and biomechanics of hip joint. 2) To recognize easily missed injuries. 7) To review common hip injuries. 8) Describe normal elbow anatomy. 9) Identify subtle and catastrophic injury patterns to elbow. 10) Recommend CT or MR when appropriate. 11) Detect imaging abnormalities commonly seen in the hand and wrist in the emergency setting. 12) Identify commonly encountered hand and wrist pathology in the emergency setting. 13) Recommend appropriate follow up for various findings in the hand and wrist in the emergency setting.

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC108A Ankle & Hindfoot

Participants
Manickam Kumaravel, MD, FRCR, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

manickam.kumaravel@uth.tmc.edu

LEARNING OBJECTIVES

1) The learner will be exposed to a wide gamut of common and uncommon presentation of soft tissue and subtle bony injuries of the ankle and hind foot. Injuries will be elucidated with CT and MRI. 2) Understand in depth the normal anatomy of the ankle and hind foot on CT and MRI. 2) Appreciate subtle and catastrophic injury patterns of the ankle and hind foot. 3) Evaluate post-operative imaging. 4) Effectively utilize CT and MRI in management of patients with ankle and hind foot injuries.

RC108B Hip

Participants
Bharti Khurana, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bkhurana@bwh.harvard.edu

LEARNING OBJECTIVES

1) To understand the anatomy and biomechanics of hip joint. 2) To recognize easily missed injuries. 3) To review common hip injuries.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Bharti Khurana, MD - 2014 Honored EducatorBharti Khurana, MD - 2018 Honored Educator

RC108C Elbow

Participants
Claire K. Sandstrom, MD, Seattle, WA (*Presenter*) Royalties, Cambridge University Press; Spouse, Advisory Board, BTG International Ltd;

LEARNING OBJECTIVES

1) Describe normal elbow anatomy. 2) Identify subtle and catastrophic injury patterns to elbow. 3) Recommend CT or MR when

1) Describe normal elbow anatomy. 2) Identify subtle and catastrophic injury patterns to elbow. 3) Recommend CT or MR when appropriate.

RC108D **Wrist & Hand**

Participants
Jonathan A. Flug, MD, MBA, Phoenix, AZ (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

flug.jonathan@mayo.edu

LEARNING OBJECTIVES

1) Detect imaging abnormalities commonly seen in the hand and wrist in the emergency setting. 2) Identify commonly encountered hand and wrist pathology in the emergency setting. 3) Recommend appropriate follow up for various findings in the hand and wrist in the emergency setting.

RC109

Abbreviated/Faster MRI Abdominal Pelvic Protocols

Sunday, Nov. 25 2:00PM - 3:30PM Room: S102CD

GI MR OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Judy Yee, MD, Bronx, NY (*Moderator*) Research Grant, EchoPixel, Inc; Research Grant, Koninklijke Philips NV;

For information about this presentation, contact:

jyee@montefiore.org

Sub-Events

RC109A Hepatocellular Carcinoma Screening

Participants
Claude B. Sirlin, MD, San Diego, CA (*Presenter*) Research Grant, Gilead Sciences, Inc; Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Bayer AG; Research Grant, ACR Innovation; Research Grant, Koninklijke Philips NV; Research Grant, Celgene Corporation; Consultant, General Electric Company; Consultant, Bayer AG; Consultant, Boehringer Ingelheim GmbH; Consultant, AMRA AB; Consultant, Fulcrum Therapeutics; Consultant, IBM Corporation; Consultant, Exact Sciences Corporation; Advisory Board, AMRA AB; Advisory Board, Guerbet SA; Advisory Board, VirtualScopics, Inc; Speakers Bureau, General Electric Company; Author, Medscape, LLC; Author, Resoundant, Inc; Lab service agreement, Gilead Sciences, Inc; Lab service agreement, ICON plc; Lab service agreement, Intercept Pharmaceuticals, Inc; Lab service agreement, Shire plc; Lab service agreement, Enanta; Lab service agreement, Virtualscopics, Inc; Lab service agreement, Alexion Pharmaceuticals, Inc; Lab service agreement, Takeda Pharmaceutical Company Limited; Lab service agreement, sanofi-aventis Group; Lab service agreement, Johnson & Johnson; Lab service agreement, NuSirt Biopharma, Inc ; Contract, Epigenomics; Contract, Arterys Inc

For information about this presentation, contact:

csirlin@ucsd.edu

LEARNING OBJECTIVES

1) Explain the need for HCC screening in adults with cirrhosis. 2) Explain the limitations of ultrasound for HCC screening in adults with cirrhosis, in particular adults with overweight or obesity. 3) Explain one approach for abbreviated MRI for HCC screening as a potential alternative to ultrasound.

RC109B Pancreatic IPMN Evaluation and Follow-up

Participants
Ivan Pedrosa, MD, Dallas, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ivan.pedrosa@utsouthwestern.edu

LEARNING OBJECTIVES

1) Describe the epidemiology of pancreatic cysts and the clinical outcomes in patients with this condition. 2) Explain the basis of a succinct but comprehensive MRI protocol for evaluation and follow up of pancreatic cysts. 3) Describe new MRI technologies that allow for a marked decreased in total exam time.

RC109C MR Enterography

Participants
Michael S. Gee, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

msgee@mgh.harvard.edu

LEARNING OBJECTIVES

1) To comprehend the indications for MR enterography. 2) To apply structured interpretation and reporting of MR enterography studies. 3) To apply new techniques for decreasing MR enterography scan time.

RC109D Rectal Cancer Staging

Participants
Marc J. Gollub, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

gollubm@mskcc.org

LEARNING OBJECTIVES

1) Understand the technical and quality requirements to result in a diagnostic rectal MRI. 2) Develop an approach to interpreting images to cover key staging questions. 3) Arrive at an accurate T-category and N-category using known criteria. 4) Describe CRM, tumor location w/r/t the sphincter apparatus and the peritoneal reflection. 5) Be aware of limitations in baseline staging.

RC110

Second and Third Trimester Obstetrical Ultrasound

Sunday, Nov. 25 2:00PM - 3:30PM Room: N228

GU OB US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

LEARNING OBJECTIVES

1) Understand how measurements can be used in obstetrical ultrasound. 2) Know which measurements should be used routinely in obstetrical ultrasound. 3) Know how to determine gestational age and estimate fetal weight. 4) To diagnose placenta previa. 5) To diagnose vasa previa. 6) To diagnose morbidly adherent placenta. 6) Identify chorionicity and amnionicity in multiple gestations. 7) Detect complications of monochorionic placentation. 8 Identify those cases that need referral for prenatal intervention.

Sub-Events

RC110A OB Measurements

Participants
Peter M. Doubilet, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

pdoubilet@bwh.harvard.edu

LEARNING OBJECTIVES

1) Understand how measurements can be used in obstetrical ultrasound. 2) Know which measurements should be used routinely in obstetrical ultrasound. 3) Know how to determine gestational age and estimate fetal weight.

Active Handout:Peter Michael Doubilet

http://abstract.rsna.org/uploads/2018/18000732/OB measurements RC110A.pdf

RC110B Pregnancy Support Structures: Placenta and Umbilical Cord

Participants
Paula J. Woodward, MD, Salt Lake City, UT (*Presenter*) Editor, Reed Elsevier

For information about this presentation, contact:

paula.woodward@hsc.utah.edu

LEARNING OBJECTIVES

1) To diagnose placenta previa. 2) To diagnose vasa previa. 3) To diagnose morbidly adherent placenta.

ABSTRACT

The placenta and umbilical cord are quite literally the lifeline for the developing fetus. Abnormalities in either can adversely affect the pregnancy and pose a significant risk of morbidity or mortality to either the fetus or mother at the time of delivery.

RC110C Multiple Gestations

Participants
Anne M. Kennedy, MD, Salt Lake City, UT (*Presenter*) Author with royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Identify chorionicity and amnionicity in multiple gestations. 2) Detect complications of monochorionic placentation. 3) Identify those cases that need referral for prenatal intervention.

Active Handout:Anne M. Kennedy

http://abstract.rsna.org/uploads/2018/18000734/RSNA 2018 Twins Refresher Course FINAL RC110C.pdf

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RC111

Update on Radionuclide Therapies

Sunday, Nov. 25 2:00PM - 3:30PM Room: S505AB

IR NM OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Sub-Events

RC111A New Guidelines for I-131 Therapy of Thyroid Cancer

Participants
Don C. Yoo, MD, E Greenwich, RI (*Presenter*) Consultant, Endocyte, Inc

For information about this presentation, contact:

dyoo@lifespan.org

LEARNING OBJECTIVES

1) Describe why thyroid cancer is increasing. 2) Review guidelines for the use of I-131 in the treatment of thyroid cancer. 3) Review the controversies in thyroid cancer treatment.

ABSTRACT

The purpose of this educational activity is to review the reasons why the incidence of thyroid cancer has risen so rapidly over the last 40 years and discuss the role of radioiodine ablation in patients with thyroid cancer. Issues that will be discussed include controversies in the extent of thyroid surgery and the appropriate use of radioiodine ablation in patients with thyroid cancer which is controversial in low risk and intermediate risk patients. The incidence of thyroid cancer in the United States has almost tripled since the early 1970s with unchanged mortality principally due to overdiagnosis. The extent of surgery performed for thyroid cancer is controversial especially in small cancers but only patients with complete thyroidectomy are candidates for radioiodine ablation. Recently lower doses of I-131 have been shown to be effective for radioiodine ablation of remnant thyroid tissue after thyroidectomy. High risk patients will benefit from radioiodine ablation with decreased recurrence and improved mortality. Radioiodine ablation in low risk patients is very controversial and has not been shown to improve mortality.

RC111B Lu177-DOTATATE Therapy for Neuroendocrine Tumors

Participants
Salvador Borges-Neto, MD, Durham, NC (*Presenter*) Grant, General Electric Company

For information about this presentation, contact:

borge001@mc.duke.edu

LEARNING OBJECTIVES

1) Learn the objectives and indications of the Lu-177 DOTATATE treatment. 2) Learn the short term and long term side effects of the Lu-177 treatment. 3) Learn how to set up this treatment modality at one's center.

RC111C Hepatic Artery Infusion Therapy with Y90 Microspheres

Participants
Charles Y. Kim, MD, Durham, NC (*Presenter*) Consultant, Merit Medical Systems, Inc; Consultant, Cook Group Incorporated

LEARNING OBJECTIVES

1) Review range of malignancies treated with Y90 microsphere infusion. 2) Discuss the types of Y90 therapy and dosimetric considerations. 3) Describe the procedures and technical steps involved in Y90 therapy. 4) Recognize pertinent scintigraphic findings associated with Y90 therapy.

ABSTRACT

Intra-arterial Yttrium-90 (Y90) therapy is an important treatment modality for a variety of hepatic tumors. While numerous types of embolotherapies are employed by interventional radiologists for treatment of cancer, Y90 therapy is unique in its multimodality and multi-procedural nature. Not only does this treatment effect rely on deposited ionizing radiation therapy, but scintigraphic imaging is also an integral component of treatment. Two types of Y90 therapies are available, made by two different manufacturers. The differences between the two types are subtle, but there are differences in administration and manufacturer-recommended dosimetric calculation. These various differences will be highlighted. Y90 therapy is comprised of several steps and is frequently subclassified into a 'planning' phase and 'treatment' phase. In the planning phase, detailed angiographic imaging is performed to delineate arterial anatomy , determine tumoral distributions, and redistribute vascular flow if indicated. Scintigraphic imaging is an integral component of this planning phase, in order to help identify angiographically occult arterial anomalies, confirm appropriate infusion site, and to quantify the hepatopulmonary shunt fraction. From this information, as well as other factors, the appropriate treatment doses can be determined. In the treatment phase(s), the Y90 dose is administered to the appropriate portions of the

liver with subsequent scintigraphic imaging for confirmation.

RC112

CTA for TAVR and Other Aortic Valve Replacements

Sunday, Nov. 25 2:00PM - 3:30PM Room: N230B

CA CT VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jonathon A. Leipsic, MD, Vancouver, BC (*Moderator*) Speakers Bureau, General Electric Company; Speakers Bureau, Edwards Lifesciences Corporation; Consultant, Heartflow, Inc; Consultant, Circle Cardiovascular Imaging Inc; Consultant, Edwards Lifesciences Corporation; Consultant, Neovasc Inc; Consultant, Samsung Electronics Co, Ltd; Consultant, Koninklijke Philips NV; Consultant, Arineta Ltd; Consultant, Pi-Cardia Ltd;
Jean Jeudy JR, MD, Baltimore, MD (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

jleipsic@providencehealth.bc.ca

jjeudy@som.umaryland.edu

Sub-Events

RC112A Pre-TAVR CT Imaging Protocols

Participants
Stefan L. Zimmerman, MD, Ellicott City, MD (*Presenter*) Project consultant, Siemens Healthcare; Research grant, American Heart Association;

LEARNING OBJECTIVES

1) To review CT imaging requirements for TAVR planning. 2) To provide an overview of default acquisition protocols to ensure robust CT image quality with various CT systems. 3) To provide tips and tricks of how to image challenging patients with renal failure or atrial fibrillation.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Stefan L. Zimmerman, MD - 2012 Honored EducatorStefan L. Zimmerman, MD - 2015 Honored Educator

RC112B CTA for Sizing Transcatheter Heart Valves

Participants
Jonathon A. Leipsic, MD, Vancouver, BC (*Presenter*) Speakers Bureau, General Electric Company; Speakers Bureau, Edwards Lifesciences Corporation; Consultant, Heartflow, Inc; Consultant, Circle Cardiovascular Imaging Inc; Consultant, Edwards Lifesciences Corporation; Consultant, Neovasc Inc; Consultant, Samsung Electronics Co, Ltd; Consultant, Koninklijke Philips NV; Consultant, Arineta Ltd; Consultant, Pi-Cardia Ltd;

For information about this presentation, contact:

jleipsic@providencehealth.bc.ca

LEARNING OBJECTIVES

1) Discuss the importance of reproducible and accurate annular anatomical definition. 2) Define the meaning of oversizing in device selection and the role that capture and sealing have to optimize clinical outcomes. 3) Discuss the importance of appropriate sizing to optimize clinical outcomes.

Honored Educators

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RC112C Aortic Valve Assessment in the Post-TAVR Patient

Participants
Jean Jeudy JR, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jjeudy@som.umaryland.edu

RC112D CT for the Evaluation of Surgical Bioprostheses

Participants
Dominika Sucha, MD,PhD, Utrecht, Netherlands (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand differences in surgical bioprostheses and learn to appreciate normal CT findings after surgical implantation. 2) To review the underlying pathology in biovalve dysfunction and the role of CT. 3) To learn what the surgeon and cardiologist want to know for clinical decision-making. 4) To discuss latest literature and developments.

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RC113

Pediatric Series: Fetal/Neonatal Imaging

Sunday, Nov. 25 2:00PM - 3:30PM Room: E352

CH GU OB PD

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Amy R. Mehollin-Ray, MD, Pearland, TX (*Moderator*) Nothing to Disclose
Carol E. Barnewolt, MD, Boston, MA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

armeholl@texaschildrens.org

Sub-Events

RC113-01 Imaging of Congenital Lung Malformation

Sunday, Nov. 25 2:00PM - 2:20PM Room: E352

Participants
Amy R. Mehollin-Ray, MD, Pearland, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

armeholl@texaschildrens.org

LEARNING OBJECTIVES

1) Describe the various types of congenital lung malformations and characteristic prenatal imaging findings. 2) Understand the pathophysiology of abnormal lung development and how it impacts lesion appearance and behavior. 3) Discuss the management implications for appropriate prospective designation of lesions based on imaging.

RC113-02 Quantitative Assessment of Posterior Fossa Malformations in Fetal MRI

Sunday, Nov. 25 2:20PM - 2:30PM Room: E352

Participants
Gregor O. Dovjak, MD, Vienna, Austria (*Presenter*) Nothing to Disclose
Mariana G. Diogo, MD, Lisboa, Portugal (*Abstract Co-Author*) Nothing to Disclose
Gerlinde Gruber, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Peter C. Brugger, MD, PhD, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Daniela Prayer, MD, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Gregor Kasprian, MD, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

Gregor.Dovjak@meduniwien.ac.at

PURPOSE

Assessment of posterior fossa malformations with fetal MRI after screening ultrasound is frequently demanded. Recently it has been shown, that fetal vermian lobules can be evaluated in detail by fetal neuroimaging. This fetal MRI study aimed to systematically segment rhombencephalic structures in common posterior fossa anomalies. The aim of the study was to determine which of the quantitative parameters is suitable to distinguish between a favorable and a less favorable outcome group.

METHOD AND MATERIALS

Group 1 (29 cases) included prenatal cases with a favorable outcome (Blake's pouch and Megacisterna magna) with a gestational age (GA) of 26.18±4.72 (mean GA ± standard deviation). Group 2 (33 cases, GA of 23.38±5.29) included the classical Dandy Walker malformation and other cystic posterior fossa malformations, known to be associated with a less favorable neurocognitive outcome. The number of vermian lobules, the brainstem-vermian angle, vermian and brainstem area (in mm^2) and the vermis-brainstem ratio were assessed using an optimal T2-weighted median sagittal slice (resolution ranging from .57/.57/3.3 to 1.17/1.17/4.4). The parameters were compared with two-sided t-tests between the two groups.

RESULTS

All evaluated parameters were significantly different between the two groups. The number of lobules was 5.69±0.95 (mean ± standard deviation) in group 1 vs 3.91±1.31 in group 2 ($p<0.001$). The brainstem-vermian angle also differed significantly with 7.93±10.86 vs 72.24±27.52 ($p<0.001$). The vermian size was 118.68±66.83 vs 54.41±34.41 ($p<0.001$). The brainstem size was 174.97±69.24 vs 121.65±51.62 ($p=0.002$). The vermis-brainstem ratio was 64.24±16.47 vs 42.22±11.96 ($p<0.001$).

CONCLUSION

Brainstem and vermian biometry provide objective and quantitative measures, which significantly differ between favorable and non-

Brainstem and vermian biometry provide objective and quantitative measures, which significantly differ between favorable and non-favorable neurodevelopmental outcome groups. Assessment of vermian lobulation (number and morphology) allows further characterization of cystic posterior fossa malformations, given optimal fetal MR imaging conditions.

CLINICAL RELEVANCE/APPLICATION

Due to the functional importance of the brainstem and the cerebellar vermis, fetal MR based biometry is a promising tool in the prognostic assessment of hindbrain malformations.

RC113-03 Fetal Cardiac MRI in the Evaluation of Double and Right Aortic Arch

Sunday, Nov. 25 2:30PM - 2:40PM Room: E352

Participants
Su-Zhen Dong, MD,PhD, Shanghai, China (*Presenter*) Nothing to Disclose
Ming Zhu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Right aortic arch (RAA) refers to a congenital abnormal position of the aortic arch to the right of the trachea. The aim of this study was to evaluate the feasibility of fetal cardiac magnetic resonance (CMR) in the assessment of fetal double and right aortic arch.

METHOD AND MATERIALS

This retrospective review included 148 pregnant women (21-32 weeks gestation mean 24 weeks) referred to a children's hospital for a fetal cardiac MRI from June 2005 to December 2017 due to the finding of a cardiovascular anomaly by fetal echocardiogram (echo) performed by a cardiologist or due to a technically limited echo. CMR was performed using 1.5T or 3.0 T unit. Sequences included steady-state free-precession (SSFP); non gated SSFP cine, single-shot turbo spin echo (SSTSE) and non-gated phase contrast (PC) cine sequences. Sequences included transverse fetal thorax, and four-chamber, short-axis, coronal and oblique sagittal planes of the fetal heart when possible. The radiologists were not blinded to the echo findings. Echo and CMR findings were compared with postnatal imaging and/or surgery.

RESULTS

Anomalies identified by CMR included double aortic arch (DAA) (n=36), right aortic arch (RAA) with aberrant left subclavian artery (LSCA) (n=52), RAA with mirror image branching (n=48), RAA with right ductus arteriosus (RDA) (n=6, 4 with other cardiovascular defects), RAA with mirror image branching with retroesophageal ductus (n=6). 93.8% (45/48) RAA with mirror image branching had additional congenital intracardiac anomalies better seen by fetal echo. The remaining were not associated with additional congenital heart defect. 75.7% (112/148) arch anomalies were correctly diagnosed by fetal echo, while Fetal CMR was correct in 87.8% (130/148). 18 arch anomalies were missed by fetal echo but identified by MRI and confirmed postnatally, echos were technically limited in 6 cases due to maternal obesity, oligohydramnios, fetal position, twins. The cases echo missed/misdignosed included DAA (n=7), RAA with aberrant LSCA (n=4), RAA with mirror image branching (n=1), RAA with RDA (n=3), RAA with mirror image branching with retroesophageal ductus (n=3).

CONCLUSION

Fetal cardiac MRI can provide additional diagnostic information for fetal DAA and RAA and can be a useful adjunct.

CLINICAL RELEVANCE/APPLICATION

Fetal cardiac MRI can provide accurate diagnostic information for fetal DAA and RAA and is recommended as an adjunct to fetal echocardiography.

RC113-04 MR Imaging of Retroplacental Clear Space during the Course of Gestation in Pregnant Mice

Sunday, Nov. 25 2:40PM - 2:50PM Room: E352

Participants
Andrew A. Badachhape, PhD, Houston, TX (*Presenter*) Nothing to Disclose
Ketan B. Ghaghada, PhD, Houston, TX (*Abstract Co-Author*) Research Consultant, Alzeca Biosciences, LLC
Igor Stupin, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Mayank Srivastava, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Laxman Devkota, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Verghese George, MBBS, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Eric Tanifum, PhD, Houston, TX (*Abstract Co-Author*) Consultant, Alzeca Bioscoences, LLC
Ananth Annapragada, PhD, Houston, TX (*Abstract Co-Author*) Stockholder, Alzeca Biosciences, LLC Stockholder, Sensulin, LLC Stockholder, Abbott Laboratories Stockholder, Johnson & Johnson

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PURPOSE

Visualization of the retroplacental clear space is critical for the diagnosis of invasive placentation. In this pre-clinical study, we evaluated MR imaging of the retroplacental clear space during the course of gestation in a mouse model using a liposomal-Gd contrast agent that has been shown to not penetrate the placental barrier.

METHOD AND MATERIALS

In vivo studies were performed in pregnant C57BL/6 mice (8-10 week age at start of pregnancy). MR imaging was performed on a 1T permanent magnet scanner. Imaging was performed at five time points during the second half of gestation (e10.5, e12.5, e14.5, e16.5, and e18.5 days). At each time point, pre-contrast and post-contrast images were acquired using a T1-weighted (T1w) 3D

gradient-recalled echo (GRE) sequence. Post-contrast images were acquired following intravenous administration of high T1 relaxivity liposomal-Gd (0.1 mmol Gd/kg). Images were reviewed by a radiologist and scored for the visualization of the retroplacental clear space. Contrast-to-noise ratio (CNR) were determined to quantify the visualization of the retroplacental clear space in T1w images.

RESULTS

Contrast-enhanced T1w images enabled the visualization of both the placenta and retroplacental clear space. The shape of the placenta at the earliest time point (e10.5) was indicative of the development phase; however, during the later imaging time points, the placenta transformed into the typical round to oval disk shape. Although the retroplacental clear space was visible at all time points, radiologist review for feature conspicuity indicated partial visibility at the first imaging time point (e10.5) and improved visibility during the mid to later stages of gestation. The CNR, determined from the analysis of retroplacental space and adjacent placenta, varied between 12±3 at e10.5 to 24±6 at e18.5.

CONCLUSION

Contrast-enhanced MR imaging using a liposomal-Gd contrast agent enabled clear visualization of the retroplacental space in a pregnant mouse model starting as early as e12.5 day of gestation.

CLINICAL RELEVANCE/APPLICATION

Visualization of the retroplacental clear space at the early stages of pregnancy using a liposomal-Gd blood-pool contrast agent may enable early detection of invasive placentation.

RC113-05 Personalized Management of Fetuses with Congenital Diaphragmatic Hernia with the Help of Fetal MRI

Sunday, Nov. 25 2:50PM - 3:00PM Room: E352

Participants
Florian Prayer, MD, Vienna, Austria (*Presenter*) Nothing to Disclose
Dieter Bettelheim, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Michael Weber, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Gerlinde Gruber, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Georg Langs, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Gregor Kasprian, MD, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Daniela Prayer, MD, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Peter C. Brugger, MD, PhD, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Fetal MRI-based diaphragmatic segmentation in fetuses with congenital diaphragmatic hernia (CDH) has the potential to provide information regarding diaphragmatic defect typology and extent as well as three dimensional visualization of the diaphragmatic defect to the pediatric surgeon even during intrauterine life. This retrospective pilot study aims to determine the feasibility of fetal MRI-based manual diaphragmatic segmentation.

METHOD AND MATERIALS

22 CDH cases (gestational week 21 to 38) who had fetal MRI and diaphragmatic repair surgery performed were retrospectively identified. Manual segmentation of the fetal diaphragm and the diaphragmatic defect was performed based on routine T2-weighted TSE sequences using ITK-Snap. Surface area measurements of the diaphragm and the diaphragmatic defect were utilized to calculate diaphragmatic defect to thoracic aperture ratios. Three dimensional visualization of the fetal diaphragm was used to assign CDH typology according to Kardon et al. (Dis Model Tech 2017). Results were compared to data from surgery reports. CDH typology, diaphragmatic defect to thoracic aperture ratios, and use of patch for diaphragmatic repair were analyzed using descriptive statistics.

RESULTS

Fetal MRI-based diaphragmatic segmentation was feasible in 90.91% (20/22) of CDH cases. In two cases excessive fetal movement did not allow segmentation. CDH typology based on three dimensional visualization of the fetal diaphragm was in accordance with information extracted from surgery reports. All CDH cases with a diaphragmatic defect to thoracic aperture ratio of more than 0.4 received diaphragmatic patch repair.

CONCLUSION

Routine fetal MRI-based diaphragmatic segmentation is possible in a majority of cases. Surface area measurements of the fetal diaphragm and the diaphragmatic defect may allow prediction of optimal diaphragmatic repair technique. In conclusion, this new method has the potential to provide personalized management of CDH cases.

CLINICAL RELEVANCE/APPLICATION

The proposed new method can be applied on routine fetal MRI data and can provide CDH typology, extent of diaphragmatic defect, diaphragmatic defect to thoracic aperture ratio, and three dimensional visualizations to the managing team already at a stage of fetal development. Fetal MRI-based personalization of management in CDH cases is indispensable in a time of intensive research regarding tissue engineering-based therapy of CDH.

RC113-06 Fast Temperature Mapping of the Fetal Brain During Routine 3T Fetal MR Imaging

Sunday, Nov. 25 3:00PM - 3:10PM Room: E352

Participants
Jason G. Parker, PhD, Indianapolis, IN (*Presenter*) Nothing to Disclose
Emily E. Diller, MS, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose
Chang Y. Ho, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose
Rupa Radhakrishnan, MD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Brandon P. Brown, MD, MA, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To develop and evaluate a rapid technique capable of quantifying the effects of RF-heating on the fetal brain during normal clinical MR scanning.

METHOD AND MATERIALS

Patients Sixteen (16) pregnant female patients underwent clinical fetal MRI at 3T. Normal scan sequences included T1, T2, DWI, and T2* sequences, and had a total scan time less than 60 mins. Scanning sequence To monitor potential heating of the fetus during MRI, temperature maps were acquired at the beginning (scan 1), mid-point (scan 2), and end of each fetal MRI (scan 3) session using a custom phase-based thermometry sequence. The thermometry sequence was designed to exploit the temperature dependence of the proton resonance frequency using a gradient-echo echo-planar imaging (GRE-EPI) technique with TR/TE: 150/8.3ms, 256x256 matrix, 5mm slice thickness, and 1mm gap. TE was chosen to maximize the SNR of brain tissue. The total acquisition time of the MR thermometry sequence was 4.3 seconds and required no special procedures to be performed by the technologist. All imaging was performed with an abdominal phased-array surface coil. Image Processing Phase unwrapping was performed for each acquisition using a magnitude-sorted list, multi-clustering phase unwrapping algorithm, and temperature maps were then created from the phase difference images. The mean, maximum, and standard deviation of a single whole brain ROI was calculated from the temperature maps for each patient. Analysis 2-way one-sample t-tests were used to investigate significant temperature changes in the ROIs at scan 2 and scan 3 compared to scan 1. A 2-way paired t-test was used to evaluate the absolute change in temperature between scan 2 and scan 3.

RESULTS

At 3T magnetic field strengths, the maximum temperature in the brain increased significantly from scan 1 to scan 2 by an average of 0.42 ± .24 °C (p=4.5*10-6) and from scan 1 to scan 3 by an average of 0.48 ± .30 °C (p=1.16*10-5). A significant difference between scan 2 and scan 3 was not found (p=.084).

CONCLUSION

We have demonstrated the clinical application of a fast, MR-based temperature mapping method to monitor RF-heating of the fetal brain during routine clinical imaging.

CLINICAL RELEVANCE/APPLICATION

RF-heating of the fetus during fetal MRI carries a theoretical risk of harm to the developing fetal brain, and this technique allows a practical method to monitor heating effects in vivo.

RC113-07 Perinatal Imaging of the Airway

Sunday, Nov. 25 3:10PM - 3:30PM Room: E352

Participants
Carol E. Barnewolt, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To define the nature of basic congenital airway abnormalities. 2) To identify general malformation categories that may require special attention at the time of delivery. 3) To help the attendee develop a perinatal imaging strategy, with the goal of optimizing the chances of prompt airway access, in settings where challenges may be expected.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC114

Interventional Course (Interactive Session)

Sunday, Nov. 25 2:00PM - 3:30PM Room: S403A

IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Steven M. Zangan, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Rakesh C. Navuluri, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Kush R. Desai, MD, Chicago, IL (*Presenter*) Speakers Bureau, Cook Group Incorporated; Consultant, Cook Group Incorporated; Consultant, The Spectranetics Corporation; Consultant, AngioDynamics, Inc; Consultant, Boston Scientific Corporation

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LEARNING OBJECTIVES

1) Recognize vascular and non-vascular conditions and their image-guided treatment in the chest, abdomen and pelvis.

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

RC115

Screening for Breast Cancer

Sunday, Nov. 25 2:00PM - 3:30PM Room: E353C

BR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jennifer A. Harvey, MD, Charlottesville, VA (*Moderator*) Stockholder, Hologic, Inc; Research Grant, Volpara Health Technologies Limited; Stockholder, Volpara Health Technologies Limited;

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Sub-Events

RC115A Screening Data: Where Are We?

Participants
Debra L. Monticciolo, MD, Temple, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review key data for breast cancer screening from randomized controlled trials and observational studies. 2) To understand the risks and benefits of mammography screening for the woman of average risk. 3) To understand the differences between various screening recommendations.

RC115B Risk Models

Participants
Jennifer A. Harvey, MD, Charlottesville, VA (*Presenter*) Stockholder, Hologic, Inc; Research Grant, Volpara Health Technologies Limited; Stockholder, Volpara Health Technologies Limited;

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LEARNING OBJECTIVES

1) Cite pros and cons of different risk models in use. 2) Describe how risk models can be used in practice. 3) List which patients at risk may not be identified using risk models.

RC115C Personalized Screening Paradigms

Participants
Wendie A. Berg, MD, PhD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Distinguish and define average risk, intermediate risk, and high-risk populations. 2) Understand existing recommendations for supplemental screening beyond mammography and/or screening at an earlier age. 3) Discuss potential strategies for elective supplemental screening and expected outcomes.

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104th Scientific Assembly and Annual Meeting
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RC116

Experiencing Radiology: Patients' Perspectives (Sponsored by RSNA Public Information Committee)

Sunday, Nov. 25 2:00PM - 3:30PM Room: E350

PR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Mary C. Mahoney, MD, Cincinnati, OH (*Moderator*) Nothing to Disclose
Jennifer L. Kemp, MD, Denver, CO (*Presenter*) Advisory Board, Koninklijke Philips NV
James V. Rawson, MD, Boston, MA (*Presenter*) Nothing to Disclose
Brian Godish, Elgin, IL (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To understand the mission and goals of RSNA's *Radiology Cares: The Art of Patient-centered Practice* and ACR's *Imaging 3.0* campaigns. 2) To assess your radiology practice model and realign it to focus on value over volume. 3) To learn tactics to put the concepts of patient-centeredness and value vs. volume into practice. 4) To understand your patients' perspectives as they navigate through the healthcare continuum, especially as it relates to radiology.

ABSTRACT

In many healthcare facilities and institutions, the culture and actual practice of radiology have marginalized the patient. Today the call to practice patient-centered care is one of the primary drivers of change within the radiology community. The benefits include improvded patient care, improved communication between radiologists and their patients and referring physicians, and greater awareness of the essential role that radiologists play in patients' overall healthcare. The RSNA's *Radiology Cares* and ACR's *Imaging 3.0* campaigns were launched to provide tools to move the radiology profession to focus on patient-centeredness and to help transform the way radiology is practiced. This course, presented in the style of a TED Talk, will offer insights into the radiology patient mindset and describe tools to bring the concept of patient-centeredness into practice.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ James V. Rawson, MD - 2017 Honored Educator

RC117

Emerging Technology: Contrast Enhanced Ultrasound - Update 2018

Sunday, Nov. 25 2:00PM - 3:30PM Room: S504CD

GI US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
David T. Fetzer, MD, Dallas, TX (*Moderator*) Researcher, Koninklijke Philips NV; Consultant, Koninklijke Philips NV ; Consultant, Siemens AG; Speakers Bureau, Koninklijke Philips NV; ;

For information about this presentation, contact:

david.fetzer@utsouthwestern.edu

LEARNING OBJECTIVES

1) Briefly introduce contrast-enhanced ultrasound (CEUS) imaging techniques, and the pharmacology of these unique agents. 2) Discuss how to start a contrast-enhanced ultrasound service in your practice. 3) Highlight how CEUS has been adopted by the ACR LI-RADS as a technique for the definitive diagnosis of HCC. 4) Explore how CEUS can enhance ultrasound-guided procedures, and may be used to monitor tumors following ablation. 5) Consider the major emerging possibilities of microbubble-directed molecular imaging and targeted therapies.

ABSTRACT

Contrast-enhanced ultrasound (CEUS) has been recognized world-wide as a robust tool that can be applied in a variety of clinical situations, particularly given its high safety profile. With the recent FDA approval of one agent for use in liver imaging in adults, and hepatic and urological imaging in pediatrics, there has been increased acceptance and use of these techniques throughout the country. However, CEUS is not limited to the liver-the use of ultrasound contrast in a range of pathologies and situations is also possible and with a variety of agents, off-label. This session will cover the opportunities and challenges in CEUS, including a brief introduction into these unique contrast agents and the imaging techniques utilized; how to start a CEUS serviceline in your practice; how CEUS has been adopted by LI-RADS in the definitive diagnosis on HCC; how contrast may be used as a problem-solving tool and in ultrasound-guided procedures; and finally where CEUS techniques and agents may be headed in the future.

Sub-Events

RC117A CEUS: A Brief Overview

Participants
David T. Fetzer, MD, Dallas, TX (*Presenter*) Researcher, Koninklijke Philips NV; Consultant, Koninklijke Philips NV ; Consultant, Siemens AG; Speakers Bureau, Koninklijke Philips NV; ;

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LEARNING OBJECTIVES

1) Briefly introduce ultrasound microbubble agent formulation and pharmacology. 2) Discuss the unique imaging techniques required for contrast-enhanced ultrasound (CEUS). 3) Highlight ultrasound contrast agent safety profile and contraindications.

RC117B CEUS: Starting a Practice from Scratch

Participants
Shuchi K. Rodgers, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) List the steps to start a contrast enhanced ultrasound service from scratch. 2) Describe the implementation process at a large academic center. 3) Explain CEUS tips and lessons learned from a beginner.

RC117C CEUS: Liver Imaging and LI-RADS

Participants
Yuko Kono, MD, PhD, San Diego, CA (*Presenter*) Equipment support, Canon Medical Systems Corporation; Equipment support, General Electric Company; Contrast agent support, Lantheus Medical Imaging, Inc; Contrast agent support, Bracco Group

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LEARNING OBJECTIVES

1) Understand CEUS LI-RADS will standardize technique, data collection interpretation and reporting of CEUS exams on patients at risk for HCC. 2) Describe differences of CEUS from CT/MRI. 3) Lean how to apply new CEUS LIRADS v2017 algorithm with interactive case examples.

RC117D CEUS: Monitoring Response to Ablative Therapies

Participants
Stephanie R. Wilson, MD, Calgary, AB (*Presenter*) Equipment support, Koninklijke Philips NV; Equipment support, Siemens AG; Equipment support, Samsung Electronics Co, Ltd; Research support, Koninklijke Philips NV; Research support, Lantheus Medical Imaging, Inc; Speaker, Samsung Electronics Co, Ltd

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LEARNING OBJECTIVES

1) Recognize CEUS features of residual/recurrent tumor following ablative therapies. 2) Perform CEUS examinations directed at showing tumor enhancement within or AP-related to the treatment sites. 3) Identify the strengths of CEUS for these evaluations related to contrast agent sensitivity and real time dynamic scanning.

RC117E CEUS: Molecular Imaging and Targeted Therapies

Participants
Andrej Lyshchik, MD, PhD, Philadelphia, PA (*Presenter*) Research support, Bracco Group; Advisory Board, Bracco Group; Research support, General Electric Company; Research support, Siemens AG; Research support, Canon Medical Systems Corporation; Speaker, SonoScape Co, Ltd

LEARNING OBJECTIVES

1) Discuss pre-clinical and translational applications of molecular ultrasound using targeted microbubble contrast agents.

RC118

Tumor Imaging Metrics: Is it Time to Invest in a Service?

Sunday, Nov. 25 2:00PM - 3:30PM Room: S504AB

BQ OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Michelle S. Ginsberg, MD, New York, NY (*Moderator*) Nothing to Disclose

Sub-Events

RC118A Current Response Assessment Tools in Clinical Trials

Participants
Les R. Folio, MPH,DO, Bethesda, MD (*Presenter*) Institutional research agreement, Carestream Health, Inc

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LEARNING OBJECTIVES

1) Comprehend objective tumor assessment criteria, such as RECIST 1.1, in a variety of clinical trials. 2) Exploit existing and evolving PACS along with other available image processing tools to improve tumor assessment consistency and workflow efficiency. 3) Optimize radiology report value with more consistent tumor quantification.

ABSTRACT

Cancer patients enrolled in clinical trials require objective imaging criteria (e.g. RECIST 1.1) rarely included (in the US) in routine radiologists' clinical reports. With oncologists' need for consistent target lesion selection and measurements many cancer centers have tumor assessment core labs consisting of various radiology personnel dedicated to image processing for consistent tumor measurements, organ/lesion segmentation for volumetric quantification, display (3D) and/or density/texture analysis. There are a variety of approaches and challenges to successfully support oncologists' needs for consistent quantification. This presentation addresses the balance between measurements made in PACS that are included in radiology reports and those that are used in objective tumor assessments by core labs supporting oncologists. By comprehending the tumor assessment requirements and process, radiology reports can be more valuable to oncologists when target lesion selection and measurements are concordant with oncologists' records used to assess therapeutic response. Consistent application of existing and evolving tools, such as line, two-diameter and volumetric segmentations, can improve report value and radiology services to include tumor imaging core labs. Understanding tumor assessment terminology (e.g. response categories, such as 'Stable Disease' or 'Partial Response') can also enhance report value while minimizing the need to addend reports. A familiar example involves using words in the impression such as 'disease progression' or 'stable disease' where radiologists are usually not aware of pertinent information. For example, may not know the previously established target lesions, the criteria used, baseline date or nadir. Without this information, progressive or stable disease often cannot be concluded. Between radiologists and oncologists, communication beyond the standard radiology report can further improve with use of PACS tools such as key images and bookmark tables to label target lesions while also establishing a workflow with more consistent and concordant measurements. Improved efficiency can result from minimizing duplication in disparate systems where data does not automatically transfer (e.g. from PACS to RIS to EMR to cancer database).

RC118B Developing Robust Imaging Biomarkers for Use in Drug Development

Participants
Nina Tunariu, MD, Sutton, United Kingdom (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To be able to understand and differentiate different types of imaging biomarkers. 2) Achieve an understanding of the use and value of imaging-based biomarkers in the various phases of clinical drug development. 3) Have a better understanding of the barriers and opportunities for using robust quantitative imaging biomarkers in oncological drug development.

RC118C Should Every Radiology Department Invest in a Quantitative Imaging Lab?

Participants
Gordon J. Harris, PhD, Boston, MA (*Presenter*) Medical Advisory Board, Fovia, Inc; Member, IQ Medical Imaging LLC; Member, Precision Imaging Metrics, LLC; ;

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LEARNING OBJECTIVES

1) Assess the pros and cons of establishing a Quantitative Imaging Lab for clinical trials image assessments. 2) Explain to Radiology Department leadership the benefits of establishing a Quantitative Imaging Lab. 3) Specify the requirements and evaluate options for implementing a Quantitative Imaging Lab.

ABSTRACT

Managing oncology clinical trials imaging assessments can be very challenging, especially with the increasing complexity of protocols and modifications to tumor response criteria. Maintaining protocol compliance and keeping up with criteria changes can be difficult. Furthermore, all trial data must be assessed accurately and be available for data locks, monitoring visits, and audits. These challenges can be addressed through a Quantitative Imaging Lab that provides quality reviews, adequate training, and consistent tumor metrics data. This presentation will discuss our experience in developing such a service, the Tumor Imaging Metrics Core (TIMC) as a shared resource of the Dana-Farber/Harvard Cancer Center, as well as our informatics and image assessment platform that we developed to manage this complex workflow, Precision Imaging Metrics. The TIMC uses this web-based platform to manage over 1,000 active clinical trials and performs over 15,000 time point image assessments per year. In addition, seven NCI-designated Cancer Centers around the US have implemented the Precision Imaging Metrics platform to manage their clinical trials image assessments. In this presentation, we will discuss the pros and cons for a radiology department to implement a Quantitative Imaging Lab for managing clinical trials image assessments.

RC120

Near Misses and Errors in Diagnostic Radiology and Radiation Oncology: What to Do Next?

Sunday, Nov. 25 2:00PM - 3:30PM Room: S404AB

RO SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Abhishek A. Solanki, MD, Maywood, IL (*Moderator*) Consultant, Blue Earth Diagnostics Ltd Advisory Board, Blue Earth Diagnostics Ltd

Sub-Events

RC120A Radiation Incidents in Diagnostic Radiology: What is the Role of the Physicist?

Participants
Christopher H. Cagnon, PhD, Los Angeles, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify areas of risk or potential staff and patient harm that may involve the diagnostic physicist. 2) Review emerging arenas of potential responsibility for the diagnostic physicist including regulatory and accreditation requirements, patient consults, and institutional priorities. 3) Discuss strategies for navigating gaps between responsibility and control from the physicist perspective. 4) Review practices and preventative measures that can control and mitigate potential problems and risk. 5) Actions that can/should be taken by the physicist in the event of emergencies or accidents.

RC120B Radiation Incidents in Radiation Oncology: What Does the Physicist Do Next?

Participants
Eric Ford, PhD, Seattle, WA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Understand the basics of investigating a near-miss or incident event including root-cause analysis. 2) Appreciate how incident learning data can inform the QA procedures of physicists. 3) Learn the new recommendations related to the physics review of plans and charts.

ABSTRACT

Near-miss and incident events in healthcare provide an opportunity for learning and improving care. Here I focus on practical aspects of this process as it relates to the medical physicist in radiation oncology. I will briefly review the basics structure of incident learning and how and incident investigation is conducted using root cause analysis. Data and experience from incident learning can inform the QA procedures that physicists perform and, in particular, the review of plans and charts be a physicist prior to treatment. I will review the new recommendations are emerging around this practice which are informed by incident reports from national and international systems.

RC120C Radiation Incidents in Diagnostic Radiology: What Does the Diagnostic Radiologist Do Next?

Participants
Kimberly E. Applegate, MD, MS, Lexington, KY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

keapple@uky.edu

LEARNING OBJECTIVES

1) To examine diagnostic radiology settings to ensure radiation incidents do not occur. 2) To develop a plan of action for post radiation incident evaluation. 3) To reflect on processes such as quality control, assurance, and PQI training, with a short list of resources.

RC120D Radiation Incidents in Radiation Oncology: What Does the Radiation Oncologist Do Next?

Participants
Naomi R. Schechter, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe strategies for responding to variety of potential near misses and errors in radiation oncology department 2) Describe strategies for learning from near misses and errors in radiation oncology department for purposes of quality improvement and prevention of future errors.

ABSTRACT

In a radiation oncology department, incidents can range from minor to severe. We take them all seriously. Due to our many checks and balances, it is unusual for an error to reach the patient. In the rare case that an error does reach the patient, most can be corrected for, with minimal if any harm to the patient. Our goal is to learn from every incident, review our processes and continually improve the delivery of radiation therapy to prevent futureerrors from occurring.

Active Handout:Naomi Rachel Schechter

http://abstract.rsna.org/uploads/2018/18001717/RSNA 2018 Radiation Incidents RC120D.pdf

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC121

Advances in CT: Technologies, Applications, Operations-Quantitative CT (QIBA)

Sunday, Nov. 25 2:00PM - 3:30PM Room: E351

BQ CT PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc
Lifeng Yu, PhD, Chicago, IL (*Coordinator*) Nothing to Disclose

ABSTRACT

CT has become a leading medical imaging modality, thanks to its superb spatial and temporal resolution to depict anatomical details. New advances have enabled extending the technology to depict physiological information. This has enabled a wide and expanding range of clinical applications. These advances are highlighted in this multi-session course. The course offers a comprehensive and topical depiction of these advances with material covering CT system innovations, CT operation, CT performance characterization, functional and quantitative applications, and CT systems devised for specific anatomical applications. The sessions include advances in CT system hardware and software, CT performance optimization, CT practice management and monitoring, spectral CT techniques, quantitative CT techniques, functional CT methods, and special CT use in breast, musculoskeletal, and interventional applications.

Sub-Events

RC121A Volumetry

Participants
Michael F. McNitt-Gray, PhD, Los Angeles, CA (*Presenter*) Institutional research agreement, Siemens AG; ; ; ; ;

LEARNING OBJECTIVES

1) Understand the role of lesion volumetry in CT, especially in the setting of oncologic imaging. 2) Understand the basic methods in lesion volumetry. 3) Understand the factors that influence the measurement of lesion volume in CT.

RC121B Material Identification

Participants
Daniele Marin, MD, Durham, NC (*Presenter*) Research support, Siemens AG

LEARNING OBJECTIVES

1) Review different dual-energy CT imaging techniques for material identification. 2) Provide an overview of clinically available applications of material identification using dual-energy CT. 3) Identify factors that can affect the reproducibility of quantitative measurements of material composition using dual-energy CT.

RC121C Texture Characterization

Participants
Samuel G. Armato III, PhD, Chicago, IL (*Presenter*) Consultant, Aduro Biotech, Inc; Consultant, Boehringer Ingelheim GmbH
Maryellen L. Giger, PhD, Chicago, IL (*Presenter*) Stockholder, Hologic, Inc; Shareholder, Quantitative Insights, Inc; Shareholder, QView Medical, Inc; Co-founder, Quantitative Insights, Inc; Royalties, Hologic, Inc; Royalties, General Electric Company; Royalties, MEDIAN Technologies; Royalties, Riverain Technologies, LLC; Royalties, Mitsubishi Corporation; Royalties, Canon Medical Systems Corporation

For information about this presentation, contact:

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s-armato@uchicago.edu

LEARNING OBJECTIVES

1) Understand the concept of texture-based image characterization. 2) Identify radiologic tasks in CT that could benefit from image texture analysis. 3) Describe the limitations of these techniques.

RC122

Anatomical MR Imaging for Radiotherapy Planning and Guidance

Sunday, Nov. 25 2:00PM - 3:30PM Room: S103AB

MR PH RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Kristy K. Brock, PhD, Houston, TX (*Moderator*) License agreement, RaySearch Laboratories AB

Sub-Events

RC122A State of the Art in Anatomical MR Imaging

Participants
Aradhana M. Venkatesan, MD, Houston, TX (*Presenter*) Research Grant, Canon Medical Systems Corporation;

RC122B Clinical Need for Anatomical MR Imaging in Radiation Therapy

Participants
Cynthia Menard, MD, Montreal, QC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the various roles of MRI in radiotherapy practice. 2) Identify pitfalls in integrating MRI in radiotherapy planning. 3) Describe anatomical sites where the integration of MRI is established as standard-care.

RC122C Technical Challenges in the Integration of Anatomical MR Imaging into Radiotherapy

Participants
Carri Glide-Hurst, PHD, Detroit, MI (*Presenter*) Researcher, ViewRay, Inc; Research Consultant, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Modus Medical Devices Inc; Equipment support, Medspira, LLC; Equipment support, QFix

LEARNING OBJECTIVES

1) To understand the unique imaging challenges and benefits for incorporating MRI into radiation therapy treatment planning. 2) To describe the magnetic resonance simulation (MR-SIM) process to yield images that are more robust for radiation therapy planning. 3) To describe emerging technologies in MR-only treatment planning and MR-guided radiation therapy and opportunities for collaboration between imaging and radiation therapy colleagues.

RC123

ACR Accreditation Updates I

Sunday, Nov. 25 2:00PM - 3:30PM Room: N226

PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
James M. Kofler JR, PhD, Jacksonville, FL (*Coordinator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn new and updated information for the ACR CT imaging accreditation program. 2) Become familiar with the requirements for the ACR MRI accreditation program. 3) Learn updated information on the ACR Nuclear Mediciant and PET accreditation program.

Sub-Events

RC123A ACR CT Accreditation Update

Participants
Jessica Clements, MS, Monrovia, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jessicaclements@gmail.com

LEARNING OBJECTIVES

1) To understand the requirements of the ACR CT accreditation program, including updates to the QC manual and accreditation process.

Active Handout:Jessica Clements

http://abstract.rsna.org/uploads/2018/18001926/2018 Nov 25 RSNA ACR CT Update RC123A.pdf

RC123B ACR MRI Accreditation Update

Participants
Donna M. Reeve, MS, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Provide an overview of the current ACR MRI and Breast MRI Accreditation Program requirements. 2) Present recent changes to the MRI programs and updates to guidance documents. 3) Discuss how to prepare for a site visit.

Active Handout:Donna M. Reeve

http://abstract.rsna.org/uploads/2018/18001927/RSNA 2018 ACR MRI Update Reeve Handout RC123B.pdf

RC123C ACR Nuclear Medicine and PET Accreditation Update

Participants
Beth A. Harkness, MS, Detroit, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the requirements of the Nuclear Medicine and PET ACR accreditation programs. 2) Describe physics testing and QC requirements. 3) List common pitfalls in the accreditation process.

ABSTRACT

The ACR Nuclear Medicine (NM) and PET Accreditation program is a means of demonstrating that the department is performing quality imaging studies. The program itself evolves to address the current state of nuclear and PET imaging and comments from users. This presentation will review the current status of the physics requirements for this process.

Active Handout:Beth A. Harkness

http://abstract.rsna.org/uploads/2018/18001928/Update on Nuclear Medicine Accreditation 2018 RSNA RC123C.pdf

RC124

The Best of RADIOLOGY in 2018: The Editors of RADIOLOGY Keep You Up to Date

Sunday, Nov. 25 2:00PM - 3:30PM Room: E353A

BR CA CH NR RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Sub-Events

RC124A Review of 2018: New Research That Should Impact Your Practice

Participants
David A. Bluemke, MD,PhD, Bethesda, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dbluemke@rsna.org

LEARNING OBJECTIVES

1) Identify key publications over the past year that may affect your clinical practice. 2) Evaluate new research developments in the field of radiological imaging. 3) Describe new developments in radiology that may affect the management of your patients.

ABSTRACT

RADIOLOGY is the leading journal for publications leading to new, important and translatable discoveries in imaging research. In the past year, there continue to be basic developments in radiology, as well as new guidelines and clinical trials in imaging that affect your practice. Overall trends for new scientific studies reflect an increasing number of clinical trials being submitted from around the world in addition to those of North America. Publications from Europe have been prominent in recent years, but new research programs from countries such as Japan, South Korea and China are developing quickly. Large numbers of study subjects in clinical trials are now common, and tends to result in more robust demonstration of the efficacy of imaging interventions. Artificial intelligence applications are becoming commonplace in our publications, as are radiomics studies with increasing large numbers of study subjects. This seminar will highlight the results of key publications in the past year that are most likely to affect your practice in the near future, as well as presenting novel topics that are likely to be important to the field over the next 5 years.

RC124B Innovations in Cardiothoracic Imaging in 2018

Participants
Albert De Roos, MD, Leiden, Netherlands (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

a.de_roos@lumc.nl

LEARNING OBJECTIVES

1) Key publications in cardiothoracic imaging 2018 will be highlighted.

ABSTRACT

Cardiothoracic manuscripts are frequently introducing new technology, acquisition techniques and clinical evaluation. Major advances in cardiothoracic imaging over the last year published in Radiology will be discussed for their innovation and potential impact.

RC124C Research and Innovations in Breast Imaging in 2018

Participants
Linda Moy, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

linda.moy@nyumc.org

LEARNING OBJECTIVES

1) To highlight key publications on breast imaging over the past year. 2) To discuss the implications of these publications for patient care

RC124D New Developments in Neuroimaging in 2018

Participants
Birgit B. Ertl-Wagner, MD, Toronto, ON (*Presenter*) Spouse, Stockholder, Siemens AG; ;

For information about this presentation, contact:

BirgitBetina.Ertl-Wagner@sickkids.ca

LEARNING OBJECTIVES

1) Identify key publications over the past year that may affect your clinical practice. 2) Evaluate new research developments in the field of radiological imaging. 3) Describe new developments in radiology that may affect the management of your patients.

RC125

Medical Physics 3.0: Re-envisioning Medical Physics in the Era of Value-based and Precision Healthcare

Sunday, Nov. 25 2:00PM - 3:30PM Room: S103CD

PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Todd Pawlicki, PhD, La Jolla, CA (*Presenter*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

LEARNING OBJECTIVES

1) Understand the broad trajectory of advances in the contribution of medical physics to human health. 2) Understand the attributes of excellent in clinical physics. 3) Outline processes to position physicists to have the competence and the confidence to fulfill their unique calling as scientific agents of precision and innovation in healthcare.

RC127

Radiologist Peer-Review and Peer Learning-Options, Best Practices, and Future Directions

Sunday, Nov. 25 2:00PM - 3:30PM Room: S403B

HP PR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

Jay K. Pahade, MD, New Haven, CT (*Moderator*) Consultant, General Electric Company
David B. Larson, MD, MBA, Stanford, CA (*Presenter*) Grant, Siemens AG ; Grant, Koninklijke Philips NV
Danny C. Kim, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To provide a brief review on radiologist peer review history, practices and discuss implementation of a department wide peer review conference. 2) To review methods of peer review and peer learning through IT improvements, institutional consensus criteria development, and creation of Rad-Path modules. 3) To discuss new methods addressing peer review with an emphasize on peer learning principles and quality improvement. 4) To allow open discussion with audience members on the pro's and con's of current peer review practices and changes to expect in the future.

Honored Educators

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RC129

MR Imaging of the Female Pelvis for Planning Fertility Preservation Therapy and the Appearance of the Pelvis Post Therapy (Interactive Session)

Sunday, Nov. 25 2:00PM - 3:30PM Room: S404CD

GU MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Hero K. Hussain, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the spectrum of benign uterine and adnexal pathology. 2) Describe the fertility sparing procedures that can be performed for such conditions. 3) Explain the role of MRI in planning for these procedures. 4) To become familiar with most current various treatment options for gynecologic malignancies as well as expected imaging appearance of post treatment female pelvis. 5) To understand the expected and some unexpected imaging appearances as well as common pitfalls. 6) Appreciate low risk imaging features of adnexal masses, supporting potential management with surveillance, cystectomy, or oophorectomy rather than complete surgical staging. 7) Recognize imaging features of non myoinvasive endometrial cancer, for both diagnosis and surveillance if managed conservatively. 8) Understand imaging guidelines supporting surgical choice of trachelectomy in cervical cancer. 9) To become familiar with most current various treatment options for gynecologic malignancies as well as expected imaging appearance of post treatment female pelvis. 10) To understand the expected and some unexpected imaging appearances as well as common pitfalls.

Sub-Events

RC129A MR Imaging for Planning Fertility Preservation Therapy in Benign Gynecologic Diseases

Participants
Jessica B. Robbins, MD, Madison, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the spectrum of benign uterine and adnexal pathology. 2) Describe the fertility sparing procedures that can be performed for such conditions. 3) Explain the role of MRI in planning for these procedures.

Active Handout:Jessica B. Robbins

http://abstract.rsna.org/uploads/2018/18001116/RSNA 2018 benign pelvis RC129A.pdf

RC129B MR Imaging of the Pelvis Post Therapy of Benign Gynecologic Conditions

Participants
Susan M. Ascher, MD, Washington, DC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To become familiar with most current various treatment options for gynecologic malignancies as well as expected imaging appearance of post treatment female pelvis. 2) To understand the expected and some unexpected imaging appearances as well as common pitfalls.

RC129C MR Imaging for Planning Fertility Preservation Therapy in Gynecologic Malignancies

Participants
Katherine E. Maturen, MD, Ann Arbor, MI (*Presenter*) Royalties, Reed Elsevier; Royalties, Wolters Kluwer nv; Consultant, Allena Pharmaceuticals, Inc;

For information about this presentation, contact:

kmaturen@umich.edu

LEARNING OBJECTIVES

1) Appreciate low risk imaging features of adnexal masses, supporting potential management with surveillance, cystectomy, or oophorectomy rather than complete surgical staging. 2) Recognize imaging features of non myoinvasive endometrial cancer, for both diagnosis and surveillance if managed conservatively. 3) Understand imaging guidelines supporting surgical choice of trachelectomy in cervical cancer.

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RC129D MR Imaging of the Pelvis Post Therapy of Gynecologic Malignancies

Participants
Liina Poder, MD, Mill Valley, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

liina.poder@ucsf.edu

LEARNING OBJECTIVES

1) To become familiar with most current various treatment options for gynecologic malignancies as well as expected imaging appearance of post treatment female pelvis. 2) To understand the expected and some unexpected imaging appearances as well as common pitfalls.

RC131

CTA from Head to Toe

Sunday, Nov. 25 2:00PM - 3:30PM Room: S503AB

CA CT HN VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Christopher Lee, MD, Los Angeles, CA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

christopher.lee.1@med.usc.edu

LEARNING OBJECTIVES

1) Describe techniques for CTA of the neck, upper and lower extremities. 2) Distinguish common artifacts on CTA of these anatomic regions. 3) Evaluate protocol/scanner modifications for optimal CTA imaging. 4) Formulate a CTA protocol to optimally image acute aortic syndrome. 5) Distinguish the imaging appearances and pitfalls of acute aortic syndrome. 6) Summarize the important measurements that help guide therapy. 7) Describe pre-procedural patient preparation including appropriate patient selection, contraindications, and beta-blockade. 8) Evaluate peri-procedural issues including vasodilation, continued heart rate control, and breathholding. 9) Evaluate Image acquisition including radiation dose reduction techniques and technique choice. 10) Describe postprocedural complications including contrast reactions and their management.

Sub-Events

RC131A Head and Neck CTA

Participants
Alexander Lerner, MD, Los Angeles, CA (*Presenter*) Research Grant, Koninklijke Philips NV; Research Grant, Bracco Group

LEARNING OBJECTIVES

1) Describe techniques for CTA of the neck, upper and lower extremities. 2) Distinguish common artifacts on CTA of these anatomic regions. 3) Evaluate protocol/scanner modifications for optimal CTA imaging.

RC131B Aortic CTA

Participants
Christopher Lee, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

christopher.lee.1@med.usc.edu

LEARNING OBJECTIVES

1) Formulate a CTA protocol to optimally image acute aortic syndrome. 2) Distinguish the imaging appearances and pitfalls of acute aortic syndrome. 3) Summarize the important measurements that help guide therapy.

ABSTRACT

Acute aortic syndrome (AAS) represents the triad of aortic dissection, intramural hematoma, and penetrating atherosclerotic ulcer. Imaging with CTA is essential for the accurate diagnosis of AAS. CTA protocols should optimally image the aorta while minimizing radiation exposure and intravenous contrast administration. Newer CT technology can reduce radiation dose and contrast delivery while preserving image quality. Minimally invasive treatment of acute aortic syndrome with thoracic endovascular aortic repair (TEVAR) has become increasingly popular.

RC131C Cardiac CTA

Participants
Cameron Hassani, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ch602nyc@gmail.com

LEARNING OBJECTIVES

1) Describe pre-procedural patient preparation including appropriate patient selection, contraindications, and beta-blockade. 2) Evaluate peri-procedural issues including vasodilation, continued heart rate control, and breathholding. 3) Evaluate Image acquisition including radiation dose reduction techniques and technique choice. 4) Describe postprocedural complications including contrast reactions and their management.

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RC132

Qualities of a Successful Leader

Sunday, Nov. 25 2:00PM - 3:30PM Room: N227B

LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
James A. Brink, MD, Boston, MA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

yoshimi.anzai@hsc.utah.edu

LEARNING OBJECTIVES

1) Develop an understanding of the essential traits and skills required for a leader to be successful, i.e. traits and states. 2) Develop an understanding of the common errors made by leaders in academic and private practices enabling the attendee to obtain the 'learnings' without the 'lumps. 3) Acquire the skills of succession planning needed to ensure that the success of your organization is sustainable over time and leadership transitions. (This course is part of the Leadership Track)

Sub-Events

RC132A Life Lessons for Successful Leadership

Participants
James A. Brink, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the importance of emotional intelligence in for successful leadership. 2) To explore the relationship between communication style and the effectiveness of leadership. 3) To consider techniques that elevate the level of respect and trust in an organization.

RC132B Key Concepts for Successful Leadership

Participants
Jonathan S. Lewin, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title. (This course is part of the Leadership Track)

Honored Educators

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RC132C Leadership: Understanding the Organizational Culture

Participants
N. Reed Dunnick, MD, Ann Arbor, MI (*Presenter*) Royalties, Wolters Kluwer nv; Editor, Reed Elsevier

LEARNING OBJECTIVES

1) Recognize historical examples of leaders, in addition to how you can recognize and emulate their favorable characteristics that draw you to their leadership attributes. 2) Understand an overview of leadership references, where and how to access the same, how the related body of knowledge has evolved, and current perspectives concerning leaders and leadership. (This course is part of the Leadership Track)

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RC150

MR Imaging-guided Breast Biopsy (Hands-on)

Sunday, Nov. 25 2:00PM - 3:30PM Room: E260

BR MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Manisha Bahl, MD,MPH, Boston, MA (*Presenter*) Nothing to Disclose
Rosalind P. Candelaria, MD, Houston, TX (*Presenter*) Nothing to Disclose
Sarah M. Friedewald, MD, Chicago, IL (*Presenter*) Consultant, Hologic, Inc; Research Grant, Hologic, Inc;
Brian Johnston, MD, Gilbert, AZ (*Presenter*) Nothing to Disclose
Jennifer R. Kohr, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Lizza Lebron, MD, West Harrison, NY (*Presenter*) Nothing to Disclose
Diana L. Lam, MD, Seattle, WA (*Presenter*) Grant, General Electric Company
Santo Maimone IV, MD, Jacksonville, FL (*Presenter*) Research Consultant, GRAIL Inc
Cecilia L. Mercado, MD, New York, NY (*Presenter*) Nothing to Disclose
Bethany L. Niell, MD,PhD, Tampa, FL (*Presenter*) Nothing to Disclose
Jessica H. Porembka, MD, Dallas, TX (*Presenter*) Nothing to Disclose
Elissa R. Price, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Jean M. Seely, MD, Ottawa, ON (*Presenter*) Nothing to Disclose
Toma Omofoye, MD , Houston, TX (*Presenter*) Nothing to Disclose
Gaiane M. Rauch, MD, PhD, Houston, TX (*Presenter*) Nothing to Disclose
Roberta M. Strigel, MD, Madison, WI (*Presenter*) Research support, General Electric Company
Jocelyn A. Rapelyea, MD, Washington, DC (*Presenter*) Speakers Bureau, General Electric Company; Consultant, Transmed7;
Ryan W. Woods, MD, MPH, Madison, WI (*Presenter*) Nothing to Disclose
Beatriu Reig, MD, New York, NY (*Presenter*) Nothing to Disclose
Erin I. Neuschler, MD, Chicago, IL (*Presenter*) Research Grant, Seno Medical Instruments, Inc; Speaker, Northwest Imaging Forums, Inc; ; ;

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sarah.friedewald@nm.org

LEARNING OBJECTIVES

1) Explain why MR-guided breast biopsy is needed for patient care. 2) Identify relative and absolute contraindications to MR-guided breast biopsy. 3) Describe criteria for MR-guided breast biopsy patient selection. 4) Debate risks and benefits of pre-biopsy targeted ultrasound for suspicious MRI findings. 5) Understand the basic MR-guided biopsy procedure, protocol and requirements for appropriate coil, needle and approach selection. 6) Manage patients before, during and after MR-guided breast biopsy. 7) Define the benefits and limitations of MR-guided vacuum assisted breast biopsy. 8) Apply positioning and other techniques to challenging combinations of lesion location and patient anatomy for successful MR-guided biopsy.

ABSTRACT

This course is intended to provide basic didactic instruction and hands-on experience for MR-guided breast biopsy. Because of the established role of breast MRI in the evaluation of breast cancer through screening and staging, there is a proven need for MR-guided biopsy of the abnormalities that can only be identified at MRI. This course will be devoted to the understanding and identification of: 1) appropriate patient selection 2) optimal positioning for biopsy 3) target selection and confirmation 4) various biopsy technologies and techniques 5) potential problems and pitfalls and 6) radiology/pathology concordance. Participants will spend 30 minutes in didactic instruction followed by 60 minutes practicing MR-guided biopsy using provided phantoms. Various combinations of full size state-of-the-art breast MRI coils, biopsy localization equipment and needles from multiple different vendors will be available for hands-on practice. Some stations will have monitors loaded with targeting software. Expert breast imagers from around the world will be at each of 10 stations to provide live coaching, tips, techniques and advice.

Active Handout:Roberta Marie Strigel

http://abstract.rsna.org/uploads/2018/4426451/Strigel-RSNA-MRIBx-2018-Handout RC150.pdf

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RC152

Nerve Ultrasound Based on a Regional Approach: Hip to Knee (Hands-on)

Sunday, Nov. 25 2:00PM - 3:30PM Room: E264

MK NR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jon A. Jacobson, MD, Ann Arbor, MI (*Presenter*) Research Consultant, BioClinica, Inc; Advisory Board, General Electric Company; Advisory Board, Koninklijke Philips NV; Royalties, Reed Elsevier
Kenneth S. Lee, MD, Madison, WI (*Presenter*) Grant, General Electric Company Research support, SuperSonic Imagine Research support, Johnson & Johnson Consultant, Echometrix, LLC Royalties, Reed Elsevier
J. Antonio Bouffard, MD, Detroit, MI (*Presenter*) Nothing to Disclose
Marnix T. van Holsbeeck, MD, Detroit, MI (*Presenter*) Minor stockholder, Koninklijke Philips NV; Minor stockholder, General Electric Company; Stockholder, MedEd3D; Grant, Siemens AG; Grant, General Electric Company;
Joseph H. Introcaso, MD, Neenah, WI (*Presenter*) Nothing to Disclose
Viviane Khoury, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Marina Kislyakova, MD, Moscow, Russia (*Presenter*) Nothing to Disclose
Ximena L. Wortsman, MD, Santiago, Chile (*Presenter*) Nothing to Disclose
Federico Zaottini, Genova, Italy (*Presenter*) Nothing to Disclose
Ghiyath Habra, MD, Troy, MI (*Presenter*) Nothing to Disclose
Lodewijk J. van Holsbeeck, MD, Lansing, MI (*Presenter*) Nothing to Disclose
Carlo Martinoli, MD, Genova, Italy (*Presenter*) Nothing to Disclose
Etienne Cardinal, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Humberto G. Rosas, MD, Madison, WI (*Presenter*) Nothing to Disclose
David P. Fessell, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Girish Gandikota, MBBS , Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

viviane.khoury@uphs.upenn.edu

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carlo.martinoli@unige.it

mkisliakova@yandex.ru

klee2@uwhealth.org

LEARNING OBJECTIVES

1) Familiarize course participants with the ultrasound appearance of nerves and the scanning techniques used to image them about the hip and knee. 2) Emphasize the ultrasound anatomy of the femoral, sciatic and peroneal nerves and their divisional branches at their common sites of entrapment. 3) Learn the technique to image some minor nerves in their course throughout the proximal lower extremity, such as the lateral and posterior femoral cutaneous, the obturator, the saphenous and the sural. 4) Outline the range of clinical conditions where ultrasound is appropriate as the primary imaging modality for nerve assessment.

ABSTRACT

In recent years, ultrasound of the musculoskeletal and peripheral nervous systems is becoming an increasingly imaging tool with an expanding evidence base to support its use. However, the operator dependent nature and level of technical expertise required to perform an adequate ultrasound assessment means that appropriate training is required. For this purpose, the present course will demonstrate the basic principles of musculoskeletal ultrasound with a special focus on nerves of the proximal lower extremity (hip to knee). The standardized techniques of performing an adequate ultrasound study of the femoral, lateral and posterior femoral cutaneous, obturator, peroneal, saphenous, sciatic, sural nerves and their divisional branches will be illustrated. The hands-on workshops will provide the opportunity to interactively discuss the role of ultrasound in this field with expert instructors. Participants will be encouraged to directly scan model patients. A careful ultrasound approach with thorough understanding of soft-tissue planes and extensive familiarity with anatomy are prerequisites for obtaining reliable information regarding the affected structure and the site and nature of the disease process affecting it.

Active Handout:Carlo Martinoli

http://abstract.rsna.org/uploads/2018/4404504/Handouts Nerves Ultrasound Based RC152.pdf

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RC153

Deep Learning in Radiology: How Do We Do It?

Sunday, Nov. 25 2:00PM - 3:30PM Room: E450A

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Luciano M. Prevedello, MD, MPH, Dublin, OH (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn what Deep Learning is and how it may be applied to Radiology. 2) Understand the challenges and benefits of creating a laboratory dedicated to machine learning in Radiology. 3) Be exposed to several applied examples of Deep Learning in Radiology at different institutions.

Sub-Events

RC153A Ohio State University Experience

Participants
Luciano M. Prevedello, MD, MPH, Dublin, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the existing infrastructure to handle pixel and non pixel data at our institution for translational research in machine learning. 2) Learn some applications of Deep Learning in Radiology through examples.

RC153B Stanford University Experience

Participants
Curtis P. Langlotz, MD,PhD, Menlo Park, CA (*Presenter*) Advisory Board, Nuance Communications, Inc; Shareholder, whiterabbit.ai; Advisory Board, whiterabbit.ai; Shareholder, Nines.ai; Consultant, Nines.ai; Shareholder, TowerView Health; Research Grant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, Alphabet Inc;

LEARNING OBJECTIVES

1) Consider the types of clinical problems that are best suited to machine learning solutions. 2) Understand how 'deep' neural networks work, and the technology and people needed for a successful program. 3) Learn about the type of work performed by an artificial intelligence laboratory focused on medical imaging and computer vision. 4) Analyze the key technologies needed to create large annotated training data sets.

RC153C Mayo Clinic Rochester Experience

Participants
Bradley J. Erickson, MD, PhD, Rochester, MN (*Presenter*) Stockholder, OneMedNet Corporation; Stockholder, VoiceIt Technologies, LLC; Stockholder, FlowSigma;

For information about this presentation, contact:

bje@mayo.edu

LEARNING OBJECTIVES

1) Describe Mayo experience with deep learning radiomics technology.

RC154

Leveraging IT to Optimize Quality in Radiology

Sunday, Nov. 25 2:00PM - 3:30PM Room: N229

IN SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Paul J. Chang, MD, Chicago, IL (*Moderator*) Co-founder, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Bayer AG; Advisory Board, Bayer AG; Advisory Board, Aidoc Ltd; Advisory Board, EnvoyAI; Advisory Board, Inference Analytics

Sub-Events

RC154A IHE and Beyond: Improving Radiology Quality through IT Interoperability

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (*Presenter*) Royalties, Osler Institute

For information about this presentation, contact:

tessa.cook@uphs.upenn.edu

LEARNING OBJECTIVES

1) Discuss the importance of interoperability of health IT systems within and beyond radiology. 2) Discuss how IHE efforts can promote this interoperability. 3) Describe other interoperability efforts to improve communication of health IT systems.

RC154B Business Intelligence and Analytics: Dashboards, Scorecards, and Beyond

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Bayer AG; Advisory Board, Bayer AG; Advisory Board, Aidoc Ltd; Advisory Board, EnvoyAI; Advisory Board, Inference Analytics

LEARNING OBJECTIVES

1) The technical steps required to develop and implement dashboards and scorecards (including data/state aggregation, semantic normalization, modeling, data mining, and presentation) will be discussed. 2) Specific strategies and technologies that can be used to create dashboards and scorecards (including HL7, DICOM, ETL, web services, and SOA) will be illustrated. 3) Strategies to create a sustainable and agile architecture to support advanced business intelligence and analytics (BIA) tools will be explored.

ABSTRACT

Current and near future requirements and constraints will require radiology practices to continuously improve and demonstrate the value they add to the enterprise. Merely "managing the practice" will not be sufficient; groups will be required to compete in an environment where the goal will be measurable improvements in efficiency, productivity, quality, and safety. Although the phrase "one cannot improve a process unless one can measure it" is a familiar platitude, it is an increasingly important and relevant concept. The proper leveraging of formal Business Intelligence and Analytics (BIA) is a critical, absolutely essential strategy for any radiology group. Although currently underutilized, concepts such as Key Performance Indicators (KPIs), tactical dashboards, and strategic scorecards, should be familiar tools for radiology groups attempting to "navigate disruption."

RC154C Leveraging IT to Optimize Quality in Radiology

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Bayer AG; Advisory Board, Bayer AG; Advisory Board, Aidoc Ltd; Advisory Board, EnvoyAI; Advisory Board, Inference Analytics

LEARNING OBJECTIVES

1) Discuss how modern radiology quality expectations require a greater degree of "meaningful innovation" in imaging IT and informatics. 2) Introduced to examples of next generation IT tools and models that can help achieve both improved efficiency and quality. 3) Describe how and why radiology must redefine and re-engineer itself in order to fully take advantage of these next generation electronic based practice tools. The impact these changes in practice management can have on quality, workflow efficiency, and productivity will be discussed.

ABSTRACT

Radiology practices have benefited from the adoption of electronic-based information technology, especially with respect to practice efficiency. However, there is great opportunity to further leverage information technology to significantly improve quality within the radiology practice. However, electronic tools, such as PACs, RIS, and speech recognition (along with their associated workflow), are still relatively immature and arguably support only "commodity-level" capability. There is a critical need for a new generation of "meaningful innovation" in radiology IT that will allow radiology to maximize value to patients and other stakeholders by significantly improving both efficiency and quality. Radiologists must be "value innovators" who maximally leverage information technology to ensure their relevance and value to patient care through measureable improvements in quality, efficiency, and safety.

RCA12

Technologies for Creating Educational Content and Teaching Files (Hands-on)

Sunday, Nov. 25 2:00PM - 3:30PM Room: S401AB

ED IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: .50

Participants
Harprit S. Bedi, MD, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

RCA12A Podcasting and Screencasting for Teaching

Participants
Mahesh M. Thapa, MD, Seattle, WA (*Presenter*) Nothing to Disclose

RCA12B ePublishing

Participants
Michael L. Richardson, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be familiar with pros and cons of ePublishing in general. 2) Be aware of several free ePublishing programs and where to find them. 3) Be aware of the ramifications of digital rights management and book pricing. 4) Know how to convert an eBook into a physical paper book as needed.

Honored Educators

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RCA12C Incorporating the iPad in Resident Education: Using Mobile Technology to Improve the Way We Teach

Participants
Harprit S. Bedi, MD, Boston, MA (*Presenter*) Nothing to Disclose

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RCB12

RSNA Diagnosis Live Interactive and Mobile Device Integrated Audience Response: Tips, Tricks, and How to Get Started (Hands-on)

Sunday, Nov. 25 2:00PM - 3:30PM Room: S401CD

ED IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Christopher G. Roth, MD,MS, Philadelphia, PA (*Moderator*) Nothing to Disclose
Christopher G. Roth, MD,MS, Philadelphia, PA (*Presenter*) Nothing to Disclose
Sandeep P. Deshmukh, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

christopher.roth@jefferson.edu

LEARNING OBJECTIVES

1) Appreciate the higher receptiveness of interactive content by adult learners compared with traditional didactic techniques. 2) Understand the basic operational features of the Diagnosis Live audience participation authoring tool, including the types of questions offered and how to embed them into PowerPoint presentations. 3) Learn how to manage the Diagnosis Live administrator portal and launch and run interactive games and review analytics regarding student performance.

RCC12

Core Cybersecurity for Imaging Departments and Imagers: Threats, Vulnerabilities and Best Practices Part 1

Sunday, Nov. 25 2:00PM - 3:30PM Room: S501ABC

IN PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Christopher J. Roth, MD, Raleigh, NC (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the changing environment of network and internet connected devices and software. 2) Be aware of the motivations and tactics of current threat actors. 3) Understand common security issues found in medical devices. 4) Know simple actions that can decrease risk. 5) Understand the vulnerabilities of imaging system modalities to security and privacy breaches. 6) Determine ways to protect and secure imaging systems from internal and external threats. 7) Describe institutional best-practices to maintain protection yet provide necessary accessibility for imaging modalities.

ABSTRACT

All imaging department devices are potential sites of risk for cybersecurity attack. Such attacks have compromised enterprise data security, modality function, patient health data, and ongoing patient care. This session will describe common insider and outsider threats, and highest yield steps for mitigation at small and large imaging sites.

Sub-Events

RCC12A Sounding the Alarm in Healthcare Cybersecurity: Escalating Threats to Patient Health

Participants
James Whitfill, MD, Scottsdale, AZ (*Presenter*) President, Lumetis LLC

LEARNING OBJECTIVES

1) Understand the changing environment of network and internet connected devices and software. 2) Be aware of the motivations and tatics of current threat actors. 3) Understand common security issues found in medical devices. 4) Know simple actions that can decrease risk. 5) Understand the steps to implement a medical device security program.

ABSTRACT

Medical devices are increasingly becoming dependent on technology and network connectivity, at a time that the electronic environment is becoming more dangerous. Because of this medical devices and systems can become easy targets for attackers attempting to access PHI, disrupt patient care or even harm a patient. When tested, these devices have been shown to have multiple vulnerabilities. These vulnerabilities range from hardcoded passwords, publically available service passwords and no encryption of patient data. Because of this institutions using these devices need to work with their vendors to improve the security of medical devices and take actions themselves to help protect their environment and patients. There are simple steps to decrease your risk and ways, even with limited resources and skills, to start to evaluate medical devices at your institution.

RCC12B The Bare Minimum Cybersecurity Hygiene for Radiologists

Participants
Christopher J. Roth, MD, Raleigh, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Appreciate the anatomy of a typical healthcare advanced persistent threat cyberattack. 2) Learn the underpinnings and impact of typical protections including anti-malware, multi-factor authentication, personal device managers, firewalls, encryption, password managers, URL and attachment screeners, popup blockers, physical data protections, and identity theft protection. 3) Understand high yield procurement, contingency planning, auditing, training, and hiring next steps. 4) Realize that health care entities will never be completely private or secure, and there is a balance of functionality, efficiency, and care process that must be understood against privacy and security protections.

RCC12C Knowing if Your Imaging Systems are Secure and Keeping Them That Way

Participants
J. Anthony Seibert, PhD, Sacramento, CA (*Presenter*) Advisory Board, Bayer AG

For information about this presentation, contact:

jaseibert@ucdavis.edu

LEARNING OBJECTIVES

1) Appreciate the evolving landscape of cyberthreats to healthcare and Radiology. 2) Understand the different targeting strategies used by cyber attackers. 3) Realize imaging system security weaknesses and everyone's responsibilities to keep systems safe.

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RCA13

3D/VR/AR Imaging: Staying on the Cutting Edge of Brain Anatomy/Pathology (Hands-on)

Sunday, Nov. 25 4:00PM - 5:30PM Room: S401AB

IN NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Komal B. Shah, MD, Houston, TX (*Presenter*) Nothing to Disclose
Maria Gule-Monroe, MD, Houston, TX (*Presenter*) Nothing to Disclose
Melissa M. Chen, MD, Houston, TX (*Presenter*) Nothing to Disclose
Jill V. Hunter, MD, Houston, TX (*Presenter*) Author with royalties, Wolters Kluwer nv
Halyna Pokhylevych, MD, Lviv, Ukraine (*Presenter*) Nothing to Disclose
Donald F. Schomer, MD, Fountain Hills, AZ (*Presenter*) Stockholder, Vertos Medical, Inc Stockholder, Sinopsys Surgical, Inc
Vinodh A. Kumar, MD, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

halia1309@gmail.com

ABSTRACT

Brain Atlas/VR/AR imaging: Staying on the Cutting Edge of Brain Anatomy/Pathology This hands-on workshop will demonstrate an advanced brain atlas which fuses with a patient's MR brain imaging. Attendees will be able to navigate a patient's brain with 3D googles using Virtual Reality (VR) technology. Augmented Reality (AR) technology will also be presented. The atlas presented has extensive data related to brain anatomy, vasculature and function. It can map white fiber tracts when conventional DTI cannot be generated as a result of tumor or vasogenic edema. The atlas also takes into account tumor mass effect by deforming adjacent anatomical structures. Given its 3D capability, this tool has been used in neurosurgical pre-operative planning cases. Intraoperatively, the atlas has been successfully fused to neuronavigation systems to aid in real time surgical guidance. The atlas also has been very useful for radiation treatment planning. It supports individualized medicine, through the generation of videos related to the patient's brain tumor assisting patient education.

RCC13

Overview of Medical 3D Printing

Sunday, Nov. 25 4:00PM - 5:30PM Room: S501ABC

IN RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jane S. Matsumoto, MD, Rochester, MN (*Moderator*) Nothing to Disclose
William J. Weadock, MD, Ann Arbor, MI (*Moderator*) Owner, Weadock Software, LLC

LEARNING OBJECTIVES

1) Understand basic 3D printing technology. 2) Learn the history of 3D printing in medicine. 3) Describe steps in production of anatomic models. 4) List current clinical, educaitonal and research applications of 3D printing of imaging data. 5) Learn about potential future opportunities.

ABSTRACT

There has been growing interest and involvement in 3D printing of anatomic models in the last few years. There are increasing reports in the literature on the usefulness of models in multiple specialty areas for surgical planning. This technology is rapidly developing with faster, less expensive and more versatile printers. It is within the reach of most radiology departments to establish some level of 3D printing service in response to surgical need. Imaging is at the center of the 3D printing and radiology offers the best home for it for many reasons. This process depends on acquisition of high resolution imaging data, segmenation by staff knowledgeable in imaging and anatomy and pathology and an embedded quality control program. Physical anatomic models created from an individual's own imaging studies offer improved comprehension of an individual's complex anatomy as an aid in presurgical planning. They are also impactful for patient education and informed consent. Models are being integrated into medical education programs and are used for procedural training simulation. Overall this developing field of medical 3D printing of imaging data offers radiology an opportunity for a unique value added service for patient care and for medical education.

Sub-Events

RCC13A Medical 3D Printing for Radiology: A View to the Future

Participants
Jane S. Matsumoto, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Teach the steps required to build hallow vascular phantoms which could be used for flow and endovascular procedure simulations. 2) Demonstrate how 3D printed phantoms could be used for angiography radiomics. 3) Demonstrate the benefit of using 3D printed cardiovascular phantoms to test endovascular devices. 4) Demonstrate the benefit of using 3D printed cardiovascular phantoms for pre-treatment simulations in high risk surgery patients.

ABSTRACT

Patient specific vascular phantoms manufactured using 3D printing can be a valuable tool for device testing, software validation and endovascular treatment planning. Traditional vascular phantoms are made from one material and they are a simplification of the patient anatomy. They model one artery, rarely included branching arteries and the arterial wall mechanical properties are not properly modeled. In addition, inclusion of pathologies such as atherosclerotic plaques or surrounding anatomical structures is practically inexistent. These simple patient specific models can be used to evaluate endovascular devices, validate software or simulate interventions but their simplicity could misguide the user about the true clinical situations. New advancements in multi-material 3D printing allow development of phantoms replicating complex vascular systems and vascular disease which can mimic mechanical properties of the vessels and physiological aspects of the blood flow. In this presentation we will present how to design complex vascular phantoms which includes significant distal vasculature and vascular lesions such as atherosclerotic plaques and aneurysms. We will show various applications of the phantoms to study device behavior and software validation. For diagnostic software validation, we will demonstrate how such phantoms could be used for angiography radiomics research. In the second part of the lecture, we will present the use of the patient specific vascular phantoms for treatment planning of vascular diseases such as abdominal aortic aneurysms with the Fenestrated Endo Vascular Aortic Repair device. We will show how significant surgery outcome improvementwas achieved in twelve patients undergoing pre-treatment simulation using patient specific phantoms.

RCC13B Research Applications of 3D Printing

Participants
Ciprian N. Ionita, PhD, Buffalo, NY (*Presenter*) Grant, Canon Medical Systems Corporation; Grant, Stratasys, Ltd; Grant, Medtronic plc;

LEARNING OBJECTIVES

1) Discuss current clinical applications of 3D printing. 2) Describe major 3D printing technologies. 3) Identify workflows appropriate for clinical 3D printing. 4) Develop a program for quality assessment of medical 3D-printed models.

ABSTRACT

Medical 3D printing is emerging as a clinically relevant imaging tool that is currently being used in directing preoperative and intraoperative planning in many surgical specialties. These life-sized models of human anatomy and pathology and patient-specific implants and surgical guides to facilitate the required procedures are fabricated using data from standard imaging modalities such as CT, MRI, echocardiography and rotational angiography. Printed models are suitable for planning both surgical and minimally invasive procedures. Major specialties that use these models and surgical aides are vascular, thoracic and orthopedic surgery services, as well as increasingly neurosurgery and interventional radiology. In a number of these specialties added value has been reported toward improving outcomes, minimizing peri-operative risk, and helping develop new procedures such as transcatheter mitral valve replacements. Anatomic models enable surgeons and interventional radiologists to assimilate information more quickly than image review, choose the optimal surgical approach, and perform a procedure more safely and in a shorter time.Finally, patient-specific 3D-printed implants are also beginning to appear and may have significant impact on cosmetic and life-saving procedures in the future. In summary, medical 3D printing is rapidly evolving and may be a potential game-changer that radiologists are ideally-suited to deliver.

RCC13C Overview of Clinical Applications

Participants
Dimitris Mitsouras, PhD, Boston, MA (*Presenter*) Research Grant, Canon Medical Systems Corporation;

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RCC13D Contemporary Issues in 3D Printing

Participants
Frank J. Rybicki III, MD, PhD, Ottawa, ON (*Presenter*) Medical Director, Imagia Cybernetics Inc

For information about this presentation, contact:

frybicki@toh.ca

LEARNING OBJECTIVES

1. To understand the rationale for the creation of the RSNA Special Interest Group (SIG) in 3D Printing 2. To review the accomplishments of the SIG and why these achievements are important 3. To define the different roles of medical profesisonals in 3D printing 4. To review the challenges in 3D printing and anatomic modeling, particularly as it relates to physican professional and technical reimbursement.

ABSTRACT

This presentation will describe and detail the important features of modern 3D printing (medical modeling, anatomic modeling) and provide an outline for the future direction of this practice in the medical sector.

SPDL20

You Take the Red Pill-You Stay in Wonderland and I Show You How Deep the Rabbit Hole Goes (Case-based Competition)

Monday, Nov. 26 7:15AM - 8:15AM Room: E451B

CA GI HN MK NR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Adam E. Flanders, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Sandeep P. Deshmukh, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Vishal Desai, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Christopher G. Roth, MD,MS, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

vishal.desai@jefferson.edu

LEARNING OBJECTIVES

1) Be introduced to a series of radiology case studies via an interactive team game approach designed to encourage 'active' consumption of educational content. 2) Use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) Receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. *This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.*

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SPSC20

Controversy Session: Screening Breast MRI: Abbreviated versus Full Protocol

Monday, Nov. 26 7:15AM - 8:15AM Room: E350

BR MR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Margarita L. Zuley, MD, Pittsburgh, PA (*Moderator*) Investigator, Hologic, Inc

For information about this presentation, contact:

zuleyml@upmc.edu

LEARNING OBJECTIVES

1) Understand the acquisition parameters for full vs abbreviated protocols for screening MRI. 2) Understand the literature surrounding the benefits and limitations of each methodology. 3) Improve your interpretive skills for screening MRI.

Sub-Events

SPSC20A Abbreviated Protocol

Participants
Christopher E. Comstock, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

comstocc@mskcc.org

LEARNING OBJECTIVES

1) Describe the concept of abbreviated breast MRI (AB-MR) for breast cancer screening. 2) Review the data and current studies evaluating AB-MR. 3) Discuss the possible benefits and future direction of the use of AB-MR.

SPSC20B Full Protocol

Participants
Bonnie N. Joe, MD, PhD, San Francisco, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bonnie.joe@ucsf.edu

LEARNING OBJECTIVES

1) Describe the components of a full protocol breast MRI exam. 2) Understand the benefits and limitations of the full protocol breast MRI exam in contrast to an abbreviated protocol.

ABSTRACT

This session will review the main components of the full-protocol breast MRI exam, including technical considerations. Benefits and limitations of the full protocol versus an abbreviated protocol for breast cancer screening will be discussed.

URL

NA

SPSH20

Hot Topic Session: 3D Printing in Urologic Oncology

Monday, Nov. 26 7:15AM - 8:15AM Room: E450A

GU IN OI

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Nicole Wake, PhD, New York, NY (*Moderator*) In-kind support, Stratasys, Ltd

For information about this presentation, contact:

nicole.wake@med.nyu.edu

Sub-Events

SPSH20A 3D Printing Basics: A Primer for the Radiologist

Participants
Frank J. Rybicki III, MD, PhD, Ottawa, ON (*Presenter*) Medical Director, Imagia Cybernetics Inc

For information about this presentation, contact:

frybicki@toh.ca

LEARNING OBJECTIVES

1) To introduce imaging and image manipulation required for 3D printing. 2) To outline basic 3D printing lab organization and funding profile, including potential reimbursement. 3) To review indications for 3D printing in urologic oncology.

ABSTRACT

This course will provide an overview of 3D printing in radiology and medicine. Requirements from radiology image acquisition will be described, as will methods to use computer aided design to convert imaging datasets into file formats amenable for 3D printing. Commonly used 3D printers will be described, as will aspects of the medical models an how they impact clinical care. Efforts for regulatory and reimbursement strategies will be briefly discussed. Finally, appropriate clinical scenarios for genitourinary oncology will be described. Dr. Rybicki will provide an overview of the field, including the creation and achievements of the RSNA Special Interest Group (SIG) in 3D printing. The disussion will also include strategies and an update on 3D printing reimbursement.

Honored Educators

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SPSH20B Advantages of 3D Printed Models in Renal Sparing Surgery

Participants
Bernard F. King JR, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bfking@mayo.edu

LEARNING OBJECTIVES

1) To be able to comphrehend the advantages that the urologic surgeon achieves by seeing, handling and better perceiving the complex anatomic relationships that are present in kidneys undergoing nehron sparing surgery. 2) The learner will be able to appy various 3D modeling techniques to best display the actual anatomic relationships of various normal and anomalous renal structures as they relate to the underlying renal tumors in patients with renal tumors undergoing nephron sparing surgery. 3) The learner will be able to understand the key features important in displaying renal tumors in 3D models including proper display of the arterial, venous and collecting system anatomy relative to the renal parenchyma and renal tumor.

ABSTRACT

This presentations will review the many advantages of 3D Models to the Urologic surgeon including but not limited to the three dimensional relationships of arteries, veins, collecting system and renal parenchyma to the renal tumor(s). These advantages may lead to safer surgeries with less ischemic time, blood loss and more preservation of renal tissue. This presentation will also review the many potential advantages to urologic residents and medical students. Finally, this presentation will discuss the advatages in patient education that can be valuable in helping the patient understand his/her underlying condition and helping the patient to choose the best treatment approach by seeing and touching the life-like model of their condition

SPSH20C Impact of 3D Printed Prostate Cancer Models in Pre-Surgical Planning and Patient Care

Participants
Nicole Wake, PhD, New York, NY (*Presenter*) In-kind support, Stratasys, Ltd

For information about this presentation, contact:

nicole.wake@med.nyu.edu

LEARNING OBJECTIVES

1) Understand how to generate patient-specific 3D printed prostate cancer models from multi-parametric magnetic resonance imaging (MRI) datasets. 2) Explain how 3D printed models may help to depict the relationship of dominant tumors to key anatomic structures such as the neurovascular bundles and urethra. 3) Describe how 3D printed prostate cancer models can help in surgical planning and can help patients to better understand their disease.

ABSTRACT

Three-dimensional (3D) printing is an adjunctive method of radiological image visualization that may facilitate anatomical understanding and assist with surgical planning. Although 3D printed models are preferred by surgeons over conventional imaging, there is a paucity of data regarding the added value of 3D models and the impact that they can make in patient care. This presentation will provide an overview for how 3D printed prostate cancer models are created from multi-parametric magnetic resonance imaging (MRI) data and will describe how 3D printed prostate cancer models are used for surgical planning and patient education. Case examples will be shown that demonstrate how 3D printing can change the surgical plan and can help patients to better understand their anatomy and disease.

SPSH20D Panel Discussion and Q&A

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RCA21

Prostate MRI (Hands-on)

Monday, Nov. 26 8:00AM - 10:00AM Room: S401AB

GU MR

AMA PRA Category 1 Credits ™: 2.00
ARRT Category A+ Credits: 2.25

Participants
Jelle O. Barentsz, MD, PhD, Nijmegen, Netherlands (*Presenter*) Advisor, SPL Medical BV
Daniel J. Margolis, MD, Los Angeles, CA (*Presenter*) Consultant, Blue Earth Diagnostics Ltd
Roel D. Mus, MD, Groesbeek, Netherlands (*Presenter*) Nothing to Disclose
Joyce G. Bomers, Arnhem, Netherlands (*Presenter*) Nothing to Disclose
Jurgen J. Futterer, MD, PhD, Nijmegen, Netherlands (*Presenter*) Research Grant, Siemens AG
Rianne R. Engels, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Renske L. van Delft, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Michiel Sedelaar, MD, PhD, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Antonio C. Westphalen, MD, Mill Valley, CA (*Presenter*) Scientific Advisory Board, 3DBiopsy, Inc;
Geert M. Villeirs, MD, PhD, Ghent, Belgium (*Presenter*) Nothing to Disclose
Leonardo K. Bittencourt, MD, PhD, Rio De Janeiro, Brazil (*Presenter*) Nothing to Disclose
Vibeke B. Logager, MD, Herlev, Denmark (*Presenter*) Nothing to Disclose
Baris Turkbey, MD, Bethesda, MD (*Presenter*) Nothing to Disclose
Joseph J. Busch, MD, Chattanooga, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Renske.vandelft@radboudumc.nl

LEARNING OBJECTIVES

1) Understand the Pi-RADS v2 Category assessment to detect and localize signifant cancer for both peripheral zone and transitional zone lesions. 2) Recognize benign pathology like inflammation and BPH and to differentiate these from significant prostate cancers.

ABSTRACT

In this Hands-on Workshop, the participants will able to review up to 47 multi-parametric MRI cases with various prostatic pathology using a dedicated workstation. Focus will be on the overall assessment of PI-RADS v2 category, which enables them to score the probability of the presence of a significant cancer in patients with elevated PSA and/or clinical suspicion. All cases are from daily non-academic practice, and have various levels of difficulty. The cases include: easy and difficult significant peripheral-transition- and central zone cancers, inflammation, BPH, and the most common pitfalls. Internationally renowned teachers will guide the participants during their PI-RADS v2 scoring. The coursebook can be found at http://bit.ly/rsna2018 Please note: To guarantee the best learning expierence, we can only allow 100 people per session. First come first serve.

Active Handout:Renske Lian van Delft

http://abstract.rsna.org/uploads/2018/16002001/Workshop RSNA 2018 Coursebook small RCA.pdf

MSAS21

Evolving Imaging Methods for the Cancer Patient - Part 1 (Sponsored by the Associated Sciences Consortium) (Interactive Session)

Monday, Nov. 26 8:30AM - 10:00AM Room: S105AB

GI IR MR OI US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Kristen Welch, RT, Milwaukee, WI (*Moderator*) Nothing to Disclose
William A. Undie, PhD, RT, Houston, TX (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1. Review evolving procedures within interventional radiology to treat cancer2. Review anatomy involved in evolving procedures utilized to treat cancer patients3. Discuss historical methods utilized in the treatment of various cancers and their evolution

ABSTRACT

n/a

Sub-Events

MSAS21A Advances in Liver Directed Therapy

Participants
Sarah B. White, MD,MS, Philadelphia, PA (*Presenter*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, BSC; Consultant, Cook Group Incorporated

LEARNING OBJECTIVES

1) Identify indications, contraindications, and complications of liver directed therapy. 2) Discuss the evolution of treatment options for hepatocellular carcinoma. 3) Identify imaging involved in the care of patients with hepatocellular carcinoma.

MSAS21B Combination Ablative Therapies

Participants
Alexios Kelekis, MD, PhD, Athens, Greece (*Presenter*) Medical Advisory Board, BTG International Ltd; Medical Advisory Board, Merit Medical Systems, Inc; Research Grant, Mindray Medical

For information about this presentation, contact:

akelekis@med.uoa.gr

LEARNING OBJECTIVES

1) Identify options for ablation for patients with cancer. 2) Discuss how ablative therapy combined with other therapies can improve patient outcomes. 3) Review results of current studies in research utilizing combination ablative therapies.

MSAS21C Introduction to MR-Guided Focused Ultrasound

Participants
Sharjeel Sabir, MD, Houston, TX (*Presenter*) Travel support, Johnson & Johnson;

LEARNING OBJECTIVES

1) Identify indications, contraindications, and complications for MR-Guided Focused Ultrasound. 2) Review procedural details of performing MR-Guided Focused Ultrasound. 3) Review current literature on MR-Guided Focused Ultrasound.

MSCM21

Case-based Review of Magnetic Resonance (Interactive Session)

Monday, Nov. 26 8:30AM - 10:00AM Room: S100AB

GI MR NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jorge A. Soto, MD, Boston, MA (*Director*) Royalties, Reed Elsevier

Sub-Events

MSCM21A MRI of the Spine

Participants
Carlos H. Torres, MD,FRCPC, Ottawa, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

catorres@toh.ca

LEARNING OBJECTIVES

1) Review common and infrequent cord and spine pathology using a case-based approach. 2) Highlight key imaging findings in order to narrow the differential diagnosis.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Carlos H. Torres, MD,FRCPC - 2017 Honored Educator

MSCM21B MRI of the Brain

Participants
Pia C. Maly Sundgren, MD, PhD, Lund, Sweden (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review common and infrequent adult brain pathology using a case-based approach. 2) Highlight key imaging findings that might help to narrow the differential diagnosis.

ABSTRACT

In this presentation common and less common adult brain pathologies will be presented. Key imaging features and clinical information will be pointed out to help narrow the differential diagnosis using a case-based approach with the aim to be familiar with normal and abnormal processes in the adult brain using MRI.

MSCM21C MRI of the Pancreas

Participants
Jaroslaw N. Tkacz, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jaroslaw.tkacz@bmc.org

LEARNING OBJECTIVES

1) Become familiar with normal and abnormal appearance of the pancreas on routine MRI sequences. 2) Develop strategies to detect pathology involving the pancreas. 3) Increase confidence in diagnosis of cystic and solid pancreatic neoplasms.

MSCM21D MRI of the GI System and Liver

Participants
Hero K. Hussain, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hh141@aub.edu.lb

LEARNING OBJECTIVES

1) Describe a range of common and uncommon pathologies of the GI tract and liver. 2) Discuss the role of the various MR sequences in making the diagnosis.

ABSTRACT

In this presentation, a range of pathologies of the GI tract will be presented, focusing on uncommon presentations of common pathologies using a case-based approach. Pertinent imaging and clinical features will be emphasized, and the value of each MR sequence will be explained to narrow the differential diagnosis and direct clinical management.

MSMC21

Cardiac CT Mentored Case Review: Part I (In Conjunction with the North American Society for Cardiovascular Imaging) (Interactive Session)

Monday, Nov. 26 8:30AM - 10:00AM Room: S406A

CA CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jill E. Jacobs, MD, New York, NY (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

jill.jacobs@nyumc.org

LEARNING OBJECTIVES

1) To be able to identify and understand normal cardiac anatomy. 2) To be able to identify and understand some of the common coronary anomalies.

Sub-Events

MSMC21A Normal Coronary Anatomy

Participants
Brian B. Ghoshhajra, MD, Waban, MA (*Presenter*) Research Grant, Siemens Healthcare USA;

MSMC21B Anomalous Coronary Arteries

Participants
Prachi P. Agarwal, MD, Canton, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List the various coronary artery anomalies. 2) Identify the CT imaging features and hemodynamics of clinically significant coronary artery anomalies. 3) Apply the knowledge of treatment options to understand normal postoperative appearance and postoperative complications.

MSMI21

Molecular Imaging Symposium: Basics of Molecular Imaging

Monday, Nov. 26 8:30AM - 10:00AM Room: S405AB

BQ MR MI NM US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Zaver M. Bhujwalla, PhD, Baltimore, MD (*Moderator*) Nothing to Disclose
Jan Grimm, MD, PhD, New York, NY (*Moderator*) Investor, NortisBio

Sub-Events

MSMI21A Molecular Imaging Using Radioactive Tracers

Participants
Jan Grimm, MD, PhD, New York, NY (*Presenter*) Investor, NortisBio

LEARNING OBJECTIVES

1) Discuss the various radio tracers and their applications in Molecular Imaging studies. 2) Understand in which situations to use which radio tracers, what to consider when developing the imaging construct and what controls to obtain for nuclear imaging studies. 3) Examples will contain imaging with small molecules, with antibodies and nanoparticles as well as with cells in order to provide the participants with examples how o correctly perform their imaging studies. 4) Most of the examples will be from the oncology field but their underlying principles are universally applicable to other areas as well.

MSMI21B Molecular Imaging with MRI and MRS

Participants
Zaver M. Bhujwalla, PhD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To list the basic principles of magnetic resonance (MR) molecular imaging. 2) To describe the uses of noninvasive multi-nuclear MRI and magnetic resonance spectroscopic imaging (MRSI) for molecular imaging applications that provide spatial and temporal information on vasculature, metabolism and physiology. 3) To identify the applications of targeted MR contrast agents to detect receptor and gene expression. 4) To describe strategies that combine detection with therapy for theranostic imaging and for metabolotheranostics. 5) To provide examples of translational applications of molecular imaging and theranostics.

ABSTRACT

Noninvasive multi-nuclear magnetic resonance (MR) imaging and spectroscopic imaging (MRSI) provide a wealth of spatial and temporal information on vasculature, metabolism and physiology. Novel targeted contrast agents have widened the scope of MR techniques for molecular imaging applications to detect receptor and gene expression. In cancer, molecular imaging can be applied to identify targets specific to cancer with imaging, design agents against these targets to visualize their delivery, and monitor response to treatment, with the overall purpose of minimizing collateral damage. Genomic and proteomic profiling can provide an extensive 'fingerprint' of each tumor. With this cancer fingerprint, theranostic agents can be designed to personalize treatment for precision medicine of cancer, and minimize damage to normal tissue.

MSMI21C Nanoparticles

Participants
Heike E. Daldrup-Link, MD, Palo Alto, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

heiked@stanford.edu

LEARNING OBJECTIVES

1) To understand important safety aspects of ultrasmall superparamagnetic iron oxide nanoparticles (USPIO). 2) To understand the biodistribution of ferumoxytol nanoparticles and implications for imaging diagnoses. 3) To recognize the value of ferumoxytol nanoparticles for cancer MR imaging and PET/MR imaging.

ABSTRACT

Gadolinium chelates as contrast agents for MRI have been associated with mounting concerns about nephrogenic sclerosis and gadolinium deposition in the brain. Therefore, a search for safe alternatives is currently underway. In North America, the iron supplement ferumoxytol has gained considerable interest as an MR contrast agent. In Europe, ferumoxtran-10 is re-entering clinical trials. Both ferumoxytol and ferumoxtran-10 provide long-lasting blood pool enhancement, which can be used for MR imaging exams that require detailed and/or long-lasting vessel delineation for MR angiographies, tissue perfusion studies, and whole body tumor staging. Iron oxide nanoparticles are slowly phagocytosed by macrophages in the reticuloendothelial system, making them ideal for

MR imaging detection of tumors in the liver, spleen, lymph nodes, and bone marrow. Similarly, iron oxide nanoparticles are slowly phagocytosed by tumor-associated macrophages in cancers; which can be used to grade tumor-associated inflammation and monitor the efficacy of new cancer immunotherapies. This presentation provides an introduction to the use of iron oxide nanoparticles for clinical MR and PET/MR imaging, including safety data acquired in children thus far, recent insights and mechanisms of rare, but potentially severe adverse reactions, applications that impact patient care and comparisons with gadolinium chelates. New developments for image guided therapy and theranostics are under way.

MSMI21D Molecular Imaging with Ultrasound

Participants
Alexander L. Klibanov, PhD, Charlottesville, VA (*Presenter*) Co-founder, Targeson, Inc; Shareholder, Targeson, Inc; Institutional research collaboration, AstraZeneca PLC; Contract, SoundPipe Therapeutics;

For information about this presentation, contact:

sasha@virginia.edu

LEARNING OBJECTIVES

1) Understand the principles of microbubble design-how to prepare fully biocompatible and safe ultrasound contrast agent particles that are clinically translatable, stable on storage, provide strong acoustic response and high sensitivity of detection by clinical ultrasound imaging systems, and could be targetable. 2) Understand the principles of selection of disease-specific targeting ligands usable for contrast ultrasound imaging, based on receptor levels in the vasculature in the disease issues, as well as vascular biomechanics. 3) Assess the results of early stage clinical trials performed with targeted microbubbles, and opportunities for clinical translation in diagnostic imaging and image-guided interventions.

ABSTRACT

Ultrasound is the most widespread clinical imaging modality. Therefore, enabling molecular imaging potential in an ultrasound setting will lead to the expanded and improved clinical diagnostic benefit. Ultrasound contrast microbubbles are already used in clinic as blood pool contrast agents, with excellent detection sensitivity: single particles with sub-picogram mass can be observed with clinical imaging systems in real time, at a depth of several cm. To achieve biomarker-selective molecular imaging, microbubble shell surface is decorated with targeting ligand molecules (antibodies, peptides, carbohydrates) that assure selective binding and retention in the areas of disease. Clinical microbubbles are typically 1-3 um in diameter; they do not extravasate, so target biomarker receptors should be located on the luminal surface of vessel wall, e.g., vascular endothelium. Microbubbles are targeted to the biomarkers in the areas of inflammation and ischemia-reperfusion injury (P- and E-selectin, VCAM-1, ICAM-1) or to tumor neovasculature (VEGFR2). The latter, a heterodimeric peptide-targeted contrast microbubble from industry, has successfully completed Phase 1-2 clinical trials for imaging of ovarian, breast and prostate cancer lesions. Overall, targeted microbubbles empower molecular ultrasound imaging; they could also be used in conjunction with image-guided interventions, such as targeted biopsy and therapy.

MSMI21E Quantitative Imaging Biomarkers

Participants
Robert J. Gillies, PhD, Tampa, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

robert.gillies@moffitt.org

LEARNING OBJECTIVES

1) Describe the differences between diagnostic, prognostic, and predictive biomarkers. 2) Describe the analytic pipeline for conventional radiomics. 3) Describe the biological basis and the practice of "habitat imaging" and why it may be useful for prediction and monitoring. 4) Briefly describe the methods and utility of deep learning in radiomics.

ABSTRACT

Quantitative Imaging: RadiomicsThe practice of radiology is undergoing revolutionary changes from describing images using a semantic lexicon to one that is increasingly quantitative and data driven, enhanced by machine learning algorithms. The discipline of radiomics grew out CAD systems and has been developing over the last decades to extract quantitative image features and analyze them with an eye to generating diagnostic, prognostic, and predictive models. In conventional radiomics, volumes of interest (VOI) are identified and segmented. In cancer, the VOIs can be the tumor, or the peri-tumor parenchyma. Within these VOI features are extracted describing size, shape, location, texture, and patterns. More than 1,000 of these features are commonly generated from each VOI and this has to be reduced to an smaller informative set using correlation analyses, test-retest data, and then classical statistical methods such as CART, LASSO, or ROC analyses. In the training phase, these can be cross validated by holding out a small sample (1/10 to 1/2) and training on the remaining and testing on the held samples to identify the best multi-variate models. These are then locked down and tested against a completely independent test set, preferably from another institution. Well-powered studies exceeding 1,000 patients have been published to generate strongly prognostic, diagnostic, and predictive models. An extension of radiomics combines data from multiple imaging modalities (PET+CT, multiparametric MRI) to generate "hypervoxels" that can be clustered using e.g. fuzzy C-means clustering, Gaussian mixture models, Otsu thresholding, identifying spatially contiguous regions with similar phenotypes. These are referred to as "habitats" which can be highly predictive of responses to specific therapeutics, and which can be longitudinally monitored for adaptive therapy dosing. Importantly, habitat imaging obviates the need for explicit segmentation. A further extension of radiomics is the increased use of "deep learning", usually with convolutional neural networks, CNN. The depth of learning is limited by the size of the training set, and many methods are employed to augment the training data by rotating the original data set to generate multiple representations. The depth of the neural network can also be increased trough the use of transfer learning, wherein a network trained on similar data can be used to form the initial layers, and only the final layers are specific to the training data at hand. While CNNs are commonly disparaged because they are "black boxes", newer methods are being deployed that can identify the region of the image that contains the most important diagnostic/prognostic information, making the black box a little more transparent.

MSRO21

BOOST: Head and Neck-Nasopharynx & Perineural Spread (Interactive Session)

Monday, Nov. 26 8:30AM - 10:00AM Room: E450A

HN NR OI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

MSRO21A Imaging of the Nasopharynx: Applied Anatomy

Participants
Suresh K. Mukherji, MD, Northville, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the normal anatomy of the nasopharynx. 2) Explain common spread patterns of nasopharyngeal carcinoma. 3) Describe the anatomy landmarks that determine staging of nasopharyngeal carcinoma.

ABSTRACT

This course will review the normal anatomy of the nasopharyx and common spread patterns of nasopharyngeal carcinoma. The new AJCC 8th edition staging for nasopharyngeal carcinoma will also be reviewed.

MSRO21B Current Concepts and Controversies in Radiation Planning of the Nasopharynx

Participants
Sung Kim, MD, New Brunswick, NJ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review important points in contouring nasopharynx cancer based on patterns of spread.

MSRO21C Question & Answer

MSRO21D Anatomy and Imaging of Perineural Spread

Participants
Suresh K. Mukherji, MD, Northville, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe common pathways of perineural spread. 2) Review the imaging findings of perineural spread. 3) Describe the proper imaging technique for being able to detect perineural spread.

ABSTRACT

This lecture will review the common perineural spread patterns of tumprs involving the nasopharynx and skull base. The emphais will be on perineural spread along the cranial nerves and also review how to optimize imagign techniques.

MSRO21E Current Concepts and Controversies in Contouring and Treatment of Perineural Spread

Participants
Sung Kim, MD, New Brunswick, NJ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To identify and discuss some common scenarios when perineural invasion is found in head & neck cancer and how they should be treated with radiation therapy.

MSRO21F Question & Answer

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

MSRO25

BOOST: Breast-Oncology Anatomy (Interactive Session)

Monday, Nov. 26 8:30AM - 10:00AM Room: S103CD

BR OI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

Stephanie Markovina, MD, PhD, Saint Louis, MO (*Moderator*) Nothing to Disclose
Amy M. Fowler, MD, PhD, Madison, WI (*Presenter*) Research support, General Electric Company
Maria A. Thomas, MD, PhD, Saint Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand breast and regional lymph node anatomy. 2) Become familiar with basic anatomic structures and breast pathology using various imaging modalities. 3) Be familiar with breast and regional lymph node contouring techniques used in radiation treatment planning for breast cancer. 4) Apply contouring knowledge to inform radiation treatment planning for breast cancer.

RC201

The Many Facets of Organizing Pneumonia: A Rad-Path Guide to Understanding and Diagnosis

Monday, Nov. 26 8:30AM - 10:00AM Room: E351

CH CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jeffrey R. Galvin, MD, Baltimore, MD (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the microscopic anatomy of the lung that explains the high resolution CT findings associated with organizing pneumonia. 2) Improve their diagnostic skills related to the imaging recognition of organizing pneumonia. 3) Recognize the range of injuries and inhaled insults that lead to organizing pneumonia. 4) Apply a new knowledge of the pathways to fibrosis that allows for the differentiation of organizing pneumonia, IPF and diffuse alveolar damage. 5) Appreciate the importance of communication between the clinician, radiologist, and pathologist to improve diagnosis.

ABSTRACT

This presentation will review the histologic and radiologic findings of organization in lung injury due to diffuse alveolar damage, organizing pneumonia and acute fibrinous and organizing pneumonia. It will clarify the role of organizing pneumonia in the pathway to fibrosis that will sharpen the radiologist's ability to separate the various forms of fibrosis including: idiopathic pulmonary fibrosis, non-specific interstitial pneumonia and diffuse alveolar damage. Finally it will describe the multidisciplinary diagnostic process of which the radiologist is a key member.

Active Handout:Jeffrey R. Galvin

http://abstract.rsna.org/uploads/2018/17000284/OP Introduction Galvin RC201.pdf

Sub-Events

RC201A Introduction

Participants
Jeffrey R. Galvin, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC201B Pathology of Organizing Pneumonia

Participants
Teri J. Franks, MD, Silver Spring, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

Active Handout:Teri J. Franks

http://abstract.rsna.org/uploads/2018/17000289/OP Pathology FranksRC201B.pdf

RC201C Imaging of Organizing Pneumonia

Participants
Seth J. Kligerman, MD, Denver, CO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

skligerman@ucsd.edu

LEARNING OBJECTIVES

View learning objectives under main course title.

Active Handout:Seth Jay Kligerman

http://abstract.rsna.org/uploads/2018/17000292/OP Imaging KligermanRC201C.pdf

RC201D Pathways to Fibrosis and Summary

Participants
Jeffrey R. Galvin, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC202

TRaD Talks: Teaching Radiology

Monday, Nov. 26 8:30AM - 10:00AM Room: S404AB

ED

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Petra J. Lewis, MD, Lebanon, NH (*Moderator*) Nothing to Disclose

Sub-Events

RC202A Cooling the Hot Seat

Participants
Petra J. Lewis, MD, Lebanon, NH (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

petra.lewis@hitchcock.org

LEARNING OBJECTIVES

1) Develop a safe, shame-free environment for learners of all abilities, stages and confidence levels to 'take cases' in conference. 2) Individualize instructor interactions according to learner responses. 3) Devise means to reinforce and develop learner strengths in this setting.

RC202B Daily Feedback: Give the Millennials What They Want

Participants
Jonathan O. Swanson, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the perceived hurdles to in-person feedback. 2) Explain the utility of frequent feedback in the setting of radiology education. 3) Detail strategies to help reluctant faculty buy-in to providing constructive feedback.

RC202C Overcoming Stagefright

Participants
Nancy J. McNulty, MD, Lebanon, NH (*Presenter*) Book contract, Oxford University Press

For information about this presentation, contact:

Nancy.J.McNulty@hitchcock.org

LEARNING OBJECTIVES

1) Describe the scope, cause, and manifestations of public speaking anxiety. 2) Discuss strategies and changes in perception that can be utilized to overcome public speaking anxiety. 3) Apply these strategies before a public speaking engagement.

RC202D Social and Emotional Intelligence in Education

Participants
Robert B. Percarpio, MD, Lebanon, NH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define the qualities of social emotional intelligence. 2) Recognize how social emotional intelligence applies to the resident training environment. 3) Develop strategies to improve resident education through the use of social emotional intelligence.

RC202E Point-of-Care Ultrasound Procedures: Taming the Wild Wild West

Participants
Eric J. Monroe, MD, Seattle, WA (*Presenter*) Advisory Board, Biogen Idec Inc

For information about this presentation, contact:

eric.monroe@seattlechildrens.org

LEARNING OBJECTIVES

1) Understand trends in POCUS procedures. 2) Navigate the sensitive politics of non-imaging specialists seeking to perform POCUS procedures. 3) Create value and 'win'.

RC202F Drawing at the Workstation: Everyone's a Visual Learner

Participants
Aaron P. Kamer, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe how drawing while teaching can solidify concepts for the learner. 2) Illustrate complex radiology topics using widely available tools at the workstation.

RC203

Coronary CTA and Calcium Scoring

Monday, Nov. 26 8:30AM - 10:00AM Room: E263

CA CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Gregory Kicska, MD, PhD, Seattle, WA (*Moderator*) Nothing to Disclose

Sub-Events

RC203A CT Derived Fractional Flow Reserve (FFR CT): A Sine Qua Non?

Participants
Eric E. Williamson, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

williamson.eric@mayo.edu

LEARNING OBJECTIVES

1) Discuss the current evidence for using CT-based fractional flow reserve. 2) Describe a potential role for FFRct in the clinical practice of cardiac CT.

RC203B Interpreting and Reporting Cardiac CT - CAD-RADS

Participants
Geoffrey D. Rubin, MD, Durham, NC (*Presenter*) Consultant, Fovia, Inc; Consultant, HeartFlow, Inc; Consultant, General Electric Company;

LEARNING OBJECTIVES

1) To review the CAD-RADS lexicon, including assessment categories and modifiers, for coronary CT angiography in the evaluation of acute and stable chest pain. 2) To understand how CAD-RADS can improve patient care through standardized reporting and linking management recommendations to actionable information in the radiology report. 3) To apply appropriate CAD-RADS coding for difficult coronary CT angiography cases.

RC203C Added Value of Myocardial Perfusion Imaging in Cardiac CT

Participants
Ricardo C. Cury, MD, Miami, FL (*Presenter*) Research Grant, General Electric Company; Research Consultant, General Electric Company

LEARNING OBJECTIVES

1) To review the literature and available evidence of Myocardial CT perfusion. 2) To evaluate the emerging role of Myocardial CTP in the work-up of patients with suspected or known CAD. 3) To describe the incremental value of Myocardial CTP over CT angiography.

RC203D Cardiac CT in Acute Chest Pain: Critical Review of the Evidence

Participants
Marc Dewey, MD, Berlin, Germany (*Presenter*) Research Grant, General Electric Company; Research Grant, Bracco Group; Research Grant, Guerbet SA; Research Grant, Canon Medical Systems Corporation; Research Grant, European Commission; Research Grant, BIH Digital Health Accelerator; Speakers Bureau, Canon Medical Systems Corporation; Speakers Bureau, Guerbet SA; Speakers Bureau, Bayer AG; Consultant, Guerbet SA; Author, Springer Nature; Editor, Springer Nature; Institutional research agreement, Siemens AG; Institutional research agreement, Koninklijke Philips NV; Institutional research agreement, Canon Medical Systems Corporation; ; ; ; ; ; ; ; ;

For information about this presentation, contact:

dewey@charite.de

LEARNING OBJECTIVES

1) Get to know the evidence for using CT in patients with acute chest pain. 2) Learn about important details from these studies that will show in which patients CT might have greatest clinical value.

ABSTRACT

Several clinical trials and smaller studies looked at the advantages and disadvantages of using CT in patients with acute chest pain. This practical talk about the pivotal facts from these clinical studies will provide the information required for informed decision making with referring physicians.

Active Handout:Marc Dewey

http://abstract.rsna.org/uploads/2018/17001208/dewey 2018 handout RC203D.pdf

RC204

Musculoskeletal Series: Knee MRI

Monday, Nov. 26 8:30AM - 12:00PM Room: E451B

MR MK

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

Participants
Naveen Subhas, MD, Shaker Heights, OH (*Moderator*) Research support, Siemens AG
Kirkland W. Davis, MD, Madison, WI (*Moderator*) Author with royalties, Reed Elsevier; Editor with royalties, Reed Elsevier
Thomas M. Link, MD,PhD, San Francisco, CA (*Moderator*) Research Grant, General Electric Company; Research Consultant, General Electric Company; Research Consultant, InSightec Ltd; Research Grant, InSightec Ltd; Royalties, Springer Nature; Consultant, Springer Nature; Research Consultant, Pfizer Inc;

For information about this presentation, contact:

thomas.link@ucsf.edu

llenchik@wakehealth.edu

Sub-Events

RC204-01 Diagnosis of Meniscus Tears

Monday, Nov. 26 8:30AM - 8:55AM Room: E451B

Participants
Kirkland W. Davis, MD, Madison, WI (*Presenter*) Author with royalties, Reed Elsevier; Editor with royalties, Reed Elsevier

For information about this presentation, contact:

kdavis@uwhealth.org

LEARNING OBJECTIVES

1) Demonstrate the imaging appearances of the types of meniscus tears. 2) Describe the most common locations of displaced flap tears of the menisci.3) Determine the best sequences for identifying tears of the meniscal root ligaments. 4) Identify signs that indicate likely presence of flap tears of the menisci.

RC204-02 Cruciates

Monday, Nov. 26 8:55AM - 9:20AM Room: E451B

Participants
Daniel E. Wessell, MD, PhD, Jacksonville, FL (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Describe the normal imaging appearance of the cruciate ligaments. 2) Examine common mechanisms of cruciate ligament injury. 3) Describe the imaging appearance of cruciate ligament injuries. 4) Identify secondary imaging signs of cruciate ligament injuries.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Daniel E. Wessell, MD, PhD - 2013 Honored Educator

RC204-03 Quantitative MRI and Biomechanical Characterization of Human Meniscus Pathology

Monday, Nov. 26 9:20AM - 9:30AM Room: E451B

Participants
Tim Finkenstaedt, MD, San Diego, CA (*Presenter*) Nothing to Disclose
Reni Biswas, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
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Palanan Siriwanarangsun, MD, Bankok, Thailand (*Abstract Co-Author*) Nothing to Disclose
Karen C. Chen, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Sheronda Statum, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Won C. Bae, PhD, La Jolla, CA (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Compare the sensitivity of conventional and Ultrashort Time-to-Echo (UTE) MR techniques to indentation biomechanical properties of normal and pathologic human menisci.

METHOD AND MATERIALS

Cadaveric knees (n=10 donors, 80±10 yrs) were dissected to obtain 18 menisci. These were cut radially to obtain three ~5 mm thick triangular pieces from anterior horn, body, and posterior horn regions (n=54 pieces total). Morphologic MRI parallel to the cut plane was performed with proton density weighted spin echo sequence (PDw; TR=2500 ms, TE=15 ms), to classify samples into 3 pathology groups: normal, degenerate and tear. Quantitative MRI was performed with 1) spin echo multi-echo T2 (SE T2; TR=2000 ms, TE=15 to 110 ms) and ultrashort echo time (UTE) T2* (UTE T2*; TR=100 ms, TE=0.01 to 20 ms) techniques. After MRI, indentation testing was performed on multiple sites (Figure 1A) on tibial and femoral articular surfaces with a 1-mm diameter plane-ended tip, to a depth of 100 μm for 1 s while measuring force, to calculate compressive indentation modulus. At each indentation site, SE T2 and UTE T2* values were determined using 2-mm circular region of interest (Figure 1B). Correlation between indentation modulus vs. SE T2 (Figure 1C) and UTE T2* (Figure 1D) was performed for all data, and separately for each group. Additionally, difference in modulus, SE T2, and UTE T2* values between groups were compared using ANOVA and Tukey posthoc test.

RESULTS

There was a significant difference in indentation modulus between all 3 groups (**Table 1A), stiffest for the normal, and softest for the tear group. While both SE T2 and UTE T2* showed similar trends, the difference between normal and degenerate groups was far greater for UTE T2* (Table 1A). Additionally, correlation with modulus was stronger for UTE T2* than SE T2, regardless of pathology group being considered (Table 1B). Statistically significant correlation was found only for the degenerate group which is interesting and warrants further investigation.**

CONCLUSION

We found higher sensitivity of UTE T2* technique to biomechanical alterations of pathologic menisci, compared to SE T2.

CLINICAL RELEVANCE/APPLICATION

Higher sensitivity of UTE MRI to biomechanical meniscus alterations may be useful for early detection of meniscus degeneration and injury, and for follow up after treatment.

RC204-04 Previous Meniscal Surgery is Associated with Higher Cartilage T2 Values Indicating More Advanced Cartilage Deterioration: Data from the Osteoarthritis Initiative

Monday, Nov. 26 9:30AM - 9:40AM Room: E451B

Participants
Jan Neumann, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
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Azien Laqmani, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas M. Link, MD,PhD, San Francisco, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Consultant, General Electric Company; Research Consultant, InSightec Ltd; Research Grant, InSightec Ltd; Royalties, Springer Nature; Consultant, Springer Nature; Research Consultant, Pfizer Inc;

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PURPOSE

To determine if participants with prior meniscal surgery show altered cartilage composition when compared to non-surgical controls and whether the grade of deterioration is different for non-injury related meniscal surgery or meniscal surgery performed to repair a previous injury.

METHOD AND MATERIALS

In this cross-sectional study, semi-automatic cartilage segmentation of the right knee of 230 participants from the Osteoarthritis Initiative (OAI) was performed on 2D multi-slice multi-echo sequences, acquired with 3T MRI, and analyzed in a mono-exponential decay model with fitting function for the signal intensity and calculation of T2 maps. Based on the medical history, participants were divided into four groups (i) with meniscal surgery due to an injury (n=79), (ii) meniscal surgery without prior injury (n=36), (iii) controls without meniscal surgery but prior knee injury (n=79) and (iv) controls without meniscal surgery or prior knee injury (n=36). All groups were matched for sex, KL score, age, and BMI. Linear regression analysis was used to compare the T2 values in each compartment, as well as the mean across all compartments.

RESULTS

The average age of all study participants was 57.7 years (SD 8.9) with a BMI of 27.9 (SD 4.0) and 76 (33.0%) female participants. Participants with previous meniscal surgery showed significantly higher mean T2 values across all compartments when compared to those without meniscal knee surgery, separately for surgical participants with ($p<0.001$) and without ($p<0.001$) previous injury. Similar results were obtained when analyzing the compartments separately: In all weight-bearing compartments (lateral/medial femur and tibia) participants with previous surgery showed significantly higher mean T2 values, when compared to controls without surgery ($p<0.05$). The subanalysis of

cartilage T2 values between the two surgical groups did not show significant differences.

CONCLUSION

Participants that underwent meniscal surgery with and without previous meniscal injury exhibited overall higher cartilage mean T2 values when compared to non-surgical controls, while no significant differences were found within the surgical groups. Our results indicate that meniscal surgery contributes to cartilage matrix degeneration, possibly independent of surgical indication.

CLINICAL RELEVANCE/APPLICATION

Indication for meniscal surgery should be thoroughly considered to prevent early or accelerated cartilage degeneration.

RC204-05 Collagen Meniscal Implant: A Long Term MRI Follow-Up in Asymptomatic Patients

Monday, Nov. 26 9:40AM - 9:50AM Room: E451B

Participants
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PURPOSE

Long term evaluation of morphology and size of collagen meniscal implants (CMI) and signs of osteoarthritis on MRI in patients with good clinical outcome.

METHOD AND MATERIALS

79 patients were prospectively included for follow-up (FU) after arthroscopic CMI. Of these, 57 patients (mean age, 44±11 years; gender, 41 male/16 female; side, 48 medial/9 lateral) showed good clinical outcome (Lysholm-score >85; visual analogue satisfaction scale <2) and 79 MRI 1-8 years postoperatively were independently evaluated by two radiologists. CMI morphology, signal intensity (SI), homogeneity and size were assessed and of these results a meniscal score was calculated. Degree of chondral defects and amount of bone marrow edema (BME) were reported as chondral score. Additionally, meniscal extrusion was evaluated. Inter-reader reliability was calculated, Pearson was used to determine correlation between imaging findings and time after operation ($P<0.05$).

RESULTS

One year postoperatively, the CMI varied in size (10% normal, 30% small, 60% hypertroph) and was hyperintense in all patients. During FU (>3 years postoperatively) the size of CMI decreased (6% resorbed, 18% normal, 41% small, 35% hypertroph). CMI was initially hyperintense in all patients and changed to normal SI in only 13% during FU. The meniscal score improved significantly over time ($r=0.28$). Less meniscal extrusion was present during FU (93% initially, 71% FU; $r=0.28$). During FU, full-thickness chondral defects were increasingly present at the femoral side (65%; initially 33%). The chondral score was significantly worse during FU ($P=0.017$). Inter-reader reliability was fair for morphology and SI, moderate for size (0.48), homogeneity (0.41) and meniscal extrusion (0.55) and good for femoral cartilage (0.62) and almost perfect for BME (0.84-0.88).

CONCLUSION

In the long-term FU CMI varies in size, is typically hyperintense in SI and appears extruded. Despite asymptomatic knees, full-thickness cartilage defects were present in the majority of knees after CMI.

CLINICAL RELEVANCE/APPLICATION

Demonstrate the MR-variety of meniscal morphologies after CMI in asymptomatic patients and heighten the awareness of radiologist and referring physicians.

RC204-06 Extensor Mechanism

Monday, Nov. 26 9:50AM - 10:10AM Room: E451B

Participants
Kirkland W. Davis, MD, Madison, WI (*Presenter*) Author with royalties, Reed Elsevier; Editor with royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Identify the anatomic components of the extensor mechanism on XR, CT, and MRI. 2) Assess the extensor mechanism, determine the pathology, and explain mechanism of injury.

RC204-07 Articular Cartilage

Monday, Nov. 26 10:20AM - 10:40AM Room: E451B

Participants
Thomas M. Link, MD,PhD, San Francisco, CA (*Presenter*) Research Grant, General Electric Company; Research Consultant, General Electric Company; Research Consultant, InSightec Ltd; Research Grant, InSightec Ltd; Royalties, Springer Nature; Consultant, Springer Nature; Research Consultant, Pfizer Inc;

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LEARNING OBJECTIVES

1) To identify abnormalities of the knee cartilage typically found in traumatic and degenerative conditions. 2) To describe MRI findings associated with cartilage repair. 3) To appraise prognostic significance of cartilage abnormalities.

RC204-08 Quantitative DCE-MRI Perfusion Imaging of the Subchondral Bone in Knee Osteoarthritis

Monday, Nov. 26 10:40AM - 10:50AM Room: E451B

Participants
Bas A. de Vries, MSc, Rotterdam, Netherlands (*Presenter*) Research Grant, Dutch Arthritis Association
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Gabriel P. Krestin, MD, PhD, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Osteoarthritis (OA) is characterized by articular cartilage degeneration, synovial inflammation and subchondral bone changes. Although subchondral bone changes are believed to have an important role in the progression of OA, the mechanism is insufficiently understood and might be related to locally increased perfusion and inflammation. Perfusion can be visualized and quantified with gadolinium-based dynamic contrast-enhanced MRI (DCE-MRI). The goal of this study was to evaluate subchondral bone perfusion of affected and non-affected compartments in osteoarthritic knees with DCE-MRI.

METHOD AND MATERIALS

23 patients with unicompartmental knee OA were prospectively included. Multisequence MRI including DCE-MRI was performed at 3T (GE Discovery MR750) using an 8-channel knee coil. Perfusion was measured in subchondral regions of interest (ROI) in both the affected and non-affected knee compartment on three sagittal slices. Perfusion was also measured in ROIs of the bone marrow lesions (BMLs). The main outcome was Ktrans, a measure of capillary permeability. In addition, the flux rate constant Kep was measured. Perfusion parameters of the affected side were compared to the non-affected side. In BMLs these parameters were compared to surrounding subchondral bone without BMLs. Statistical analyses included the Wilcoxon-signed-rank test.

RESULTS

The mean Ktrans and Kep were significantly increased ($p<0.05$) in the affected compared to the non-affected compartment in the subchondral bone of the knee in both the femur and the tibia. Subchondral BMLs detected on fat-saturated T2-weighted images were present in all 23 patients, of which most BMLs close to the articular surface. Ktrans and Kep were significantly ($p<0.001$) higher within subchondral BMLs compared to surrounding subchondral bone without BMLs.

CONCLUSION

Perfusion of the subchondral bone measured with DCE-MRI is significantly increased in the affected compared to the non-affected side in patients with unicompartmental knee OA. Since subchondral BMLs are highly associated with increased perfusion parameters compared to subchondral bone regions without BMLs, BMLs most likely account for the increased subchondral bone perfusion in knee OA.

CLINICAL RELEVANCE/APPLICATION

Subchondral bone inflammation is suggested to affect cytokine excretion, which accelerates cartilage degeneration. Increased subchondral perfusion, related to inflammation was present in the OA knee.

RC204-09 Effects of Foot Strike Pattern on Running Biomechanics and Knee Joint Degeneration

Monday, Nov. 26 10:50AM - 11:00AM Room: E451B

Participants
Richard Kijowski, MD, Madison, WI (*Presenter*) Research support, General Electric Company; Consultant, Boston Imaging Core Lab, LLC
Peter C. Thurlow, MD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Mikel Joachim, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
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Joost Verschueren, MD, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Joshua M. Farber, MD, Cincinnati, OH (*Abstract Co-Author*) Research Consultant, Q-Metrics, Inc; Shareholder, Q-Metrics, Inc
Bryan C. Heiderscheit, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare running biomechanics and knee joint degeneration between fore-foot and rear-foot runners.

METHOD AND MATERIALS

Sixteen fore-foot runners and 24 rear-foot runners underwent a running biomechanics gait analysis and 3.0T knee MRI examination consisting of sagittal three-dimensional fast spin-echo (3D-FSE) and T2 mapping sequences. Features of knee joint degeneration on the 3D-FSE images were graded using the standardized MRI Osteoarthritis Knee Scoring

(MOAKS) system. Cartilage thickness and cartilage T2 relaxation time were measured in the patella, trochlea, medial and lateral femoral condyle, and medial and lateral tibia plateau using the 3D-FSE and T2 mapping images respectively. Mann-Whitney-Wilcoxon tests and ANCOVA tests adjusted for age and gender were used to compare biomechanical parameters and MRI parameters respectively between fore-foot and rear-foot runners.

RESULTS

Fore-foot runners had a significantly lower foot angle at contact ($p<0.001$), vertical loading rate ($p=0.010$), and knee negative work load ($p=0.001$), but no significant difference in cadence ($p=0.439$), speed ($p=0.090$), or external knee adductor moment ($p=0.891$) when compared to rear-foot runners. Cartilage lesions and bone marrow edema lesions were present in the patella and trochlea of both fore-foot and rear-foot runners, but there was no significant difference ($p=0.271$-0.512) in MOAKS scores within the patelofemoral compartment. No runner had evidence of morphologic joint degeneration on MRI within the medial or lateral compartments. There was no significant difference ($p=0.151$-0.854) in cartilage thickness on any articular surface between fore-foot and rear-foot runners. Fore-foot runners had significantly higher cartilage T2 on the medial tibia plateau (p-0.008), but no significant difference ($p=0.056$-0.930) in cartilage T2 on the remaining articular surfaces when compared to rear-foot runners.

CONCLUSION

While fore-foot runners had significantly lower vertical loading rate and knee negative work load than rear-foot runners, morphologic and quantitative MRI showed no benefits of the fore-foot strike pattern on reducing the risk of knee joint degeneration.

CLINICAL RELEVANCE/APPLICATION

While the fore-foot running pattern has beneficial biomechanical effects, our preliminary cross-sectional study using MRI showed no evidence that the improved biomechanics could reduce the risk of knee joint degeneration.

RC204-10 Is CT Imaging Necessary for Bone Tunnel Assessment in ACL Revision Surgery? A Comparison of Multi-Planar Reformatting (MPR) Tibial Bone Tunnel Maximum Diameter on Routine MR Imaging versus Dedicated CT Imaging

Monday, Nov. 26 11:00AM - 11:10AM Room: E451B

Participants
Ayesha Jameel, MBBS, LONDON, United Kingdom (*Presenter*) Nothing to Disclose
Abul Lasker, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

ACL revision surgery requires strict preoperative planning to evaluate the existing tibial bone tunnel. If osteolysis has occurred, bone grafting is required intra-operatively. Current practice dictates the use of dedicated preoperative CT imaging for assessment. However all patients considered for ACL revision undergo diagnostic MR study to determine any underlying abnormality and confirm graft failure. We postulate by utilising multi-planar reformatting (MPR), commonly built into PACS, we can accurately and reliably measure the maximum bone tunnel diameter on MRI. This method would reduce cost, patient exposure to radiation and time delay to surgery by obviating the need for dedicated CT.

METHOD AND MATERIALS

A retrospective review identified 20 ACL revision patients over 10 year period (2008-2018) with both MR and CT studies. These were performed using the department technique with a variety of suppliers and included metal artefact reduction sequences where appropriate. Using Carestream Vue PACS (version 12.1.6) built in MPR capability the maximum diameter of the bone tunnel was measured orthogonally on both MR and CT, >1cm from the tibial intercondylar notch. For MRI the axial proton density fat saturated (PDFS) imaging was realigned to be perpendicular to the sagittal T1 and coronal PDFS. Two musculoskeletal radiologists with up to 5 years experience reviewed each study independently and each modality on separate occasions. The MRI and CT tunnel maximum diameter was compared using a paired T-test. A p-value of <0.05 was taken to be significant.

RESULTS

20 patients were reviewed, 1 excluded due to MRI movement artefact. 38 MPR measurements were taken and any metal artefact in the tibial tunnel was documented for further analysis. For both reviewers, there was no statistically significant difference in the MPR measurements on CT and MR (0.7 and 0.2 respectively). The mean tunnel measurements for reviewer 1 were 11.45(CT) and 11.40(MR), for reviewer 2 were 12.25(CT) and 12.6(MR).

CONCLUSION

Preoperative MRIs could be used to measure the maximum bone tunnel diameter prior to ACL revision, obviating the need for dedicated CT imaging, for ACL grafts with both metallic and non-metallic interference screws, however more evaluation is required.

CLINICAL RELEVANCE/APPLICATION

In ACL revision surgery, tibial tunnel osteolysis could be identified and measured accurately on the preoperative MRI, reducing the need for additional CT imaging.

RC204-11 Extra-articular Knee

Monday, Nov. 26 11:10AM - 11:35AM Room: E451B

Participants
Julia R. Crim, MD, Columbia, MO (*Presenter*) Nothing to Disclose

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Active Handout:Julia Ruth Crim

http://abstract.rsna.org/uploads/2018/18000780/Crim RSNA handout RC204-11.pdf

LEARNING OBJECTIVES

1) Analysis of Hoffa fat pad for impingement, synovitis, fibrosis, and mass. 2) Recognition of muscle injury patterns and anatomic variants. 3) Recognition of nerve and vascular abnormalities. 4) Evaluation of the iliotibial band. 5) Recognition of Morel-Lavallee lesion and its distinction from other masses around the knee.

RC204-12 Post-arthroscopy Knee

Monday, Nov. 26 11:35AM - 12:00PM Room: E451B

Participants
Naveen Subhas, MD, Shaker Heights, OH (*Presenter*) Research support, Siemens AG

LEARNING OBJECTIVES

1) Review the postoperative meniscus: Normal postoperative appearance, postoperative tears, and postoperative complications. 2) Review the postoperative ACL: Normal postoperative appearance, ACL graft tears, and postoperative complications. 3) Review articular cartilage repair: Normal postoperative appearance and postoperative complications.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
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RC205

Neuroradiology Series: Brain Tumors

Monday, Nov. 26 8:30AM - 12:00PM Room: S406B

AI MR MI NR NM OI

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Soonmee Cha, MD, San Francisco, CA (*Moderator*) Nothing to Disclose
Kei Yamada, MD, Kyoto, Japan (*Moderator*) Nothing to Disclose

Sub-Events

RC205-01 Multimodal Molecular Imaging Using Advanced MRI and PET: Applications in Clinical Neuro-Oncology

Monday, Nov. 26 8:30AM - 9:00AM Room: S406B

Participants
Norbert Galldiks, Cologne, Germany (*Presenter*) Research grant, Wilhelm-Sander Stiftung (Munich, Germany); Advisory board, Abbvie

LEARNING OBJECTIVES

1) To give an overview on the most relevant advanced MRI techniques (i.e., PWI MRI, 2-hydroxyglutatate MRS) and PET tracers (i.e., amino acid PET tracers, radiolabeled somatostatin receptor ligands) to improve diagnostics in the field of clinical Neuro-Oncology.

RC205-02 Robust Pre-Operative Language Mapping in Patients with Brain Tumors: A Feasibility Study

Monday, Nov. 26 9:00AM - 9:10AM Room: S406B

Participants
Mohammad Fakhri, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Manu S. Goyal, MD, MSc, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Joshua S. Shimony, MD, PhD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Carl Hacker, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Amrita Hari-Raj, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Abraham Z. Snyder, PhD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

We evaluate multilevel perceptron (MLP)-based mapping as a tool for identification of language-related resting-state networks in brain tumor patients. Currently available alternative resting state fMRI analysis methods are either biased (e.g., seed-based correlation) or not robust at the single subject level (e.g., Independent Component Analysis), and therefore, not ideal for use in presurgical planning.

METHOD AND MATERIALS

Twenty-one patients with a brain tumor in the vicinity of expressive language areas were included (mean age 42 ±16 years; 71% male). The MLP output was compared to seed-based correlation in two different manually defined language regions of nterst (ROIs). The putative language ROIs were defined using meta-analysis of task-fMRI responses, resting state seed based correlation maps, and direct cortical stimulation language maps. MLP performance in patients was also compared to a cohort of 688 normal subjects.

RESULTS

Upon presentation, 62% of the patients exhibited expressive aphasia prior to the surgical resection. Thirty-two percent of the patients were positive for IDH-1 mutation and 27% had 1p/11q deletion. The MLP was able to reliably map robust language RSN affiliation in putative language areas in all patients (n=21, 100%). Results were similar to those obtained in a cohort of young, healthy subjects. Fisher z-transformed Pearson correlation maps obtained from seed ROIs were strongly spatially correlated with the MLP score in both evaluation ROIs (Spearman rho=0.74 and 0.62, $p<0.0001$ and $p<0.003$ respectively).

CONCLUSION

MLP-based language maps are comparable to results obtained using conventional seed-based correlation mapping. MLP-based mapping is reliable in patients with brain tumors. The trained MLP is robust to anatomical shifts owing to mass effects and focal, tumor-related neural dysfunction, hence, is suitable for use in patients with brain tumors.

CLINICAL RELEVANCE/APPLICATION

A trained machine-learning algorithm can reliably identify resting-state language-related networks on an individual basis in patients

with brain tumors in vicinity of the language cortex.

RC205-03 Use of Quantitative Blood Oxygen Level Dependent (qBOLD) in Non-Invasively Determining Glioma Grade, with Correlation through Neuropathology

Monday, Nov. 26 9:10AM - 9:20AM Room: S406B

Participants
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David Munoz, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Todd Mainprize, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Arjun Sahgal, Toronto, ON (*Abstract Co-Author*) Speaker, Medtronic plc; Speaker, Elekta AB; Medical Advisory Board, Varian Medical Systems, Inc; Speaker, Accuray Incorporated; Research Grant, Elekta AB
Sean P. Symons, MPH, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Bradley J. Macintosh, PhD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Aimee Chan, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Sunit Das, MD,PhD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Quantitative blood oxygen level dependent (qBOLD) magnetic resonance imaging (MRI) has been used as a method to gauge the level of oxygen saturation (SO2) in the tumors of patients with gliomas. We investigated whether there was a difference in the level of oxygenation in different grades of gliomas.

METHOD AND MATERIALS

10 patients were recruited for this prospective, multi-institutional study. Patients underwent a preoperative Ferumoxytol-based qBOLD MRI. Based on visual inspection of SO2 maps from qBOLD imaging, two volumes of interest (VOIs) from the tumor were chosen. Biopsy samples from the VOIs were taken to correlate histopathological measures of hypoxia against qBOLD, and staining was scored by a neuropathologist. Patients with glioblatoma (GBM; WHO Grade IV) was compared with lower-grade astrocytomas. 1 patients' research samples were inconclusive, and therefore excluded from pathological analysis.

RESULTS

Pathology reports indicated that: 1 patient had diffuse astrocytoma (WHO Grade II), 3 patients had anaplastic astrocytoma (WHO Grade III), and 6 patients GBM. When comparing low-SO2 samples, non-GBM patients had on average higher SO2 (26.0% vs 10.6%, $p=0.07$). Pathology staining of low-SO2 samples showed significantly higher levels of staining in HIF1a ($p=0.048$), VEGF ($p=0.04$) and CAIX ($p<0.01$) in GBM compared to lower-grade gliomas. No significant differences were detectable in the high SO2 (mean, 37.4%) tumors.

CONCLUSION

Levels of oxygenation appear to decrease with increasing glioma grade, and is detectable by qBOLD MRI. Pathological markers of hypoxia support this notion. The threshold for differentiating GBM from lower-grade gliomas appears to be ~35% SO2. More subjects are required to confirm these results.

CLINICAL RELEVANCE/APPLICATION

qBOLD MRI can be an alternative method to assess tumor grade when biopsy is not feasible. In light of new hypoxia-targeting therapies, it can also be used to monitor oxygenation state of the tumor during treatment.

RC205-04 Probabilistic Atlases of Pre-Treatment MRI Reveal Hemispheric and Lobe-Specific Spatial Distributions across Molecular Sub-Types of Diffuse Gliomas

Monday, Nov. 26 9:20AM - 9:30AM Room: S406B

Awards
Trainee Research Prize - Medical Student

Participants
Niha G. Beig, MS, Cleveland, OH (*Presenter*) Nothing to Disclose
Marwa Ismail, PhD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Anant Madabhushi, PhD, Cleveland, OH (*Abstract Co-Author*) Research funded, Koninklijke Philips NV
Manmeet Ahluwalia, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Pallavi Tiwari, PhD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Recent WHO classification of diffuse gliomas defined 3 subtypes based on their molecular status: Isocitrate dehydrogenase wild type (IDH-WT), IDH mutant with 1p/19q intact (IDHmut-noncodel), and IDH mutant with 1p/19q co-deletion (IDHmut-codel). Each category represents different prognosis and chemo-sensitivity thus impacting treatment decisions. Previous studies have linked tumor location with patient outcome. In this feasibility study, we developed population atlases of pre-treatment MRI lesions to evaluate whether IDH-WT, IDHmut-codel, IDHmut-noncodel tumors will have spatial proclivity to hemispheric or lobe-specific locations based on their frequency of occurrence.

METHOD AND MATERIALS

150 pre-operative MRI sequences (1.5T/3T T1w, T2w, FLAIR scans, multi-center) of patients diagnosed with diffuse gliomas (65 low grade gliomas and 85 glioblastomas) were considered from TCIA, along with their IDH mutation and 1p/19q co-deletion status. Frequency atlases of tumor occurrence in T2/FLAIR hyper-intensity regions were developed for each sub-type, by averaging voxel intensities across all patients. To compute significant differences (p-value<0.05), voxel-based analysis of differential involvement (ADIFFI) based on two-tailed Fisher's exact test was performed on (a) IDH-WT (n= 91) vs IDH-mut (n=59), and (b) IDHmut-codel (n=13) vs IDHmut-noncodel (n=57) atlases. Prominent clusters were identified and mapped to LONI Probabilistic Brain Atlas (LPBA40) parcellations to provide anatomic localization for each sub-type.

RESULTS

The ADIFFI analysis revealed that IDHmut tumors were predominant in frontal lobe with a frequency of 52.7% occurrence whereas IDH-WT had a multi-centric distribution across parietal and temporal lobes (p<0.005). Prominent cluster of IDHmut-codel was found to be lateralized to the left hemisphere in the cingulate gyrus region, while IDHmut-noncodel had 60% occurrence in the superior frontal gyrus of the right hemisphere (p<0.05).

CONCLUSION

Our analysis suggests spatial proclivity of molecular subtypes to hemispheric and lobe-specific locations in the brain. The spatial localization could serve as an imaging marker for differentiating molecular subtypes of gliomas.

CLINICAL RELEVANCE/APPLICATION

IDHmut-codel have a favorable response to chemoradiation, while IDHmut-noncodel have improved prognosis versus IDH-WT. Identifying radiogenomic markers of sub-types could enable personalized treatments in Gliomas.

RC205-05 High-Tumor Mutation Burden (Hypermutation) in Gliomas Exhibit a Unique Predictive Radiomic Signature

Monday, Nov. 26 9:30AM - 9:40AM Room: S406B

Participants
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PURPOSE

Increase in tumor mutation burden (TMB) or hypermutation is the excessive accumulation of DNA mutations in cancer cells. Hypermutation was reported in recurrent as well as primary gliomas. Hypermutated gliomas are mostly resistant to alkylating therapies and exhibit a more immunologically reactive microenvironment which makes them a good candidate for immune checkpoint inhibitors. Herein, we sought to use MRI radiomics for prediction of high TMB (hypermutation) in primary and recurrent gliomas.

METHOD AND MATERIALS

In this IRB-approved retrospective study, we analyzed 101 patients with primary gliomas from the University of Texas MD Anderson Cancer Center. Next generation sequencing (NGS) platforms (T200 and Foundation 1) were used to determine the Mutation burden status in post-biopsy (stereotactic/excisional). Patients were dichotomized based on their mutation burden; 77 Non-hypermutated (<30 mutations) and 24 hypermutated (>=30 mutations or <30 with MMR gene or POLE/POLD gene mutations). Radiomic analysis was performed on the conventional MR images (FLAIR and T1 post-contrast) obtained prior to tumor tissue surgical sampling; and rotation-invariant radiomic features were extracted using: (i) the first-order histogram and (ii) grey level co-occurrence matrix. Then, we performed Logistic regression modelling using LASSO regularization method (Least Absolute Shrinkage and Selection Operator) to select best features from the overall features in the dataset. ROC analysis and a 50-50 split for training and testing, were used to assess the performance of logistic regression classifier and AUC, Sensitivity, Specificity, and p-value were obtained.

RESULTS

LASSO regularization (alpha = 1) was performed with all the 4880 features for feature selection and 40 most prominent features were selected for logistic regression modelling. Our 50-50 split ROC analysis showed an accuracy of 94%, sensitivity of 75%, and specificity of 100% and a p-value of 0.0008).

CONCLUSION

An MRI-radiomic phenotype is predictive of the increase in TMB (Hypermutation) in both primary and recurrent gliomas.

CLINICAL RELEVANCE/APPLICATION

Hypermutated gliomas are resistant to alkylating therapies but responsive to immune checkpoint inhibitors. Our proposed radiomic biomarker can be used to guide therapy and patient selection for immunotherapy clinical trials.

RC205-06 Brain Tumor Surveillance Imaging in the Era of Genomics and Personalized Medicine

Monday, Nov. 26 9:40AM - 10:10AM Room: S406B

Participants
Rajan Jain, MD, Hartsdale, NY (*Presenter*) Consultant, Cancer Panels; Royalties, Thieme Medical Publishers, Inc

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LEARNING OBJECTIVES

1) To discuss currently used response assessment criteria in brain tumor surveillance, such as Macdonald and RANO criteria and their limitations. 2) Participants will learn how the emergence of genomic markers has brought a paradigm shift in the management and surveillance of gliomas. 3) Participants will learn about the complexities of post-treatment imaging appearance of brain tumors in the new age of targeted immuno-therapies and what functional imaging techniques can add value to conventional surveillance MRI.

RC205-07 Update on Pediatric Brain Tumor Imaging

Monday, Nov. 26 10:20AM - 10:50AM Room: S406B

Participants
Zoltan Patay, MD, PhD, Memphis, TN (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Familiarize with new concepts and entities introduced in the 2016 update of the WHO Classification of Tumours of the CNS and pertinent to pediatric brain neoplasms. 2) Review the most recent developments related to the classification of embryonal and ependymal tumors since the publication of the 2016 update. 3) Discuss relevance and implications of the above for the practcing radiologist.

RC205-08 Selection of Imaging-based Surrogate Endpoints Depending on a Specific Target of Test Treatment in Phase III Randomized Controlled Trials of Glioblastoma

Monday, Nov. 26 10:50AM - 11:00AM Room: S406B

Participants
Chong Hyun Suh, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
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PURPOSE

Phase III randomized controlled trials (RCTs) in glioblastoma have used various potential surrogate endpoints with imaging. The surrogacy of imaging-based endpoints remains largely unknown and can be dependent on the type of test treatment. We investigated the surrogacy of imaging-based endpoints as well as their values depending on a specific target of test treatment in patients with glioblastoma.

METHOD AND MATERIALS

A systematic search of phase III RCTs in glioblastoma was performed. Surrogacy between imaging-based endpoints including progression-free survival (PFS), 6 month PFS (6moPFS), 12 month PFS (12moPFS), median PFS, and objective response rate (ORR) with overall survival (OS) were explored using weighted linear regression for the hazard ratio for OS and the hazard ratios or odds ratios for imaging-based endpoints. Subgroup analyses according to disease entity, a specific target of test treatment, and response assessment criteria were performed. The quality of the reporting of efficacy with these IBEs was also evaluated.

RESULTS

Twenty-three RCTs published between 2000 and 2017, covering 8387 patients, met the inclusion criteria. OS showed significant correlations with PFS (standardized ß coefficient [R]=0.719), 6moPFS (R=0.647), and 12moPFS (R=0.638). OS showed nonsignificant correlations with median PFS and ORR. The subgroup analyses consistently showed highly significant correlations between OS and PFS. PFS showed the highest correlations with OS in drugs targeting DNA repair-cell cycle control-epigenetic modifiers (R=0.913) and drugs targeting growth factor receptors-MAPK/PI3K signaling pathways (R=0.962). 12moPFS showed the highest correlations with OS in antiangiogenic therapy, (R=0.821). Trials using RANO criteria showed higher correlation coefficients between OS and PFS, 6moPFS, and 12moPFS than trials using MacDonald criteria. In terms of quality of reporting, there were high proportions of clearly defined primary endpoints (91%) and intent-to-treat analyses (83%). Compared with trials published between 2000 and 2011, those published between 2012 and 2017 were more likely to be supported by industry.

CONCLUSION

Imaging-based endpoints can be surrogates in phase III RCTs of glioblastoma.

CLINICAL RELEVANCE/APPLICATION

The specific target of test treatment and response assessment criteria should be considered in selection of imaging-based endpoints as a surrogate endpoint.

RC205-09 18F-Choline PET/RM in Brain Tumours: Multimodality Imaging in Gliomas Response Assessment

Monday, Nov. 26 11:00AM - 11:10AM Room: S406B

Awards
Student Travel Stipend Award

Participants
Valentina Ferrazzoli, MD, Rome, Italy (*Presenter*) Nothing to Disclose
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PURPOSE

Evaluation of post-treatment glioma burden remains a significant challenge, particularly in Teenage and Young Adult (TYA) population. Although aminoacid PET has impacted on glioma imaging, 18fluoro-Choline Positron Emission Tomography (ChoPET) is currently more widely available. Purpose was to evaluate ChoPET/MR for post-treatment TYA glioma burden.

METHOD AND MATERIALS

27 TYA (mean age 16 years, 8-22 years) in treatment (radiotherapy e/o chemotherapy) for astrocytic brain tumours (14 WHO III/IV; 13 WHO I/II) were evaluated with ChoPET/MR. 59 follow up scans were retrospectively reviewed; maximum standardized uptake values (SUVmax) and MR features (diameters, enhancement) were recorded. In 13 cases dynamic susceptibility contrast perfusion weighted imaging (DSCpwi) was analyzed; relative cerebral blood volume (rCBV) and SUV in enhancing and non-enhancing tumour volumes (Venh, Vne) and in normal appearing white matter (wm) were calculated (rCBVenh, rCBVne, rCBVwm, SUVenh, SUVne, SUVwm). A blinded nuclear medicine and a radiologist scored the images on tumour probability (1:unlikely-5:definitely). Receiver Operating Characteristic (ROC) analysis was used considering as gold standard for diagnosis the histopathology or follow up. Pearson correlation coefficient was used for SUV and rCBV and independent T-Test for differences in ROIs.

RESULTS

MR sensitivity for residual tumour was 92.7% (85.7% WHO III/IV,81.5% WHO I/II). PET sensitivity was 78.2% (78.6% WHO III/IV, 63.0% WHO I/II). Discrepancy was of 20% (11/12 non enhancing). Significant positive correlation between SUV and rCBV in all ROIs was found (r=0.051, p=0.0016). Tumour component analysis showed significantly higher SUVenh and SUVne than SUVwm (SUVenh:p<0.001, SUVne: p=0.021) and significantly higher rCBVne than rCBVwm (p=0.005). rCBVenh showed only borderline significance (p=0.053).

CONCLUSION

ChoPET is able to detect post-treatment enhancing and non-enhancing tumour but both conventional MR and pwi are superior for evaluating non-enhancing disease. In TYA gliomas follow up a quantitative multimodality evaluation can better identify both enhancing and non-enhancing residual/recurrent disease being promising in the early assessment of tumour response.

CLINICAL RELEVANCE/APPLICATION

In teenage and young-adults gliomas early assessment of tumour response to therapy can be improved by complementary use of PET/MR to evaluate different tumour components.

RC205-10 Prediction of Genomic Profiles and Survival in Glioblastoma Patients: Feasibility of Qualitative and Quantitative Analyses of Arterial Spin-Labeling Perfusion-Weighted Imaging

Monday, Nov. 26 11:10AM - 11:20AM Room: S406B

Participants
Roh-Eul Yoo, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Tae Jin Yun, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To explore the feasibility of using arterial spin-labeling perfusion-weighted imaging (ASL-PWI) to predict genomic profiles and survival in glioblastoma (GBM) patients.

METHOD AND MATERIALS

One hundred thirty-two consecutive GBM patients, who had undergone maximal surgical resection or biopsy followed by concurrent chemo- and radiation therapy and adjuvant chemotherapy using temozolomide between January 2011 and November 2015, were included in this retrospective study. CBF at the contrast-enhancing and T2 hyperintense portions on preoperative ASL-PWI were evaluated both qualitatively (hypo- / iso- / hyperperfusion relative to gray matter) and quantitatively (mean and maximal CBFs of tumors normalized with respect to those of contralateral gray matter [nCBFmean and nCBFmax]). The associations between ASL findings and major genomic profiles or survival were evaluated using Mann-Whitney U-test, Fisher's exact test, Spearman rank correlation, and Kaplan-Meier analysis. Receiver operating characteristics analysis was performed to determine the diagnostic performance of the imaging parameters for prediction of genetic biomarkers.

RESULTS

nCBFmean and nCBFmax at contrast-enhancing portions were significantly higher in IDH wild-type group (n = 102) than in IDH mutant (IDH1 or IDH2) group (n = 17) (*P* = .009 and *P* = .007, respectively). Sensitivity and specificity for prediction of IDH mutation were 59% and 81% at the optimal cutoff value of 1.13 for nCBFmax. nCBFmax at contrast-enhancing portions tended to be lower in patients with methylated MGMT promoter (n = 65) than in those with unmethylated MGMT promoter (n = 49) (*P* = .072). No significant associations were found between nCBF and other genetic biomarkers including ATRX, PTEN, p53, and EGFR. Hyperperfusion at contrast-enhancing portions was significantly more common in IDH wild-type group than in IDH mutant group (*P* = .003). Hyperperfusion was associated with shorter progression-free survival as compared with hypo- or isoperfusion (Median, 6.9 vs. 12.5 vs. 19.3 months; *P* = .029).

CONCLUSION

ASL-PWI may help noninvasively predict IDH mutation status and progression-free survival in glioblastoma patients

ASL-PWI may help noninvasively predict IDH mutation status and progression-free survival in glioblastoma patients.

CLINICAL RELEVANCE/APPLICATION

ASL-PWI may help noninvasively predict IDH mutation status and progression-free survival in glioblastoma patients and is recommended as part of preoperative tumor evaluation particularly for patients with impaired renal function.

RC205-11 Clinical Data and Vascular Pattern on MRI to Predict Survival in 'De Novo' Glioblastoma

Monday, Nov. 26 11:20AM - 11:30AM Room: S406B

Awards
Student Travel Stipend Award

Participants
Blanca Domenech, MD, Barcelona, Spain (*Presenter*) Nothing to Disclose
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PURPOSE

MRI provides information on the physiologic properties of glioblastomas. In addition to established prognostic markers such as age, performance status, and extent of resection, increased vascularity on contrast-enhanced MRI is associated with shortened survival. We investigated whether glioblastoma vascular pattern (GVP-MRI), combined with clinical variables and other imaging features, could improve the predictive power of survival models.

METHOD AND MATERIALS

From January 2012 through December 2016, 97 consecutive patients (62 men; mean age, 58±15 years) with histologically proven glioblastoma (GLIOCAT substudy) underwent 1.5T-MRI including anatomical, diffusion-weighted, first-pass DSC, and T1-weighted sequences after 0.1 mmol/kg gadobutrol (1 mm isometric voxel). We used Olea Sphere V.3.0 software (Olea Medical, La Ciotat, France) to analyze rCBV, rCBF, mean delay time, and apparent diffusion coefficient in volumes of interest for contrast-enhancing lesion (CEL), non-CEL, and contralateral tissue. Glioblastomas with >5 vessels seen within the lesion on postcontrast T1-weighted images were considered hyper-GVP-MRI. Prognostic factors were evaluated by Kaplan-Meier survival, ROC analyses, and hazard ratios (HR).

RESULTS

Glioblastomas were considered hyper-GVP-MRI in 58 (60.4%) patients. Patients with hyper-GVP-MRI glioblastomas were older, had higher volumeCEL, increased rCBFCEL and poor survival. Combining Stupp protocol (HR: 0.604; 95% CI: 0.459-0.796), age (HR: 0.163; 95% CI: 0.090-0.297), and GVP-MRI (HR: 1.481; 95%CI: 0.909-2.414) best predicted survival at 1 year (AUC 0.901, 83.3% sensitivity, 93.3% specificity, 96.2% PPV, 73.7% NPV).

CONCLUSION

Our preliminary data suggest that combining clinical parameters and vascular pattern on MRI improves survival prediction in 'de novo' glioblastoma. Cross-validation studies in other populations are necessary to test the generalizability of our findings.

CLINICAL RELEVANCE/APPLICATION

Information about baseline risk and prognosis is crucial for assigning patients with glioblastomas to optimized treatment regimens in clinical practice or to subgroups in clinical trials.

RC205-12 Application of Radiomics & Deep-Learning in Brain Tumor Imaging

Monday, Nov. 26 11:30AM - 12:00PM Room: S406B

Participants
Philipp Kickingereder, MD,MBA, Heidelberg, Germany (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To understand and critically reflect the impact of radiomics and radiogenomics. 2) To understand the impact of deep-learning for guiding treatment decisions and advancing precision and personalized medicine in neuro-oncology.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC206

Head and Neck Series: There's a New (AJCC 8th Edition) Manual-Updates in Head and Neck Cancer Science and TNM Staging

Monday, Nov. 26 8:30AM - 12:00PM Room: E450B

HN NR OI

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Remy R. Lobo, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose
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Sub-Events

RC206-01 All About the AJCC and Its 8th Edition

Monday, Nov. 26 8:30AM - 8:55AM Room: E450B

Participants
Christine M. Glastonbury, MBBS, San Francisco, CA (*Presenter*) Author with royalties, Reed Elsevier

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LEARNING OBJECTIVES

1) To present the rationale for changes in HN cancer staging in the AJCC/UICC 8th edition. 2) To illustrate some specific features that make dramatic changes to the prognostic stage, particularly with regard to HPV;associated OPSCC. 3) To reinforce the necessity of a team approach to cancer management and the utility of the radiologist for aiding staging.

ABSTRACT

The 8th edition of the American Joint Committee on Cancer (AJCC) Cancer Staging Manual was published December 2016 but only officially came in to use January 2018. The updates to the head and neck (HN) section, which forms part II of XVIII, were created in collaboration with the Union for International Cancer Control (UICC). The AJCC and UICC cancer staging manuals reflect the current medical understanding of tumor behavior and treatment options. While most of us think of tumor staging as a method to stratify patients into prognostic groups, this system also allows accurate data collection for understanding and refining tumor and treatment protocols and helps determine patient eligibility for clinical trials. Staging is currently an anatomically-based description of the patient's tumor burden: the location and extent of the primary tumor, any evidence of nodal disease and of distant (metastatic) spread. In the AJCC/UICC manuals these tumor descriptors are designated as the T, the N and the M respectively. Oncologists determine a final clinical stage ('cTNM') by combining all available information (physical exam findings, radiology findings, fine needle aspiration, sentinel node biopsy, etc.). The clinical 'c' is replaced with the prefix 'p' when pathological information from surgical tumor resection is included. The cTNM / pTNM determine each patient's overall anatomic stage or prognostic group (O to IV) which in turn influences choice of treatment plans and enables effective communication between care teams. Updates to the staging manual occur periodically, typically every 7-8 years, with analysis of updated knowledge about tumor biology, pathology and patient outcomes. A recognition of better outcomes in specific subsets of patients will thus lead to alteration in previously used staging criteria. The most important example of this in the current AJCC8 is the separation of staging criteria and prognostic stage groupings for HPV-mediated / p16 positive oropharyngeal squamous cell carcinoma [OPSCC] from p16 negative OPSCC. There are now two separate staging tables used for OPSCC with almost matching T criteria, but vastly different nodal criteria and prognostic staging groups when the tumor is HPV+/p16+, reflecting the knowledge that these tumors have a vastly better prognosis with an overall close to 90% 5 year survival. In a similar fashion, changes may be made to the designation of specific imaging findings based on new information as to the prognostic impact of that feature. In the AJCC7 edition, invasion of the lateral pterygoid muscle by a nasopharyngeal carcinoma was designated T4 disease. Publications since then have shown that this is not indicative of a very poor prognosis, so that in AJCC8 lateral pterygoid invasion is designated T2. Invasion beyond the lateral pterygoid muscle however is T4 disease. A new pathologic feature may also alter staging criteria. In the oral cavity SCC section a pathologic feature, depth of invasion, has been added to the T criteria. This has been determined to be an important prognostic feature of oral cavity tumors, and is used in conjunction with the overall tumor size to determine T designation. The imaging feature of extrinsic muscle invasion that has in practice been very difficult to correlate with pathology has been removed from the T criteria. The three features above are part of the substantial changes to the HN section of AJCC8. The Pharynx chapter has been restructured into three chapters: Nasopharyngeal carcinoma, HPV-mediated/p16+ OPSCC, HPV-/p16- OPSCC with Hypopharynx. For the latter two chapters there are substantial changes to the nodal criteria so that there are now 3 separate clinical nodal criteria tables plus two distinct pathologic nodal criteria tables. The cervical nodal chapter added to the AJCC8 also gives guidance as to how to manage the unknown primary tumor. Most of these unknown primary tumors will ultimately be found to be HPV-mediated OPSCC. An important new criterion has been added to the nodal evaluation for HPV-/p16-/EBV- tumors, and this is the clinical designation of extranodal extension [ENEc]. Clinical examination features of skin invasion, infiltration of musculature, dense tethering or fixation or specific nerve invasion with dysfunction [brachial plexus, sympathetic trunk, cranial or phrenic nerve] are required for this designation, but it substantially

modifies the nodal designation to N3 disease. With the restructuring of the pharynx chapter into three plus a new chapter on Cutaneous SCC of the HN there are now 11 HN chapters. Thyroid tumor staging is now located in the Endocrine section of the Manual, and Head and Neck Sarcomas, an entirely new staging system and chapter, is found in the Soft Tissue Sarcomas section of the Manual. It is worth noting that the original published AJCC8 Manual has multiple errors and there are additional updates since publication. The AJCC website lists the errata in addition to having free downloadable staging forms that contain the updated staging tables.

RC206-02 Monitoring Treatment Response to Chemoradiotherapy in Nasopharyngeal Carcinoma with MR Imaging Features: Value of Diffusion-Weighted Imaging

Monday, Nov. 26 8:55AM - 9:05AM Room: E450B

Participants
Xiangyi Liu, MS, Fuzhou, China (*Presenter*) Nothing to Disclose
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PURPOSE

The purpose of this study was to evaluate the monitoring performance of treatment response to chemoradiotherapy (CRT) in Nasopharyngeal Carcinoma (NPC) with Diffusion-weighted imaging (DWI) combining T2-weighted MRI.

METHOD AND MATERIALS

74 patients with stage III and IV NPC were enrolled and randomly assigned to two groups in this study. DWI sequences were identified and matched with T2-weighted images performed on pretreatment, 3 days, 20 days (group 1 only) /42days (group 2 only) after Neoadjuvant Chemotherapy (NAC) initiated and at the end of chemoradiotherapy initiation (radiotherapy terminated). The tumor size before and after 20/42 days after NAC initiated was measured and classified into responders and non-responders based on treatment response (RECIST 1.1) . At the end of CRT, the tumors were regrouped into complete remission (CR) and residual disease. The apparent diffusion coefficient (ADC) values and their changes at each time point were compared between all different outcome groups using dependent-samples t test. The parameters with optimal time point to detect the tumor response to therapy were chosen. Receiver operating characteristics (ROC) analysis and logistic regression model were performed in order to evaluate the feasibility of the chosen parameters in monitoring treatment response.

RESULTS

The ADCs, ADC changes (ΔADCs) and percentage ADC changes (Δ%ADCs) of day 20 in responders were significantly higher than in non-responders (P<0.05) for group 1 (day20). At the end of CRT, responders from group 1 (day20) all achieved CR while responders from group 2 (day42) have two residual lesions. The ΔADCs and Δ%ADCs of day 3 in patients with CR were significantly higher than in patients with residual tumor (P=0.007; P=0.005, respectively). When ΔADCs (day3) <=0.099×10-3mm2/s was used for threshold, the sensitivity was 79.6%, with specificity 73.7%. There was a negative correlation between the possibility of residual tumor and ΔADCs (day3) after CRT (ß=-8.426,P=0.047).

CONCLUSION

DWI with ADCs allows for detecting early treatment response of NPC and provides the opportunity to adjust following CRT regimen. 20 days after NAC initiated might be the optimal time for monitoring NAC response. ADCs on 3 days after NAC initiated was a potential imaging predictor for CRT in NPC.

CLINICAL RELEVANCE/APPLICATION

Accessing the curative effect of chemoradiotherapy in advanced NPC provides the opportunity to adjust following CRT regimen.

RC206-03 Prognostic Predictive Value of the Primary Lesion Apparent Diffusion Coefficient in Locoregionally Advanced Nasopharyngeal Carcinoma Patients: A Retrospective Cohort Study

Monday, Nov. 26 9:05AM - 9:15AM Room: E450B

Participants
Tao X. Huang, Guangzhou, China (*Presenter*) Nothing to Disclose

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PURPOSE

To investigate the prognostic predictive value of the primary lesion apparent diffusion coefficient (PL-ADC) prior treatment in locoregionally advanced nasopharyngeal carcinoma (LA-NPC).

METHOD AND MATERIALS

A cohort of 919 untreated LA-NPC patients from January 2011 to April 2014 were enrolled,All patients received 3-Tesla MRI examination prior treatment including diffusion weighted imaging(b values:0,1000 sec/ mm2) and the PL-ADC values were calculated.The prognostic value of PL-ADC in LA-NPC patients were analyzed using the Kaplan-Meier method and multivariate analysis.

RESULTS

The cut-off value of PL-ADC prior treatment was 748.5 ×10-6 mm2/s(AUC=0.664, 95% CI 0.598-0.729)according to the local relapse.Then patients were divided into PL-ADC-high(>=748.5 ×10-6 mm2/s) group and PL-ADC-low group(<748.5 ×10-6 mm2/s). PL-ADC-high group had a significant poor 3-year local relapse-free survival (LRFS) (91.3% vs. 98.3% , P< 0.001) and 3-year

disease-free survival (DFS)(72.1% vs 84.0%, P< 0.001) rates than PL-ADC-low group. However, no significance was found in 3-year distant metastasis-free survival(DMFS)and 3-year overall survival (OS) between groups.Results of multivariate analysis showed that high PL-ADC (>=748.5 ×10-6 mm2/s) is an independent risk factor for LRFS (HR 4.80, 95% CI 2.04-11.30, p= 0.0003) and DFS (HR 1.76, 95% CI 1.28-2.41, p= 0.0005) in LA-NPC.

CONCLUSION

The PL-ADC prior treatment is an independent prognostic factor for LRFS and DFS in LA-NPC patients, which might be used to select patients at high risk and administrate intense treatment.

CLINICAL RELEVANCE/APPLICATION

MRI is used for staging and evaluation and parameters obtained from fMR can potentially predict prognosis.

RC206-04 Prognostic Value of Restaging 18-FDG PET/CT Volumetric Parameters for Post-Index Irradiation Recurrence of Head and Neck Squamous Cell Carcinoma

Monday, Nov. 26 9:15AM - 9:25AM Room: E450B

Participants
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Kateryna O. Musaieva, MD, Vinnitsa, Ukraine (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Statistical image features of tumor metabolism from pretreatment 18F-FDG-PET/CT scans were studied for their potential to predict clinical outcome of the recurrent squamous cell carcinoma of head and neck (HNSCC).The purpose of this study was to define the prognostic value of metabolic and volumetric parameters for recurrent HNSCC and the role of salvage re-irradiation in overall survival in this cohort.

METHOD AND MATERIALS

Pretreatment PET/CT scans and after treatment PET/CT scans of 69 patients who underwent salvage treatment for recurrent HNSCC, were retrospectively evaluated. Metabolic response was assessed using PET response criteria for solid tumors (PERCIST). Multiple statistical image features related to the standard uptake value (SUV) were computed: metabolic tumor volume, maximum SUV, mean SUV, total lesion glycolysis (TLG). The correlation between the image features and local control and overall survival was calculated.

RESULTS

In this study we reported on the utility of PET/CT in survival prognostication for recurrent head and neck cancer. Our analysis indicates that whole body metabolic tumour volume WB MTV has potency in estimating the overall survival. High WB MTV (over 21,5 cc) corresponds with poor prognosis and low one-year survival rate (56,0% of patients will not survive over 12 months); on the other hand, one-year survival at WB MTV < 21,5 cc is estimated as 93,2%. This observation remained robust even after accounting for other known prognostic factors including salvage re-irradiation and recurrence location.

CONCLUSION

With this study we established a pre-salvage volumetric cut-off point (whole body metabolic tumour volume WB MTV of 21,5 cc) that predicts one-year survival with high accuracy. A more extensive study is warranted to decide if this cut-off point is acceptable for subgroup of patients who will undergo a salvage re-irradiation.

CLINICAL RELEVANCE/APPLICATION

18-FDG PET/CT for post-index treatment follow-up is well integrated into the management of HNSCC and a restaging PET/CT is performed to decide the further management, thus, volumetric prognostic parameters can be acquired for each patient without additional expenses.Our experiences herein illustrate the prognostic significance of 18-FDG PET/CT scan in the salvage treatment setting.

RC206-05 Diffusion Kurtosis Imaging for Characterizing Parotid Gland Tumors: A Preliminary Study

Monday, Nov. 26 9:25AM - 9:35AM Room: E450B

Participants
Hao Hu, Nanjing, China (*Presenter*) Nothing to Disclose
Wen Qian, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Diffusion kurtosis imaging (DKI) has been proven to be potential in diagnosing Sjögren's syndrome; however, no study has explored the usefulness of DKI in differentiating parotid gland tumors. To evaluate the potential of DKI in the characterization of parotid gland tumors.

METHOD AND MATERIALS

DKI was performed in 40 patients (33 benign and 7 malignant) with parotid gland tumors. DKI parameters including apparent diffusion coefficient (Dapp) and apparent kurtosis coefficient (Kapp) were obtained using DK model. Independent-samples t test, Steel-Dwass tests and receiver operating characteristic curve analyses were used for statistical analyses.

RESULTS

There were no significant differences in Dapp (1.283±0.443 ×10-3 mm2/s vs 0.937±0.250 ×10-3 mm2/s, P=0.055) and Kapp (0.575±0.323 vs 0.589±0.235, P=0.915) between benign and malignant group. In the subgroup analyses, pleomorphic adenomas

showed higher Dapp (P=0.001) and lower Kapp (P=0.031) than malignant tumors. Dapp showed better discriminative value (area under curve, 0.889; cutoff value, 1.319 ×10-3 mm2/s; sensitivity, 77.78%; specificity, 100%). Pleomorphic adenomas also showed higher Dapp (P<0.001) and lower Kapp (P<0.001) than Warthin's tumors. Kapp showed better discriminative value (area under curve, 0.994; cutoff value, 0.663; sensitivity, 94.44%; specificity, 100%). Warthin's tumors demonstrated higher Kapp than malignant tumors (P=0.003), while no significant difference was found on Dapp (P=0.298). The area under curve, sensitivity and specificity of Kapp for discriminating Warthin's tumors from malignant tumors at an optimal threshold of 0.735 were 0.905, 88.89%, and 85.71%, respectively.

CONCLUSION

DKI may be a promising imaging technique for characterizing parotid gland tumors.

CLINICAL RELEVANCE/APPLICATION

To assist in differentiation of parotid gland tumors.

RC206-06 Staging Nasopharyngeal Carcinoma

Monday, Nov. 26 9:35AM - 10:00AM Room: E450B

Participants
Barton F. Branstetter IV, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define how radiology contributes to the TNM staging of nasopharyngeal carcinoma. 2) Elaborate differences in NPC staging between the 7th and 8th edition of AJCC Staging Manual.

ABSTRACT

The 8th edition of the American Joint Committee on Cancer Staging Manual became active in January of 2018. This lecture will delineate the staging scheme for nasopharyngela carcinoma, emphasizing differences between the 7th and 8th editions of the AJCC Manual.

RC206-07 Staging Oropharyngeal Carcinoma

Monday, Nov. 26 10:05AM - 10:30AM Room: E450B

Participants
Lawrence E. Ginsberg, MD, Houston, TX (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Stress the importance of staging in oropharyngeal cancer treatment and research. 2) Review the rationale for revising oropharyngeal cancer staging in the HPV era. 3) Discuss the new features AJCC8 with respect to staging oropharyngeal cancer, emphasizing the differences between HPV +ive and HPV -ive; how to stage if p16 status is unknown.

RC206-08 The Radiologic Extranodal Extension (ENE) As Imaging Biomarker in Human Papillomavirus (HPV)-Related Oropharyngeal Squamous Cell Carcinoma (OPSCC)

Monday, Nov. 26 10:30AM - 10:40AM Room: E450B

Participants
Boeun Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Young Jun Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung Hwan Baek, Seoul, Korea, Republic Of (*Abstract Co-Author*) Consultant, STARmed; Consultant, RF Medical
Jeong Hyun Lee, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine whether radiologic extranodal extension (ENE) on pretreatment CT and MR could predict prognosis in patients with human papillomavirus (HPV)-related oropharyngeal squamous cell carcinoma (OPSCC).

METHOD AND MATERIALS

The study population was obtained from a historical cohort who was diagnosed as HPV-related OPSCC between March 2007 and March 2016. We included patients who had metastatic lymph node on pretreatment CT or MR. We analyzed demographic and clinical variables and radiologic ENE. The primary outcome was chosen as progression-free survival (PFS) and secondary outcome was the diagnostic performance of CT of MRI for the diagnosis of ENE among the patients who underwent neck dissection for lymph node. The Cox proportional hazard model identified predictors of PFS.

RESULTS

A total of 134 patients were included with a mean follow-up of 38 months, among whom 70 patients (52.2%) were ENE-positive. In univariate analysis, the presence of ENE, N-stage, T-stage, overall stage showed statistically significant association with worse PFS. In multivariate analysis, the presence of radiologic ENE was not significantly associated with PFS (P=0.141, hazard ratio [HR], 2.68; 95% CI, 0.72-9.97). The Kaplan-Meier disease-free survival curves showed that PFS was significantly lower in patients with radiologic ENE-positive disease, with a 3-year PFS of 95.3% versus 83.7%, respectively (log-rank P= .023)

CONCLUSION

Radiologic ENE in patients with HPV-related OPSCC tend to associate with PFS, but it did not reach statistical significance in our study. Large scale study are needed to determine whether radiologic ENE may be a useful for risk-stratifying patients with HPV-

related OPSCC.

CLINICAL RELEVANCE/APPLICATION

Radiologic ENE in patients with HPV-related OPSCC may serve as an imaging biomarker to tailor individual treatment regimens.

RC206-09 Detection of Loco-regional Recurrence in Malignant Head and Neck Tumors: A Comparison of CT, MRI, and FDG PET-CT

Monday, Nov. 26 10:40AM - 10:50AM Room: E450B

Participants
Hyungjin Lee, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Eun Soo Kim, Anyang, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Dae Young Yoon, MD, Kangdong-Gu, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
You Mie Han, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young Lan Seo, Kangdong-Gu, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Joo Yun, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To compare the diagnostic accuracy of contrast-enhanced computed tomography (CT), contrast-enhanced magnetic resonance imaging (MRI), and fluorodeoxyglucose (FDG) positron emission tomography (PET)-CT, alone and in combination, in detecting the loco-regional recurrence of malignant head and neck tumor.

METHOD AND MATERIALS

A total of 93 patients with loco-regional recurrence of malignant head and neck tumors underwent CT, MRI, and PET-CT within 30 days before surgery. CT, MRI, and PET-CT for each patient were retrospectively reviewed to determine the presence of recurrent tumors in the primary site on a patient-by-patient basis and that of regional lymph nodes on a level-by-level basis. The diagnostic accuracy of CT, MRI, and PET-CT, alone and combined, were accessed with the postoperative histopathological findings or with 12-months follow-up results as the standard of reference.

RESULTS

The sensitivity/specificity/accuracy of CT, MRI, and PET-CT for the detection of primary site recurrence was 89.9%/85.7%/89.3%, 94.9%/85.7%/93.6%, and 97.5%/92.9%/96.8%, respectively. The sensitivity/specificity/accuracy of CT, MRI, and PET-CT for the detection of nodal recurrence was 66.3%/99.4%/92.4%, 74.7%/99.4%/94.2%, and 85.5%/94.9%/93.0%, respectively. MRI plus PET-CT achieved the best performance in the receiver operating characteristics curve analysis (Az value=0.958 for primary site recurrence and 0.929 for nodal recurrence)

CONCLUSION

MRI plus PET-CT offered the highest diagnostic performance in the detection of loco-regional recurrence of malignant head and neck tumor, compared with CT, MRI, PET-CT, and other combinations including CT.

CLINICAL RELEVANCE/APPLICATION

Detecting the loco-regional recurrence of malignant head and neck tumors has important clinical applications because salvage protocols are available.

RC206-10 Staging Oral Cavity Carcinoma

Monday, Nov. 26 10:50AM - 11:15AM Room: E450B

Participants
Kristine M. Mosier, DMD, PhD, Indianapolis, IN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Know the critical elements for staging oral cavity carcinoma with the 8th Edition of the AJCC. 2) Know the differences in staging between the 7th and 8th Editions, why the changes were made, and the impact on management. 3) Know the differences between tumor thickness and depth of invasion.

RC206-11 MRI-based Texture Features Serve as the Risk Factors of Cervical Lymph Node Metastases in Early Stage Oral Tongue Cancer

Monday, Nov. 26 11:15AM - 11:25AM Room: E450B

Participants
Ying Yuan, shanghai, China (*Presenter*) Nothing to Disclose
Jiliang Ren, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Yiqian Shi, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Xiaofeng Tao, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Lymph node metastases are one of the most important prognostic factor of oral tongue squamous cell carcinoma (OTSCC). However, lymph node metastases are often occult without preoperative signs.It is controversial either to perform elective neck

dissection for all early stage (cT1-T2N0) OTSCC patients, because of the disparity in pathologic and clinical lymph node staging in OTSCC.The aim of the study was to assess MRI texture based quantitative imaging biomarkers in the discrimination of cervical lymph node metastases in early OTSCC.

METHOD AND MATERIALS

This retrospective study enrolled 49 cases of early stage (cT1-T2N0) OTSCC patients. Fifty-three textural parameters were extracted respectively from preoperative T2WI and CE-T1WI, based on histogram, gray-level co-occurrence matrices (GLCM), and gray-level run length matrices (GLRLM). Least absolute shrinkage and selection operator (LASSO) regression model was used for data dimension reduction and feature selection. The receiver operating characteristic (ROC) analyses were conducted to evaluate the ability of each texture model.

RESULTS

The texture models, which consisted of 5 selected features from T2WI and/or 4 selected features from CE-T1WI, were significantly associated with pathological lymph node metastases, independent of clinical risk factors (P<0.001). The areas under the curve (AUCs) of the T2WI and CE-T1WI based models were 0.84 and 0.747, respectively. The texture model combining T2WI and CE-T1WI showed the best discriminative ability, with AUC value of 0.923. The corresponding accuracy was 89.8%, sensitivity was 90.5% and specificity was 89.3%.

CONCLUSION

MRI-based texture features could help to preoperatively predict early stage OTSCC with pathological lymph node metastasis. Combined use of features derived from T2WI and CE-T1WI showed the best discriminative power.

CLINICAL RELEVANCE/APPLICATION

It is controversial either to perform elective neck dissection for all early stageOTSCC patients, because of the disparity in pathologic and clinical lymph node staging in OTSCC.Our study provided a new approach for accurate preoperative discrimination of cervical lymph node metastases in early OTSCC, which would be beneficial for clinical treatment selection.

RC206-12 Discrimination of Human Papillomavirus Status Using CT Texture Analysis in Oral Cavity and Oropharyngeal Squamous Cell Carcinomas

Monday, Nov. 26 11:25AM - 11:35AM Room: E450B

Participants
Miran Han, MD, Suwon, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ji Young Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Wook Choi, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Ju Ha, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Taehee Kim, MD, PhD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

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PURPOSE

To evaluate diagnostic performance of texture analysis for distinguishing HPV-status in oral cavity and oropharyngeal squamous cell carcinoma (OC-OPSCC), separately in primary tumor and metastatic lymph nodes.

METHOD AND MATERIALS

119 patients with primary tumor and 80 patients with metastatic lymph nodes who have known HPV status and underwent pretreatment contrast-enhanced CT scan were included in the study as discovery population. The CT texture analysis was performed using commercial TexRAD software. The conventional imaging features of primary tumor and metastatic lymph node were also evaluated. Differences between HPV-positive and HPV-negative groups were analyzed using $\chi 2$ test and independent t-test. For heterogeneity parameters, ROC curve analysis was performed for discrimination of HPV status. Intraclass correlation coefficients (ICC) were estimated to assess intra- and inter-reader measurement reliability. Diagnostic accuracy of texture analysis for HPV status were additionally evaluated in the separated validation-population that comprised of 18 patients obtained from outside hospital.

RESULTS

The HPV-positivity was 37.0% for the primary tumors and 46.3% for metastatic lymph nodes. HPV-positive groups demonstrated more frequently well-defined border of primary tumor (p<0.001) and cystic nodal metastasis (p=0.015). HPV-negative patients showed extracapsular modal spread more often (p=0.022). Entropy with medium filter (SSF 5) was the best discriminator between HPV-positive and HPV-negative primary tumors (AUC=0.852) and standard deviation (SD) without filter for metastatic lymph nodes (AUC=0.801). Diagnostic accuracy of entropy for primary tumor is 80.6% in discovery and 88.9% in validation group. In case of metastatic lymph nodes, accuracy of SD is 76.3% in discovery and 77.7% in validation groups. Intra and inter-reader measurement reliability for entropy and SD are almost perfect (ICC, 0.81~0.96).

CONCLUSION

We found significant differences in heterogeneity parameters from texture analysis on pretreatment contrast-enhanced CT, according to HPV status in OC-OPSCC. CT texture analysis can be additional tool for diagnosis of HPV status.

CLINICAL RELEVANCE/APPLICATION

CT texture analysis have possibility of diagnostic tool for discrimination of human papillomavirus status in oral cavity and oropharyngeal squamous cell carcinoma.

RC206-13 Staging Laryngeal and Hypopharyngeal Carcinoma

Monday, Nov. 26 11:35AM - 12:00PM Room: E450B

Participants
Peter M. Som, MD, New York, NY (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To understand the anatomy of the larynx and hypopharynx and the new Eighth Edition of the AJCC staging for larynx and the hypopharynx as well as the staging of the cervical lymph nodes.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC207

A Case-based Audience Participation Session (Genitourinary) (Interactive Session)

Monday, Nov. 26 8:30AM - 10:00AM Room: N227B

GU

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Peter S. Liu, MD, Solon, OH (*Moderator*) Nothing to Disclose
Peter S. Liu, MD, Solon, OH (*Presenter*) Nothing to Disclose
Katherine E. Maturen, MD, Ann Arbor, MI (*Presenter*) Royalties, Reed Elsevier; Royalties, Wolters Kluwer nv; Consultant, Allena Pharmaceuticals, Inc;
Tristan Barrett, MBBS, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To be introduced to a series of Genitourinary case studies via an interactive team game approach designed to encourage 'active' consumption of educational content. 2) To be able to use their mobile wireless device (tablet, phone, laptop) to electronically respond to various Genitourinary case challenges; participants will be able to monitor their individual and team performance in real time. 3) To receive a personalized self-assessment report via email that will review the case material presented during the session along with individual and team performance.

ABSTRACT

The extremely popular audience participation educational experience is back! GU Diagnosis Live is an expert-moderated session featuring a series of interactive Genitourinary case studies that will challenge radiologists' diagnostic skills and knowledge. Building on last year's successful Diagnosis Live premiere, GU Diagnosis Live is a lively, fast-paced game format: participants will be automatically assigned to teams who will then use their personal mobile devices to test their knowledge of GU radiology in a fast-paced session that will be both educational and entertaining. After the session, attendees will receive a personalized self-assessment report via email that will review the case material presented durinig the session, along with individual and team performance.

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Katherine E. Maturen, MD - 2014 Honored Educator

RC208

Emergency Neuroradiology: Imaging of Infection (Interactive Session)

Monday, Nov. 26 8:30AM - 10:00AM Room: E451A

ER HN NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
A. Orlando Ortiz, MD, MBA, Mineola, NY (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To diagnose head and neck infection on CT. 2) To characterize the nature of the infection. 3) To localize the infection and its spread. 4) To appreciate the potential complications that may result from the infection. 5) To recognize underlying abnormalities that may predispose to head and neck infection. 6) Examine the imaging features of infective conditions of the brain and meninges. 7) Identify the varied CT findings in brain infections as they present in the Emergency Department, and assess the role of MRI in further diagnostic characterization and management. 8) Review the epidemiology of spine infection. 9) Focus on making the diagnosis of infectious spondylitis utilizing: clinical findings, imaging findings, biopsy. 10) Distinguish infectious spondylitis from other radiographic mimics.

Sub-Events

RC208A Head and Neck Infection

Participants
Wayne S. Kubal, MD, Tucson, AZ (*Presenter*) Author, Reed Elsevier; Editor, Reed Elsevier

LEARNING OBJECTIVES

1) To diagnose head and neck infection on CT. 2) To characterize the nature of the infection. 3) To localize the infection and its spread. 4) To appreciate the potential complications that may result from the infection. 5) To recognize underlying abnormalities that may predispose to head and neck infection.

RC208B Brain Infection

Participants
Diego B. Nunez Jr, MD, MPH, Boston, MA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Examine the imaging features of infective conditions of the brain and meninges. 2) Identify the varied CT findings in brain infections as they present in the Emergency Department, and assess the role of MRI in further diagnostic characterization and management.

RC208C Spine Infection

Participants
A. Orlando Ortiz, MD, MBA, Mineola, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the epidemiology of spine infection. 2) Focus on making the diagnosis of infectious spondylitis utilizing: clinical findings, imaging findings, biopsy. 3) Distinguish infectious spondylitis from other radiographic mimics.

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RC209

Gastrointestinal Series: Pancreas Imaging

Monday, Nov. 26 8:30AM - 12:00PM Room: E353C

GI OI

AMA PRA Category 1 Credits ™: 3.00
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants
Eric P. Tamm, MD, Houston, TX (*Moderator*) Institutional Research Grant, General Electric Company
Desiree E. Morgan, MD, Birmingham, AL (*Moderator*) Institutional Research Grant, General Electric Company
Bhavik N. Patel, MD,MBA, Stanford, CA (*Moderator*) Nothing to Disclose
Koenraad J. Mortele, MD, Boston, MA (*Moderator*) Nothing to Disclose
So Yeon Kim, MD, Seoul, Korea, Republic Of (*Moderator*) Nothing to Disclose

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Sub-Events

RC209-01 Pancreatic Cancer Staging Update

Monday, Nov. 26 8:30AM - 8:50AM Room: E353C

Participants
Eric P. Tamm, MD, Houston, TX (*Presenter*) Institutional Research Grant, General Electric Company

LEARNING OBJECTIVES

1. To understand changes that have occurred recently in the AJCC staging system. 2. To understand the purpose of AJCC staging currently for pancreatic cancer (prognosis versus management). 3. To understand the categorization of cancer as resectable/borderline resectable/clearly unresectable. 4. To understand how to use the above information to guide effective radiology reporting.

LEARNING OBJECTIVES

1) Understand recent changes in the staging of pancreatic cancer. 2) Understand the differences between societies in the categorization of borderline resectable pancreatic cancer. 3) Apply the above understanding of staging and categorizing pancreatic cancer to improve the clarity and utility of radiology reports for the staging of pancreatic cancer and to aid clinical management.

RC209-02 Implementation of NCCN Guideline for Assessment of Resectability of Pancreatic Adenocarcinoma: Software Development and Validation

Monday, Nov. 26 8:50AM - 9:00AM Room: E353C

Participants
Ying Li, MD, Boston, MA (*Presenter*) Nothing to Disclose
Wenli Cai, PhD, Boston, MA (*Abstract Co-Author*) Stockholder, IQ Medical Imaging LLC
Sun Ying-Shi, MD, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

The purpose of this study is to develop and evaluate a CAA software to assess the resectability of pancreatic adenocarcinoma by using NCCN guideline and to generate a structured report by using SAR and APA structured reporting template in imaging evaluation of pancreatic adenocarcinoma.

METHOD AND MATERIALS

The CAA software of resectability of pancreatic adenocarcinoma was designed in terms of NCCN guidelines, which consists of three procedures: tumor characterization evaluations, resectability assessment and structured reporting. Forty-five patients with pathologically proven pancreatic adenocarcinoma who underwent CT examination between January 2015 and June 2016 were retrospectively collected to validate the software. Four independent readers (radiologists) assessed the resectability status of pancreatic adenocarcinoma without using (subjective evaluation) and with using the software (CAA evaluation), respectively. The agreements between subjective evaluation and CAA evaluation of four readers were tested by using Cohen's kappa coefficient. The agreement for four subjective evaluations and that for four CAA evaluations were tested with McNemar test and intra-class correlation coefficients (ICCs) were calculated.

RESULTS

The ICC among four subjective evaluations was 0.569 (95% confidence interval (CI): 0.426~0.704, P < 0.01), moderate agreement, whereas the ICC among four CAA evaluations was 0.687 (95% CI: 0.565~0.794, P < 0.01), substantial agreement. For the subgroup of 26 patients after excluding 19 unanimous unresectable cases, the ICC among four subjective evaluations was -0.074 (95% CI, -0.181 ~0.109, P = 0.811), indicating no agreement, whereas the ICC among four CAA evaluations was 0.355 (95% CI, 0.159~0.579, P<0.001), indicating fair to moderate agreement. The inter-observer agreement was statistically significantly improved with the CAA software.

CONCLUSION

The use of CAA software resulted in a significant improvement in inter-observer agreements of resectability assessment of pancreatic adenocarcinoma among clinicians, and has the potentials to improve the standardization for managing pancreatic adenocarcinoma patients in clinical practice.

CLINICAL RELEVANCE/APPLICATION

The use of CAA software has the potentials to improve the standardization for managing pancreatic adenocarcinoma patients in clinical practice.

RC209-03 Quantitative Assessment of Tumor Blood Flow with Volume Perfusion CT: A New Imaging Biomarker for Predicting Prognosis in Patients with Pancreatic Cancer after Chemoradiotherapy

Monday, Nov. 26 9:00AM - 9:10AM Room: E353C

Participants
Yutaka Toyomasu, MD, Mie, Japan (*Presenter*) Nothing to Disclose
Yasutaka Ichikawa, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Motonori Nagata, MD, PhD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Ahmed H. Heussein, MD,MSc, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshihito Nomoto, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Hajime Sakuma, MD, Tsu, Japan (*Abstract Co-Author*) Research Grant, Fuji Pharma Co, Ltd; Research Grant, DAIICHI SANKYO Group; Research Grant, FUJIFILM Holdings Corporation; Research Grant, Siemens AG; Research Grant, Nihon Medi-Physics Co, Ltd; Speakers Bureau, Bayer AG
Naoki Nagasawa, RT, PhD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Kakuya Kitagawa, MD, PhD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Akinori Takada, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Akio Yamazaki, RT, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Masayuki Naito, Mie, Japan (*Abstract Co-Author*) Nothing to Disclose
Tomoko Kawamura, Mie, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Volume perfusion CT (VPCT) is a new technique that can provide three-dimensional perfusion quantification for the entire pancreas. The aims of this study were to establish a VPCT protocol with a total radiation dose approximately equal to conventional dynamic CT, and to determine the value of quantifying pretreatment perfusion parameters in predicting prognosis of the patients with pancreatic cancer who were scheduled for chemoradiotherapy (CRT).

METHOD AND MATERIALS

Consecutive 37 patients with biopsy-proven newly diagnosed pancreatic adenocarcinoma who were scheduled for CRT were prospectively recruited. VPCT was performed on a dual-source CT scanner (SOMATOM Force). The CT acquisition parameters included Z-axis coverage of 22.4cm, tube voltage of 80kv, dynamic acquisitions of 40, and acquisition duration of 60s. Blood flow (BF), blood volume (BV), and mean transit time (MTT) in pancreatic cancer were quantified from VPCT images. Univariate and multivariate analyses were performed to evaluate the prognostic value of BF, BV and MTT by VPCT, as well as CA19-9, age, sex, primary tumor site, tumor diameter and surgical indication for the prediction of progression-free survival (PFS) and overall survival (OS).

RESULTS

The mean dose-length product and estimated effective dose of VPCT was 619±145 mGy*cm and 9.3±2.2 mSv, respectively. Twenty-two (59%) of 37 patients experienced disease recurrence (n=18) or death (n=11) during the median observation period of 14 months. In univariate analysis, BF (<48.4 vs >=48.4 mL/100mL/min) and BV (<4.32 vs >=4.32 mL/100mL) were significant prognostic factors for both PFS (BF, p=0.013; BV, p=0.017) and OS (BF, p=0.007; BV, p=0.045), while MTT was not a significant predictor for PFS (p=0.116) or OS (p=0.236). In multivariate analysis, BF (<48.4 vs >=48.4 mL/100mL/min) was an independent prognostic factor for PFS (Hazard ratio (95% CI), 2.772 (1.154-6.660); p=0.023) and OS (Hazard ratio (95% CI), 6.198 (1.333-28.810); p=0.02).

CONCLUSION

VPCT allows for perfusion quantification for the entire pancreas with radiation dose approximately equal to conventional dynamic CT. The pretreatment tumor blood flow derived from the VPCT is an independent prognostic factor for patients with pancreatic cancer after CRT.

CLINICAL RELEVANCE/APPLICATION

Tumor blood flow quantified by VPCT is a novel imaging biomarker that permits prediction of the prognosis in patients with newly diagnosed pancreatic cancer who are scheduled for CRT.

RC209-04 The Prognostic Utility of Differential Enhancement Patterns Measured on Dual Energy CT in Patients with Pancreatic Ductal Adenocarcinoma

Monday, Nov. 26 9:10AM - 9:20AM Room: E353C

Awards
Trainee Research Prize - Resident

Participants
Ahmed M. Amer, MD, Birmingham, AL (*Presenter*) Nothing to Disclose
Yufeng Li, PhD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
David S. Summerlin, MD, Gardendale, AL (*Abstract Co-Author*) Nothing to Disclose
Constantine M. Burgan, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Andrew D. Smith, MD,PhD, Birmingham, AL (*Abstract Co-Author*) President and Owner, Radiostics LLC; President and Owner, eRadioMetrics LLC ; President and Owner, Liver Nodularity LLC ; President and Owner, Color Enhanced Detection LLC ; Patent holder
Michelle M. McNamara, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Desiree E. Morgan, MD, Birmingham, AL (*Abstract Co-Author*) Institutional Research Grant, General Electric Company

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PURPOSE

To investigate the prognostic value of baseline DECT imaging biomarkers in patients with pancreatic ductal adenocarcinoma (PDAC).

METHOD AND MATERIALS

Retrospective IRB-approved HIPAA-compliant study of 158 consecutive adult patients (79M/79F, mean age 68) with pathologically proven treatment naïve PDAC who had multiphasic pancreas DECT obtained 12/20/12 through 3/9/17. Regions of interest (ROIs) in tumor core, tumor border, pancreas border, and normal pancreas were recorded on both 52 keV and Iodine images. The Delta across the tumor-normal pancreas interface was calculated. Clinical outcomes included overall survival (OS), distant metastases-free survival (DMFS), and tumor grade/lymphovascular invasion on surgical pathology. Quantitative DECT metrics were associated with clinical outcomes using Cox regression, Pearson correlation, and ROC analysis.

RESULTS

93 patients with advanced stage (50 locally advanced, 43 metastatic) and 65 with lower stage (48 resectable, 17 borderline). Low peripheral tumor enhancement on Iodine images was associated with shorter OS in lower stage (7.6 vs 19.7 months) (HR=5.89; 95%CI 1.89 to 15.44; P=0.003) and in advanced stage patients (6.8 vs 12.4 months) (HR=2.04; 95%CI 1.09 to 3.58; P=0.027). High Delta tumors on 52 keV were associated with shorter OS in advanced stage compared to Low Delta tumors (10.8 vs 12.9 months) (HR, 1.71; 95%CI 1.07 to 2.74; P=.024). High Delta tumors were associated with shorter DMFS on 52 keV (HR=2.6; 95%CI 1.16 to 5.72; P=0.02) and Iodine images (HR=2.34; 95%CI 1.02 to 5.12; P=0.04). In multivariate analysis adjusting for age, sex, tumor size, and surgery status, High Delta on 52 keV images was associated with shorter DMFS (HR=2.39; 95%CI 1.006 to 5.58; P=0.04). Tumor core enhancement was lower in metastatic population on both 52 keV (P=0.01) and Iodine images (P=0.008) compared to nonmetastatic patients. The Delta across the tumor-normal pancreas interface on 52 keV was associated with lymphovascular invasion (P= 0.04) and associated with tumor grade on Iodine images (P=0.04).

CONCLUSION

Quantitative DECT metrics in treatment naïve PDAC patients are prognostic of OS and other important clinical outcomes.

CLINICAL RELEVANCE/APPLICATION

DECT-based stratification of patients with PDAC can be accomplished using 52 keV and Iodine images, and can provide prognostic information on survival.

RC209-05 Factors Affecting Reproducibility of Radiomic Features in Pancreatic Parenchyma and Pancreatic Ductal Adenocarcinoma on Contrast-enhanced CT Imaging

Monday, Nov. 26 9:20AM - 9:30AM Room: E353C

Participants
Rikiya Yamashita, MD,PhD, New York, NY (*Presenter*) Nothing to Disclose
Thomas Perrin, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Jayasree Chakraborty, New York, NY (*Abstract Co-Author*) Nothing to Disclose
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William Jarnagin, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Amber Simpson, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Richard Kinh Gian Do, MD, PhD, New York, NY (*Abstract Co-Author*) Consultant, Bayer AG

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PURPOSE

To explore the reproducibility of radiomic features in pancreatic parenchyma and pancreatic ductal adenocarcinomas (PDAC) in patients who underwent consecutive contrast-enhanced CT (CECT) scans.

METHOD AND MATERIALS

In this IRB-approved and HIPAA-compliant retrospective study, consecutive patients with pancreatic tumors who underwent two CECT with variable imaging protocols within two weeks were included. In each patient, pancreas parenchyma and/or PDAC were manually segmented by two radiologists independently using a commercial software. 266 radiomic features, which consist of 12 shape and 254 texture features, were extracted using Matlab. The concordance correlation coefficient (CCC) of each feature was calculated to assess the feature reproducibility for 3 different scenarios, 1) two radiologists performing segmentations on the same CECT, 2) each radiologist performing segmentations on paired CECTs, and 3) one radiologist' segmentation on one CECT, with the other radiologist's segmentation on the paired CECT.

RESULTS

The study cohort included 37 unique patients for the analyses of pancreas parenchyma and 18 patients with PDAC. Paired CECT scans had different protocols with ranges of slice thickness from 2.5 to 5 mm and contrast injection rates from 1-4 cc/s. For pancreas parenchyma, 47/266 (17.7%) and 48/266 (18.1%) features showed CCC>0.90 for scenario 1, 14/266 (5.3%) and 15/266 (5.6%) features showed CCC>0.90 for scenario 2, and 13/266 (4.9%) and 10/266 (3.8%) features showed CCC>0.90 for scenario 3. For PDAC, 11/266 (4.1%) and 17/266 (6.3%), 1/266 (0.4%) and 5/266 (1.9%), and no features showed CCC>0.90 for scenarios 1, 2, and 3, respectively.

CONCLUSION

A greater number of radiomic features with high CCC were found for pancreas parenchyma than for PDAC. Reproducibility of radiomic feature may be affected by differences in CECT scanning parameters to a greater degree than radiologist segmentation.

CLINICAL RELEVANCE/APPLICATION

Reproducibility of radiomic features for pancreas parenchyma and PDAC is affected by radiologist segmentation and variability of CECT scanning parameters and requires further prospective investigation.

RC209-06 Autoimmune Pancreatitis Update

Monday, Nov. 26 9:30AM - 9:50AM Room: E353C

Participants
So Yeon Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Understand the recent evolution of the concepts and diagnostic criteria for autoimmune pancreatitis. 2) Recognize typical and atypical manifestation of autoimmune pancreatitis. 3) Provide an imaging approach for differentiating autoimmune pancreatitis from its mimickers.

ABSTRACT

Autoimmune pancreatitis (AIP) is a distinct form of chronic pancreatitis that shows evidence of possible involvement of autoimmune mechanisms such as increased serum levels of IgG or IgG4, or presence of autoantibodies, and effective response to steroid therapy. For the past decade, many different criteria for AIP have been proposed, including the Japanese Pancreas Society (2002, 2006, 2010), the Korean criteria (2007), the HISORt criteria by the Mayo clinic (2006, 2009), the Asian Consensus criteria (2008), and the most recent International Consensus Diagnostic Criteria (2010). As AIP is becoming increasingly recognized as a worldwide entity, it was found that AIP should be divided into two subtypes according to histologic patterns: 1) lymphoplasmacytic sclerosing pancreatitis (LPSP) or AIP without granulocyte epithelial lesions (GELs); 2) idiopathoic duct-centric pancreatitis (IDCP) or AIP with GELs. Furthermore, the two groups of AIP differ in their clinical presentation and outcome. Pancreatic imaging is one of the most important diagnostic criteria in the guidelines. As AIP and its extrapancreatic manifestation have diverse imaging findings, they can mimic other diseases such as pancreatic cancer or lymphoma. Parenchymal involvement of AIP can be diffuse or focal. The diffuse type is more commonly seen than the focal lesion. The diffuse type is seen as diffuse enlargement of the pancreatic parenchyma (i.e., a sausage-like appearance); the absence of normal pancreatic clefts (i.e., featherless); and minimal peripancreatic infiltration. A capsule-like peripancreatic rim appears to be a highly specific finding of AIP. The focal type manifests as an focal enlargement of the pancreas or formation of a mass. The presence of long or multifocal stricture of the pancreatic duct without marked upstream dilatation is frequently noted. Narrowing of the intrapancreatic bile ducts has been observed in up to 90% of AIP patients, corresponding to the finding that the majority of these patients presented with obstructive jaundice. The presence of extrapancreatic organ involvement can be a supportive feature in the diagnosis of type 1 AIP.

RC209-07 CT Texture Analysis in Differentiating Pancreatic Ductal Adenocarcinoma from Autoimmune Pancreatitis

Monday, Nov. 26 9:50AM - 10:00AM Room: E353C

Participants
Satomi Kawamoto, MD, Laurel, MD (*Presenter*) Nothing to Disclose
Seyoun Park, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Linda C. Chu, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Shahab Shayesteh, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Daniel Fadaei Fouladi, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Karen M. Horton, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Alan Yuille, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Ralph H. Hruban, Baltimore, MD (*Abstract Co-Author*) Board Member, miDiagnostics;
Elliot K. Fishman, MD, Baltimore, MD (*Abstract Co-Author*) Institutional Grant support, Siemens AG; Institutional Grant support, General Electric Company; Co-founder, HipGraphics, Inc

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PURPOSE

Autoimmune pancreatitis (AIP) shares overlapping clinical and imaging features with pancreatic ductal adenocarcinoma (PDAC). Importantly, treatment of the two conditions is different. The purpose of this study is to determine if CT texture feature of AIP and PDAC provide possibility of distinguishing these two conditions.

METHOD AND MATERIALS

As an IRB-approved matched case-control study, 32 patients with AIP (male=25, female=7, average age: 63.0±9.7 years) and 40

patients with PDAC (male=17, female=23, average age: 66.0±8.9 years) who had dedicated pancreas protocol CT between 2004 and 2017 were retrospectively evaluated. All CT imaging was performed in dual-phase imaging with intravenous contrast administration. All images were reconstructed at 0.75 mm thickness and 0.5 mm increment. Segments of pancreas involved by PDAC and autoimmune pancreatitis (areas of enlargement, altered enhancement, effacement of pancreatic duct) as well as uninvolved segments of the pancreas were segmented in 3D using commercially available software, VelocityAI (Varian Medical Systems, USA). 478 radiomics features from the segmented volume using venous phase images were extracted to express pancreas phenotype, and random forest was used for the classification PDAC and AIP. CT reports were reviewed to determine the radiological diagnosis based on CT imaging.

RESULTS

In AIP, pancreas was diffuse involved in 15 cases, and focally involved in 17 cases. Among 32 cases of AIP, diagnosis of AIP was suspected or included in the differential diagnosis based on the CT reports in 14 cases (44%). Overall accuracy of texture analysis for differentiation of AIP and PDAC with 10 fold cross-validation was 94.4% (68 among 72 cases were correctly classified). Two among 40 PDAC cases were incorrectly classified as AIP, and 2 among 32 AIP cases were incorrectly classified as PDAC, giving sensitivity of 95.0% and specificity of 93.8%.

CONCLUSION

CT texture analysis is accurate in differentiating autoimmune pancreatitis and pancreatic ductal adenocarcinoma.

CLINICAL RELEVANCE/APPLICATION

Using texture data as a supplemental information in diagnosing pancreatic mass will be helpful for differentiating pancreatic adenocarcinoma and autoimmune pancreatitis.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Elliot K. Fishman, MD - 2012 Honored EducatorElliot K. Fishman, MD - 2014 Honored EducatorElliot K. Fishman, MD - 2016 Honored EducatorElliot K. Fishman, MD - 2018 Honored Educator

RC209-08 Differentiation of Pancreatic Cancer from Focal Mass-forming Pancreatitis: Added Value of Magnetic Resonance Elastography to Dynamic Contrast-enhanced Magnetic Resonance Imaging

Monday, Nov. 26 10:00AM - 10:10AM Room: E353C

Participants
Shi Yu, MS, Shenyang, China (*Presenter*) Nothing to Disclose
Yanqing Liu, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Min Wang, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Qiyong Guo, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Thin study is to investigate if incorporating MR elastography (MRE) with conventional dynamic contrast-enhanced MR imaging (DCE-MRI) can provide a benefit in differentiating pancreatic cancer (PC) and focal mass-forming pancreatitis (FMFP).

METHOD AND MATERIALS

We retrospectively identified 21 FMFP patients and 42 PC patients confirmed by histopathological examinations through a prospectively maintained database. The patients did DCE-MRI together with a dual-frequency MRE at 40Hz and 60Hz with a 32-slice, flow-compensated, spin-echo(SE), EPI pulse sequence. A five-point scale for likelihood of PC was used by two experienced radiologist in consensus. To evaluate the added value of MRE, the ROC analysis of a combined technique using both MRE and MR imaging was determined by logistic regression models to calculate probabilities. To estimate how accurately the above classifiers would perform in practice, a leave-one-out cross-validation was applied for all the above ROC analysis.Results from ROC analysis with cross-validation were carried out with 'R' statistical computing software (R version 3.4.0).

RESULTS

The mean stiffness with FMFP was 2.03kPa (IQR:1.75~2.32kPa) at 40Hz and 3.05kPa (2.71~3.52kPa) at 60Hz, both significantly lower than those of PC, showing 3.21kPa (IQR:2.38~4.41kPa) and 4.95kPa (IQR:3.64~7.23kPa), respectively (Mann-Whitney U test, both P< 0.001). Accuracies for determination of PC using 60Hz-MRE, 40Hz-MRE, DCE-MRI and the combination of DCE/MRI and 60Hz-, 40Hz-MRE, were, 70.2%, 77.4%, 83.3%, 75.0% and 92.9%, respectively. The combined DCE-MRI with 40Hz-MRE significantly improved diagnostic performance to DCE-MRI alone (Area under the ROC curve [AUC]: 0.937 vs 0.783), by increasing specificity (96.9% vs 62.1%), without a significant loss of sensitivity (90.9% vs 94.6%). The combined DCE-MRI with 60Hz-MRE didn't significantly change diagnostic performance of DCE-MRI alone (AUC: 0.761 vs 0.783, P>0.05).

CONCLUSION

Combined assessment of 40Hz-MRE to DCE-MRI may help to differentiate PC from FMFP in a noninvasive fashion.

CLINICAL RELEVANCE/APPLICATION

The incorporation of 40Hz-MRE into a standard MRI protocol may enhance the value of routine pancreatic MR imaging for better non-invasive differentiation between PC and FMFP.

RC209-09 Acute Pancreatitis Reporting

Monday, Nov. 26 10:30AM - 10:50AM Room: E353C

Participants
Bhavik N. Patel, MD,MBA, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the new reporting terminology based on the Revised Atlanta Classification. 2) Be familiar with the morphologic classification of acute pancreatitis and associated fluid collections. 3) Know the reporting template for acute pancreatitis.

RC209-10 Pancreatic Neuroendocrine Tumors

Monday, Nov. 26 10:50AM - 11:10AM Room: E353C

Participants
Desiree E. Morgan, MD, Birmingham, AL (*Presenter*) Institutional Research Grant, General Electric Company

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LEARNING OBJECTIVES

1) Identify the imaging features of pancreatic endocrine tumors that differentiate them from pancreatic ductal adenocarcinoma. 2) Understand the World Health Organization grading of pancreatic endocrine tumors and implications for staging and treatment of patients. 3) Apply knowledge of specific strengths and unique clinical utilities of different imaging modalities during evaluation of patients with pancreatic endocrine tumors.

RC209-11 A Preliminary Study about the Robustness of CT Derived Radiomic Features (RF) In Pancreatic NEN and Their Ability in Predicting Tumors' Histologic Characteristics

Monday, Nov. 26 11:10AM - 11:20AM Room: E353C

Participants
Giulia Benedetti, MD, Milan, Italy (*Presenter*) Nothing to Disclose
Marta Maria Panzeri, MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Martina Mori, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Carla Sini, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Maurizio Barbera, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesca Muffatti, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
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Massimo Falconi, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Claudio Fiorino, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To assess inter-observer variability in delineating pancreatic neuroendocrine neoplasia (NEN) on CT images, and to evaluate ability of RF in predicting histopathologic characteristics of pancreatic NEN.

METHOD AND MATERIALS

30 histologically confirmed pancreatic NEN were contoured on CT images by 3 blinded observers. Contours were delineated on arterial or venous phase, and then projected onto the pre-contrast acquisition and adjusted to correct small anatomical discrepancies. Interobserver contouring variability was assessed by DICE-index. 71 RF were extracted from each observer's contours, their robustness was investigated against contour variability with Spearman-R and Intra-Class Correlation (ICC). Histologic data (HD) were collected from the surgical specimen: Ki67 (%), Histologic grade, N, M and vascular invasion (VI). Significant differences of RF according to histologic data were tested.

RESULTS

Volume mean and median were 14.2 cc and 1.3 cc, respectively. A satisfactory agreement was found, with mean DICE=0.78 and no significant differences between observers. 66/72 RF were very robust (ICC>0.9); 4/72 showed ICC<0.8, mostly in the 'Neighbourhood intensity-difference' RF family. Average R-values were 0.90 for RF with ICC>0.9 and 0.85 for the others. Only 'sphericity' had R-value<0.6. 19 non-redundant features were selected. Patients with VI had higher Mean HU (p=0.039), Entropy (p=0.035), Volume (p=0.002, AUC=0.87) and Low-Intensity Run Emphasis (p=0.021). Second Angular Moment was significantly related to Ki67% (p=0.018) and Volume with M (p=0.41, AUC=0.80).

CONCLUSION

Despite a small number of patients, results show a good robustness of CT derived RF in NEN and a good ability to predict their histologic characteristics. Therefore, RF have a possible future role in predicting NEN's outcome.

CLINICAL RELEVANCE/APPLICATION

NEN can present with different macroscopic and histologic features. Unfortunately, only histology has a validated role in predicting NEN's outcome. Therefore, there is a need for implementing clinicians' tools to stratify and predict the prognosis of NEN. Radiomic is a promising field to build predictive models relating imaging features to clinical outcomes, especially for neoplasms. Nevertheless, its robustness is still under investigation. Our study is one of the first to assess RF reliability and its ability to predict hystologic feature in this group of Patients.

RC209-12 Differentiation Atypical Pancreatic Neuroendocrine Tumors from Pancreatic Ductal Adenocarcinomas: Using Volumetric CT Texture Analysis

Monday, Nov. 26 11:20AM - 11:30AM Room: E353C

Participants
Jiali Li, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Yaqi Shen, PhD, MD, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Daoyu Hu, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Zhen Li, MD, PhD, Wuhan, China (*Presenter*) Nothing to Disclose

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PURPOSE

To investigate whether CT texture analysis (CTTA) can be used to differentiate atypical pancreatic neuroendocrine tumors (pNET) from pancreatic ductal adenocarcinomas(PDAC).

METHOD AND MATERIALS

This single-center retrospective study was approved by local institutional review board and the requirement for informed consent was waived. We retrospectively analyzed 210 patients in pathology database between January 2012 and May 2017, according to inclusion and exclusion criterion, 127 patients with 50 PDACs and 77 pNETs were included finally. Traditional imaging manifestations and texture parameters (mean, median, 5th ,10th, 25th, 75th,90th percentiles, skewness, kurtosis and entropy) were extracted from portal images and compared between these two tumors by using proper statistical method. The optimal parameters for differentiating PDACs and atypical pNETs was gained through receiver operating characteristic (ROC) curves and area under curve(AUC) analysis.

RESULTS

On the basis of arterial enhancement, 52 pNETs (67%,52/77) were typical and 25 pNETs (32%,25/77) were atypical(nonhypervascular). Well-defined margin, homogeneity and no duct dilatation on portal phase were easier to appear in atypical pNET compared to PDAC, although there weas no statistical difference. Atypical pNETs had statistically higher mean, median, 5th ,10th and 25th percentiles (P=0.006,0.024,0.000,0.001,0.021, respectively) and statistically lower skewness(P=0.017) versus PDACs. However, there were no difference for 75th,90th percentiles, kurtosis and entropy between these two tumors (P=0.232,0.415,0.143,0.291, respectively). For differentiating PDACs and atypical pNETs, 5th percentile (AUC=0.811) and5th+skewness (AUC=0.887) were optimal parameters for alone and combined diagnosis respectively.

CONCLUSION

CT texture features, especially combined diagnosis of 5th+skewness, can be applied as a quantitative tool to distinguish atypical pNETs from PDACs.

CLINICAL RELEVANCE/APPLICATION

CTTA could be used as a non-invasive alternative tool to reduce the number of false diagnoses of atypical pNETs as PDACs. It would be useful for surgery planning and the selection of combined treatments.

RC209-13 Characterization of Small Insulinomas with Typical and Atypical Appearance on Pancreatic 3T MRI in Comparison to GLP-1-R PET/CT and Histopathology

Monday, Nov. 26 11:30AM - 11:40AM Room: E353C

Participants
Patricia Wiesner, Basel, Switzerland (*Presenter*) Nothing to Disclose
Kwadwo Antwi, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Elmar M. Merkle, MD, Basel, Switzerland (*Abstract Co-Author*) Speakers Bureau, Siemens AG Research Grant, Bayer AG Research Grant, Guerbet SA Research Grant, Bracco Group Research Grant, Siemens AG
Daniel Boll, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
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Tobias Heye, MD, Basel , Switzerland (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To evaluate imaging characteristics of small insulinomas with typical and atypical appearance on 3T MRI in comparison to surgery or GLP-1-R PET/CT.

METHOD AND MATERIALS

31 patients with endogenous hyperinsulinemic hypoglycemia suspicious for insulinoma (24f, 7m, mean 53 y, 19-81 y) were included, patients with multiple lesions were excluded. Patients underwent pancreatic 3T MRI including T1w, T2w, diffusion weighted imaging (DWI) and dynamic contrast enhanced (DCE) imaging using compressed sensing techniques (GRASP; Golden-Angle Radial Sparse Parallel). GLP-1-R (Glucagon like peptide-1 receptor)-PET/CT 2.5h after i.v. administration of 68Ga-DOTA Exendin-4 (all patients) and surgery (29 patients) served as reference standard. One non-blinded reader measured tumor-to-background ratios (T2BR) on MRI data. T2BR were defined as <0.8=hypointense; 0.8-1.2 isointense/less conspiciuous; >1.2=hyperintense. Three blinded expert readers (>10 years of experience in abdominal radiology) analyzed MRI data for presence of lesions, when at least 2 readers detected the same lesion per case, the lesion was considered detected.

RESULTS

In 31 patients, 30 lesions in total were identified by GLP-1-R PET/CT, one surgically proven insulinoma was not identified. Mean lesion size was 11.9 mm (6-24 mm) on MRI. Three expert readers detected 22 lesions on MRI, resulting in a 71% accuracy. 9 lesions were considered undetected, out of these, the non-blinded reader was able to measure T2BR in 5 lesions. 4 lesions were not visible on MRI. The undetected 5 lesions with a mean size of 8.8 mm (6-12 mm) were less conspicuous with mean T2BR for T1w=0.71; T2w=1.02; high b-value DWI=0.92 compared to detected lesions, mean size 12.6 mm (6-24 mm), mean T2BR for T1w=0.65; T2w=1.63, high b-value DWI=1.3. Arterial hyperenhancement was present in 17/22 (77%) detected lesions and in 3/5 (60%) undetected lesions.

CONCLUSION

Pancreatic MRI can visualize small lesions in patients with suspected insulinoma. Typical insulinomas show hypointense signal on T1w, hyperintense on T2w and DWI and arterial hyperenhancement on DCE-MRI. Atypical insulinomas may be small, are less conspicuous, show hypo-/isointense signal on T1w and isointense on T2w and DWI.

CLINICAL RELEVANCE/APPLICATION

A proportion (18.5%) of small insulinomas are less conspiciuous on MRI due to atypical presentation. Combination of GLP-1-R PET/CT and MRI facilitates locating a lesion and performing minimal invasive surgery.

RC209-14 Approach to Cystic Pancreatic Lesions

Monday, Nov. 26 11:40AM - 12:00PM Room: E353C

Participants
Koenraad J. Mortele, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be familiar with the specific imaging features of a vast array of cystic pancreatic lesions. 2) Be able to name the most common cystic pancreatic lesions seen in clinical practice. 3) Have an understanding of how to manage the cystic pancreatic lesions from an imaging follow up standpoint.

ABSTRACT

Cystic pancreatic neoplasms are a diverse group of tumors which vary in aggressiveness from benign to dysplastic or pre-malignant to frankly invasive cancers. The true prevalence of pancreatic cystic lesions is unknown but has been previously reported to be between 2.4% and 25 % (1-3). At the author's institution, Lee reported the prevalence of incidental pancreatic cystic lesions detected on MRI to be 13.5% and showed that both prevalence and cyst size increased with age (4). Since most cystic pancreatic lesions are neoplastic, accurate diagnosis via a combination of clinical information, imaging, and endoscopic ultrasound (EUS) with cyst fluid analysis is of utmost importance (5-8). The primary purpose of this review is to highlight the key imaging findings for a vast array of cystic pancreatic neoplasms. These include the relatively common ones: intraductal papillary mucinous neoplasm (IPMN), serous microcystic adenoma, and mucinous cystic neoplasm (MCN). Secondly, the radiological features of more rare ones, including cystic endocrine tumors, solid pseudopapillary tumor (SPT), cystic metastases, and lymphangiomas, will also be discussed. Finally, this article also provides a comprehensive management algorithm based on lesion size and patient's symptoms, with recommendations when to reimage patients with those lesions.

RC210

Advances in Gynecologic Ultrasound

Monday, Nov. 26 8:30AM - 10:00AM Room: S504AB

GU US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

RC210A Uterus and Endometrium: A Primer with Pearls to Perfect Your US Performance

Participants
Loretta M. Strachowski, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the varied appearance of the uterus and endometrium throughout a woman's life. 2) Improve sonographic visualization of the endometrium utilizing technical tips and tricks. 3) Recite a basic differential diagnosis for uterine/cervical masses and endometrial thickening. 4) Apply appropriate terminology when describing abnormal bleeding, location of myomas and mullerian duct anomalies. 5) Understand the controversies, cutoffs and considerations in the context of the role of US in postmenopausal bleeding.

RC210B 3D Ultrasound in Gynecology

Participants
Beryl R. Benacerraf, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To discuss the multiplanar reconstruction technique in scanning the pelvis, including the usefulness of looking at the coronal view of the uterus to evaluate the endometrium and uterine shape. 2) To discuss the use of 3D ultrasound to look for causes of pelvic pain. 3) To discuss the use of 3D ultrasound when evaluating a potential hydrosalpinx.

RC210C Ovarian Cysts and Masses

Participants
Deborah Levine, MD, Boston, MA (*Presenter*) Editor with royalties, Taylor & Francis Group; Editor with royalties, Reed Elsevier;

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LEARNING OBJECTIVES

1) Review findings of the 'First International Consensus Report on Adnexal Masses: Management Recommendations' . 2) Assess the potential of risk prediction models to improve practice patterns. 3) Improve knowledge of the malignant potential of various sonographic findings. 4) Integrate these findings into daily practice with goal of reducing excess surgery for benign masses while improving triage to gynecology-oncology in women with suspicious adnexal masses.

RC210D Ultrasound for Deeply Infiltrative Endometriosis

Participants
Luciana P. Chamie, MD, PhD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Define clinical and epidemiological aspects of endometriosis. 2) Define the importance of imaging mapping for deeply infiltrative endometriosis before clinical counseling. 3) Apply the most appropriate technique to investigate endometriosis. 4) Describe the bowel preparation required for the transvaginal ultrasound to investigate endometriosis. 5) Apply the imaging algorithm to map deeply infiltrative endometriosis. 6) Assess the ultrasonographic findings of deeply infiltrative endometriosis in the most common sites such as bladder, vesicouterine pouch, retrocervical space, vagina, ureters, appendix and rectosigmoid colon.

ABSTRACT

Endometriosis is a very common gynecological disease affecting millions of women in their reproductive life, often causing pelvic pain and infertility. Clinical history and physical examination may suggest endometriosis, but imaging mapping is necessary to identify the disease and mandatory for clinical couseling and surgical planning. Transvaginal ultrasound after bowel preparation is the best imaging modality as the first-line technique to evaluate patients suspected of endometriosis. The bowel preparation is relatively simple and includes the day before and the day of the examination. This method is highly accurate to identify intestinal endometriosis and to determine which layers of the bowel wall are affected. In addition, it provides better assessment of small peritoneal lesions of the retrocervical space, vagina and bladder. Pelvic adhesions can also be evaluated during the exam.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
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RC211

Nuclear Medicine Series: New PET Tracers for Prostate Cancer (Interactive Session)

Monday, Nov. 26 8:30AM - 12:00PM Room: S505AB

CT GI NM

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Terence Z. Wong, MD, PhD, Chapel Hill, NC (*Moderator*) Consultant, Lucerno Dynamics, LLC;

Sub-Events

RC211-01 Logistics: Incorporating New PET Tracers into Practice

Monday, Nov. 26 8:30AM - 8:45AM Room: S505AB

Participants
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RC211-02 Validation of the Use of Image-Derived Input Function for the Quantification of Ga-68 PSMA-11 Uptake in Prostate Cancer Patients Using Dynamic PET/MR

Monday, Nov. 26 8:45AM - 8:55AM Room: S505AB

Participants
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PURPOSE

To validate the use of image-derived input function of the common iliac artery as an alternative to arterial blood sampling in pharmacokinetic modeling of Ga-68 PSMA-11 uptake using hybrid positron emission tomography and magnetic resonance (PET/MR) imaging in primary prostate cancer.

METHOD AND MATERIALS

This observational prospective study was approved by our Institution's Ethics Committee. Eleven patients with clinically significant prostate cancer underwent a 60-minute dynamic PET/MR scan of the pelvis with an injected dose of Ga-68 HBED-CC-PSMA (Ga-68 PSMA-11). Arterial blood activity was measured by an automatic arterial blood sampling device during the first 10 min and manual blood samples were collected for metabolite analysis and for blood to plasma transformation to derive an arterial input function (AIF). One lesion per patient (with the highest uptake) and the common iliac artery were outlined using isocontour volumes on the PET images. Two image-derived input functions (IDIF) were calculated: whole blood curve (IDIF_bl) and plasma curve (IDIF_pl) corrected by the average plasma-to-blood ratio. An irreversible two-tissue compartment model, with rate constants K1, k2 and k3, were fitted to the data using AIF, IDIF_pl and IDID_bl and the net influx rate Ki=K1k3/(k2+k3) was calculated. The agreement between K1 and Ki from AIF and IDIF_bl and IDIF_pl were reported by intraclass correlation coefficients (ICC) with 95% confidence intervals.

RESULTS

Ga-68 PSMA-11 was stable in-vivo, not necessitating metabolite correction. The mean plasma-to-blood ratio was 1.63. IDIF underestimated the arterial input function by 50% at the bolus peak and by 20% at late times. For K1, ICC between AIF and IDIF_bl was 0.40 (-0.22, 0.80) and between AIF and IDIF_pl 0.60 (0.04, 0.87). For Ki, ICC between AIF and IDIF_bl was 0.77 (0.34, 0.93) and between AIF and IDIF_pl 0.94 (0.78, 0.98).

CONCLUSION

IDIF plasma curve can be used in clinical practice as an alternative to arterial blood sampling to calculate the uptake of Ga-68

PSMA-11, but the method requires a known mean plasma-to-blood ratio. Agreement between IDIF whole blood curve and arterial input function was poor to moderate. Underestimation of the IDIF should be explained by partial volume effects.

CLINICAL RELEVANCE/APPLICATION

Image-derived plasma curves can be used in clinical practice as an alternative to arterial blood sampling to quantify uptake of Ga-68 PSMA-11 in prostate cancer.

RC211-03 Dual-Time 68Ga-PSMA-11 Imaging for Biochemically Recurrent Prostate Cancer Using LYSO and SiPM-Based Detectors PET/CT

Monday, Nov. 26 8:55AM - 9:05AM Room: S505AB

Participants
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PURPOSE

68Ga-labeled prostate-specific membrane antigen (PSMA-11) is a highly specific tracer for biochemically recurrent prostate cancer at low PSA levels. In this study we aim to compare the diagnostic performance of a new PET/CT scanner (Discovery Molecular Insights - DMI) using silicon photomultipliers (SiPM) detectors vs standard LYSO detectors PET/CT (Discovery 690 - D690) in patients with biochemical relapse following a single injection of radiopharmaceutical.

METHOD AND MATERIALS

Forty-four patients were prospectively recruited to undergo imaging on the D690 and DMI scanners, in randomized order. Images from the DMI PET/CT were reconstructed using ToF and a Bayesian penalized likelihood algorithm (Q.Clear®) whereas images from the D690 PET/CT were reconstructed using time-of-flight (ToF) and an ordered subset expectation maximization (OSEM) protocol. Two experienced nuclear medicine physicians reviewed both scans for each patient in random order, recorded the number and location of each lesion, and acquired standardized uptake value (SUV) measurements.

RESULTS

Twenty-three patients underwent imaging on the D690 PET/CT first followed by the DMI scanner, and twenty-one underwent scanning in the reverse order. The median PSA was 4.33 ng/mL with one outlier of 1170 ng/mL. PSMA PET detected sites of recurrence in 32/44 (73 %) patients, including 6/12 (50 %) patients with PSA below 1 ng/mL with the lowest PSA and a positive scan at 0.05 ng/mL. The mean lesion SUVmax measurements were higher on DMI than D690 regardless of the timely order of the scan (6.5 vs. 5.7 in D690 scan first and 4.6 vs. 4.2 for DMI performed first). However, the difference in mean lesion SUVmax was only significant for patients scanned on the D690 first ($p<0.018$).

CONCLUSION

These preliminary results suggest that the SiPM-based DMI PET/CT system offers better performance and superior detector technology and image quality compared to conventional LYSO-based D690 PET/CT. These results need to be confirmed in larger studies.

CLINICAL RELEVANCE/APPLICATION

SiPM-based DMI PET/CT system seems to offer better performance and superior detector technology and image quality compared to conventional LYSO-based D690 PET/CT.

RC211-04 Same Day PET/CT and PET/MRI with 68Ga-PSMA in the Evaluation of Biochemical Recurrence of Prostate Cancer

Monday, Nov. 26 9:05AM - 9:15AM Room: S505AB

Participants
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PURPOSE

To compare PET/CT and PET/MRI with 68Ga-PSMA in patients with radical prostatectomy and biochemical recurrence (BCR).

METHOD AND MATERIALS

This is a prospective, IRB approved study, 29 patients with prostate cancer were referred to our department to investigate BCR

This is a prospective, IRB approved study. 29 patients with prostate cancer were referred to our department to investigate BCR and submitted to PET/CT and PET/MR with 68Ga-PSMA in the same day. The first exam started 50 minutes after 68Ga-PSMA injection (15 started with PET/CT while 14 started with PET/MRI). The second study began right after the first one. Readers of each study were aware of clinical data but blinded of eventual findings of the other scan. Patients had age ranging from 52 to 78 years old, had submitted to radical prostatectomy up to 12 years before the exams, and Gleason score ranged from 6 to 9. Serum PSA levels ranged from 0.22 to 12.8 ng/mL at time of the scans.

RESULTS

There were 16 positive PET/CT and 15 positive PET/MRI. Negative studies (no abnormal area suspicious for prostatic cancer recurrence) counted 11 PET/CT and 13 PET/MR scans. PET/CT found 34 suspicious lesions and PET/MR, 27 lesions. Few equivocal studies were found by both methods: 2 in PET/CT and 1 in PET/MRI, all of them with one uncertain lesion. There were 24/39 studies match studies (positive or negative on both methods).

CONCLUSION

PET/CT and PET/MRI with 68Ga-PSMA can both be used in BCR scenario, in spite of PET/CT seems to have a slightly higher sensitivity in our population.

CLINICAL RELEVANCE/APPLICATION

PET/CT and PET/MRI are the most important imaging methods in BCR scenario. The comparison among them is essential to perform the right choice in clinical practice.

RC211-05 Evaluation of Whole-body MRI versus 68Ga-PSMA PET/CT for Detection of Biochemical Recurrence in Prostate Cancer Patients

Monday, Nov. 26 9:15AM - 9:25AM Room: S505AB

Participants
Lino Sawicki, MD, Dusseldorf, Germany (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

The purpose of our study was to assess whole-body MRI (wb-MRI) for lesion detection of biochemical relapse in prostate cancer (PCa) patients after curative treatment in comparison to 68Ga-PSMA PET/CT.

METHOD AND MATERIALS

This is a prospective IRB-approved trial of 30 patients (age: 65.5 ± 9.6 years) with newly documented biochemical relapse of PCa (mean prostate-specific antigen (PSA) 2.11 ± 1.97 ng/ml) after curative therapy. All patients underwent both wb-MRI including a dedicated pelvic imaging protocol and PET/CT with 167 ± 35 MBq 68Ga-PSMA within a time window of 10.5 ± 9.5 days. PET/CT and MRI datasets were separately evaluated regarding PCa lesion count, lesion type, localization, and diagnostic confidence (3-point scale; 1-3) by two physicians. The reference standard was based on histopathology results, changes of PSA after targeted irradiation, follow-up imaging, and clinical data. Lesion-based and patient-based detection rates were compared using chi2 test. Differences in diagnostic confidence were assessed by Welch test.

RESULTS

A total of 58 PCa lesions were found in 22/30 patients in the study cohort. 68Ga-PSMA PET/CT detected 57/58 (98.3 %) lesions in 21/30 (70 %) patients, and 15/58 (25.9 %) lesions were detected in 13/30 (43.3 %) patients using wb-MRI. The higher detection rate of 68Ga-PSMA PET/CT was statistically significant both on a per-lesion ($p = 0.001$) and per-patient ($p = 0.039$) basis. In 8/30 patients none of the two modalities actually localized the PCa relapse. Except for one local recurrence in the former prostate fossa that was exclusively detected by wb-MRI, all lesions detected by wb-MRI were also detectable on 68Ga-PSMA PET/CT. 68Ga-PSMA PET/CT offered a superior diagnostic confidence in categorization of PCa lesions compared to wb-MRI (2.7 ± 0.6 vs. 2.3 ± 0.6, $p = 0.011$).

CONCLUSION

68Ga-PSMA PET/CT significantly outperforms wb-MRI for detection of biochemical relapse in PCa patients after curative treatment.

CLINICAL RELEVANCE/APPLICATION

Wb-MRI is inferior to 68Ga-PSMA PET/CT for the detection of recurrent PCa. Nevertheless, as one local recurrence in one patient was only detectable with MRI, it might be useful in selected cases.

RC211-06 The Effect of Various Beta Values on Image Quality and Semi-Quantitative Measurements in 68Ga-Labeled GRPR and PSMA PET/MRI Images Reconstructed With a Block Sequential Regularized Expectation Maximization Algorithm

Monday, Nov. 26 9:25AM - 9:35AM Room: S505AB

Participants
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PURPOSE

The block sequential regularized expectation maximization (BSREM) algorithm is a new image reconstruction method that controls noise at higher iterations by applying a relative difference penalty built into the objective function. This enables one to employ more iterations for convergence and better contrast recovery, while mitigating noise amplification. BSREM was recently introduced on the GE SIGNA PET/MRI platform. Here we evaluated how different values influence image quality and SUVmax in a cohort of prostate cancer patients who underwent 68Ga-RM2 or 68Ga-PSMA-11 scans.

METHOD AND MATERIALS

We analyzed 36 prostate cancer patients who underwent either 68Ga-RM2 (15) or 68Ga-PSMA-11 (21) PET/MRI. The raw PET data were retrospectively reconstructed using values of 250, 350, 500, 750 and 1000. Each reconstruction was reviewed independently by 3 nuclear medicine physicians and scored using a Likert scale (1 - poor, 5 - excellent quality). SUVmax values were measured from 68Ga-RM2/PSMA PET/MRI for all the lesions identified as compatible with prostate cancer.

RESULTS

The mean±SD scores for 68Ga-RM2 PET images were 2.5±0.5 for =250 reconstructions, 3.2±0.6 for =350, 4.1±0.6 for =500, 4.7±0.5 for =750 and 4.8±0.5 for =1000. The mean±SD scores for 68Ga-PSMA-11 PET images were 3.3±0.9 for =250 reconstructions, 4.2±0.9 for =350, 4.7±0.6 for =500, 4.9±0.3 for =750 and 4.9±0.4 for =1000. The relative observed agreement among readers for the values of 250, 350, 500, 750, 1000 were 49%, 50%, 60%, 70% and 74%, respectively. A total of 24 lesions (6 on RM2 and 18 on PSMA-11) were detected and the mean SUVmax measurements were: 13.1, 12.5, 10.4, 9.3 and 8 for the 68Ga-RM2 values of 250, 350, 500, 750 and 1000, respectively; 22.6, 21.2, 19.7, 18.9 and 16.8 for the 68Ga-PSMA-11 values of 250, 350, 500, 750 and 1000, respectively.

CONCLUSION

Different values should be used for different 68Ga-labeled radiopharmaceuticals such as those targeting GRPR and PSMA receptors in prostate cancer. Once selected, the same value should be consistently used since SUVmax measurements differ with different values.

CLINICAL RELEVANCE/APPLICATION

BSREM algorithm improves image quality. Different beta values make different image quality and different SUVmax measurements on different 68Ga-labeled radiopharmaceuticals.

RC211-07 Fluciclovine PET/CT: Practical Approach to Interpretation

Monday, Nov. 26 9:35AM - 9:50AM Room: S505AB

Participants
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LEARNING OBJECTIVES

1) Assess the appropriate clinical indications for 18F-fluciclovine PET and understand the diagnostic accuracy of 18F-fluciclovine PET for local and metastatic prostate cancer. 2) Develop 18F-fluciclovine PET protocols for image optimization. 3) Apply the correct 18F-fluciclovine PET interpretation for local and metastatic prostate cancer and benign physiologic variants.

ABSTRACT

Anti-1-amino-3-[18F]-flurocyclobutane-1-carboxylic acid (18F-fluciclovine) is a non-naturally occurring amino acid PET radiotracer that is recently United States Food and Drug Administration approved for detection of suspected recurrent prostate cancer. The tumor imaging features of this radiotracer mirror the upregulation of transmembrane amino acid transport that occurs in prostate cancer due to increased amino acid metabolism for energy and protein synthesis. This refresher course provides an overview of 18F-fluciclovine PET diagnostic accuracy for identifying primary and metastatic disease, as well as proper 18F-fluciclovine PET imaging protocols. Correct interpretation criteria will be explored in detail to identify physiologic and pathologic 18F-fluciclovine uptake patterns and potential pitfalls.

RC211-08 Quantitative Comparison of Standardized Uptake Values of Same-Day Randomized Ga-68 PSMA-11 PET/CT and PET/MR Scans in Recurrent Prostate Cancer Patients

Monday, Nov. 26 9:50AM - 10:00AM Room: S505AB

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PURPOSE

To determine the reproducibility and agreement of standardized uptake values from same-day Ga-68 PSMA-11 PET/CT and PET/MR scans, randomized in order to eliminate the influence of Ga-68 PSMA-11 accumulation as a function of time, in patients with recurrent prostate cancer.

METHOD AND MATERIALS

Eighteen patients with recurrent prostate cancer after radical prostatectomy, all with visible lesions on the PET scan, were included in this retrospective study, approved by the Institution's Ethics Committee. All patients underwent PET/CT and PET/MR scans in randomized order after intravenous injection of a single dose of Ga-68 HBED-CC-PSMA (Ga-68 PSMA-11). Volumes of interest on tumor lesions were outlined and maximum standardized uptake value (SUVmax) corrected for lean body mass was calculated. Correlation and agreement between scans were assessed by generalized linear mixed-effects models and Bland Altman analysis. A predictive model of PET/CT SUVmax was developed based on PET/MR SUVmax, patient characteristics and imaging parameters.

RESULTS

In total, there were 34 visible lesions on the PET scans: 5 local recurrences, 22 lymph node and 7 bone metastases. SUVmax from PET/CT and PET/MR were significantly correlated, described by the following regression model equation: (PET/CT SUVmax) = 0.75 + 1.00* (PET/MR SUVmax), with a coefficient of determination R2 of 0.77. Bland-Altman analysis showed that SUVmax were on average 20% higher on PET/CT than on PET/MR, with the largest percentage differences for small SUV's. The full predictive model of PET/CT SUVmax showed significant association with PET/MR SUVmax (effect 1.15 ($p<0.001$)), serum prostate specific antigen (effect 0.99 ($p=0.053$)), scan time post-injection (effect 0.98 ($p=0.003$)) and acquisition time per bed position (effect 1.49 ($p=0.021$)) with a coefficient of determination R2 of 0.85.

CONCLUSION

SUVmax from PET/CT and PET/MR are comparable and well correlated, but should not be used interchangeably without applying a correction factor.

CLINICAL RELEVANCE/APPLICATION

Since both Ga-68 PSMA-11 PET/CT and PET/MR are increasingly used in clinical practice, the reproducibility of SUVmax measurements is essential in monitoring of disease progression and response to treatment.

RC211-09 Detection Rate of 18F-FACBC (Fluciclovine) PET/CT Scan as a Function of Prostatic Specific Antigen (PSA) Level: Initial Experience of 76 Patients with Biochemically Recurrent Prostate Cancer

Monday, Nov. 26 10:00AM - 10:10AM Room: S505AB

Awards
Trainee Research Prize - Resident

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PURPOSE

In 2016, synthetic amino acid anti-1-amino-3-[18F]-flurocyclobutane-1-carboxylic acid (FACBC, Fluciclovine, Axumin) was approved by U.S. Food and Drug Administration (FDA) as a new PET tracer for the detection and localization of biochemically recurrent prostate cancer. The goal of this study was to determine the impact of PSA level on the detection rate of 18F-FACBC PET/CT.

METHOD AND MATERIALS

After obtaining IRB approval, we retrospectively enrolled 76 patients with biochemical recurrence of prostate cancer referred for an 18F-FACBC PET/CT scan at our institution. Relevant clinical information including demographic data,PSA level, and Gleason score were collected. Images were interpreted by two experienced nuclear radiologists. Receiver operating characteristic (ROC) curve and bootstrap technique with 2000 iterations were performed to determine the optimal cutoff points of PSA as a predictor of positive and negative 18F-FACBC PET/CT scan.

RESULTS

The detection rate of 18F-FACBC PET/CT was 67.1% (51 of 76 scans). Positive findings were detected in the prostate/bed and pelvic lymph node regions in 88% of positive scans(45 of 51); metastatic lesion outside the pelvis in 21.5% of positive scans(11 of 51), and bone metastasis in 11.7% of positive scans (6 of 51).18F-FACBC PET/CT scan detected potential sites of recurrence in 23.5% of patients when PSA is < 1.0 ng/ml, 66.7 % of patients when PSA is 1.0-2.0 ng/ml, and 86.2% of patients when PSA is >2.0 ng/ml. The ROC curve analysis with bootstrapping demonstrates a PSA >3.38 ng/ml has a likelihood ratio > 10 and positive predictive value > 95% for a positive 18F-FACBC PET/CT scan. The PSA < 0.36 ng/mL has a likelihood ratio > 14 of having a negative 18F-FACBC PET/CT scan and results in positive imaging findings in <2.5% of patients.

CONCLUSION

Given the high pretest probability of positive imaging findings in patients with PSA > 3.4 ng/ml, they benefit most from 18F-FACBC PET/CT scans. In addition, negative scans of these patients should be interpreted more cautiously. Conversely, considering the low pretest probability of positive PET/CT findings in patients with PSA < 0.36 ng/ml, these patients may benefit from a short follow-up before a diagnostic 18F-FACBC PET/CT scan.

CLINICAL RELEVANCE/APPLICATION

18F-Fluciclovine is a valuable novel clinically-available PET/CT tracer for the detection and localization of biochemically recurrent prostate cancer, particularly when the PSA level is > 2 ng/ml.

RC211-10 Role of Early Dynamic PET/CT Imaging with 68Ga-PSMA in Staging and Restaging of Prostate Cancer

Monday, Nov. 26 10:10AM - 10:20AM Room: S505AB

Awards
Trainee Research Prize - Resident

Participants
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PURPOSE

Ga-68 Prostate-Specific Membrane Antigen (PSMA)PET/CT is a new tool for the detection of new and recurrent prostate cancer.Standard imaging time is 60 minutes post injection of radiotracer but some lesions may be obscured by physiologic accumulation of radiotracer in bladder. The aim of the study is to determine if the addition of early imaging at 3 and 6 minutes to standard imaging at 60 minutes can improve the detection of new and recurrent prostate cancer at Ga-68 PSMA PET/CT.

METHOD AND MATERIALS

After obtaining IRB approval, retrospective review of 257 consecutive patients who underwentGa-68 PSMA PET/CT between December 2016 and July 2017 was conducted. 167 patients underwent early (3 and 6 minute) and late (60 minute) imaging. Two readers blinded to the patient's clinical information, independently reviewed the early and late images and qualitatively and quantitatively scored the visibility of prostate lesions on a scale of 1-2 (1: lesion seen, 2: lesion not seen). Qualitatively, focal uptake higher than background that did not correspond to physiologic tracer accumulation was considered cancer. Quantitatively, a cut off maximum standardized uptake value (SUVmax) of 2 was indicative of prostate cancer. Detection of prostate cancer was compared between early and late imaging using McNemar test.

RESULTS

A total 115 patients (68.9%) had prostate cancer on imaging as seen on early (median SUVmax= 6.4) and late (median SUVmax= 8) PET/CT images. In 106/115 (64%), the cancers were seen on early and delayed imaging, in 8/115 (6.9%) the cancer was only seen on early imaging and masked by bladder activity on delayed imaging, and in 1/115(0.6%) only seen on delayed imaging. The addition of early imaging significantly improved the detection rate of prostate cancer (p=0.039).

CONCLUSION

The addition of early imaging at 3 and 6 minutes to the standard 60 minute imaging at Ga-68 PSMA PET/CT improves the detection of prostate cancer .

CLINICAL RELEVANCE/APPLICATION

Early imaging at Ga-68 PSMAPET/CT can help in the detection of prostate cancer that is obscured by the bladder activity at 60 minutes.

RC211-11 Change in Salvage Radiotherapy Management Based On Fluciclovine (18F) PET/CT Guidance in Post-Prostatectomy Recurrent Prostate Cancer

Monday, Nov. 26 10:20AM - 10:30AM Room: S505AB

Awards
Student Travel Stipend Award

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PURPOSE

We previously reported a 40.5% post-prostatectomy salvage radiotherapy management decision change based on guidance with fluciclovine PET/CT in a trial with 87/162 accrual (Clin Nucl Med. 2017 Jan;42(1):e22-e28). We set out to determine if this finding continued at the current accrual of 145/162 patients.

METHOD AND MATERIALS

145 patients with post-prostatectomy biochemical recurrence of prostate cancer and negative bone scan were randomized to undergo treatment planning based on conventional imaging (CT, MRI) or fluciclovine PET/CT in a provider-determined intention-to-treat protocol. Radiotherapy decisions before and after fluciclovine PET/CT were compared and changes in treatment decision and field were noted. Statistical significance of decision changes was determined using Clopper-Pearson (exact) binomial method with significance set at p <0.05.

RESULTS

70/145 patients underwent fluciclovine PET. Mean PSA (±SD) at scan was 1.89 (±4.32) ng/ml. 54/70 (77.1%) patients had a positive fluciclovine PET. Radiotherapy decision was changed in 27/70 (38.6%). Four (5.7%) had the decision for radiotherapy withdrawn after the fluciclovine PET findings of extrapelvic uptake. Radiotherapy field decision was changed in 23/66 (34.9%) remaining patients: 13/23 prostate bed only to prostate bed and pelvis; 10/23 prostate bed and pelvis to prostate bed only. There was no significant difference in mean age (62.0 vs. 61.6 years) and treatment-recurrence time interval (991.4 vs. 1403.6 days) between those with change in radiotherapy decision and those without. However, the pre-treatment PSA mean was significantly higher in those with treatment change (2.76ng/ml vs. 1.35ng/ml, $p < 0.05$). Changes in overall radiotherapy decision ($p = 0.01$) and field ($p < 0.05$) were statistically significant.

CONCLUSION

Fluciclovine PET/CT had a significant effect on radiotherapy planning in post-prostatectomy patients with biochemical recurrent prostate cancer. Radiotherapy planning decision and field changes in the updated analysis is similar to the prior report. Further studies are required to determine if this change in treatment plan has an effect on clinical outcomes. Research support: NIH (R01CA169188), NCT 01666808.

CLINICAL RELEVANCE/APPLICATION

Use of fluciclovine PET/CT resulted in significant change in management (38.6%) in salvage radiotherapy planning in post-prostatectomy patients with recurrent prostate cancer.

RC211-12 Impact of 68Ga-PSMA PET on the Management of Patients with Prostate Cancer: A Systematic Review and Meta-Analysis

Monday, Nov. 26 10:30AM - 10:40AM Room: S505AB

Participants
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Yeon Joo Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Chong Hyun Suh, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

68Gallium prostate-specific membrane antigen positron emission tomography (68Ga-PSMA PET) is a relatively novel imaging modality for assessment of patients with prostate cancer. Recent studies have shown promising results, with their ability to detect recurrent/metastatic prostate cancer foci with superior performance than that of conventional imaging modalities (computed tomography, bone scintigraphy, and choline PET). However, the actual impact that 68Ga-PSMA PET has on management of prostate cancer patients has not been well-established. Therefore, we aimed to systematically review the literature and to perform a meta-analysis on the impact of 68Ga-PSMA PET on management of patients with prostate cancer.

METHOD AND MATERIALS

Pubmed and EMBASE databases were systematically searched up to January 20, 2018. Studies reporting the proportion of patients with prostate cancer that experienced change in management after 68Ga-PSMA PET were included. Quality of the included studies was evaluated using the GRADE system. The proportion of management changes were pooled using a random-effects model. Subgroup analyses and meta-regression analyses was done to explore potential causes of heterogeneity.

RESULTS

15 studies (1163 patients) were included. The pooled proportion of management changes was 54% (95% CI 47%-60%). Meta-regression analyses revealed that PET-positivity was a significant factor of heterogeneity (p=0.0486). Other variables, including clinical setting, change type (intended vs implemented), responding entity (referring doctor or multidisciplinary committee), D'Amico risk, Gleason score, use of androgen deprivation therapy, PSA at initial diagnosis, pre-PET PSA, and PSA-doubling time, were not significant (p=0.2802-0.9574). In patients with biochemical failure, proportions of radiotherapy, surgery, focal therapy, and multimodal treatment increased, while those of systemic treatment and no treatment decreased after performing 68Ga-PSMA PET.

CONCLUSION

This meta-analysis showed that 68Ga-PSMA PET had a large impact on the management of prostate cancer patients. PET-positivity affected the proportion of management changes.

CLINICAL RELEVANCE/APPLICATION

We found that 68Ga-PSMA PET alters management in approximately half of the patients with prostate cancer. Studies with higher proportion of patients with 68Ga-PSMA PET-positive lesions tend to have their management altered more frequently.

RC211-13 Clinician's Perspective: Impact and Applications

Monday, Nov. 26 10:40AM - 10:55AM Room: S505AB

Participants
Steve Cho, MD, Madison, WI (*Presenter*) Imaging Endpoints; General Electric Company

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LEARNING OBJECTIVES

1) Review current and emerging PET radiotracers for prostate cancer. 2) Assess how PET imaging can address unmet clinical needs in prostate cancer. 3) Address remaining and new clinical and research questions arising from these new PET radiotracers.

RC211-14 Fluciclovine (18F) Parameters on Targeted Prostate Biopsy Associated With True Positivity in Recurrent Prostate Cancer

Monday, Nov. 26 10:55AM - 11:05AM Room: S505AB

Participants
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David M. Schuster, MD, Decatur, GA (*Abstract Co-Author*) Institutional Research Grant, Nihon Medi-Physics Co, Ltd; Institutional Research Grant, Blue Earth Diagnostics Ltd; Institutional Research Grant, Advanced Accelerator Applications SA; Consultant, Syncona Ltd; ; ;

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PURPOSE

Fluciclovine is FDA approved for detection of recurrent prostate cancer. We set out to evaluate fluciclovine uptake parameters that correlate with true positivity for local recurrence in non-prostatectomy treated patients.

METHOD AND MATERIALS

21 patients (PSA 7.4±6.8 ng/ml) with nadir PSA+2 after non-prostatectomy local therapy underwent dual time-point fluciclovine (364.1±37.7 MBq) PET/CT (4-15 minutes; 16-25 minutes) from pelvis to diaphragm. Uptake in the prostate over background was delineated and co-registered to a previously obtained planning 3-D ultrasound. Fluciclovine uptake (SUVmax) and target-to-background ratios (TBR) (SUVmax/SUVmean) of blood pool (aorta), prostate, and marrow (L3) were recorded. Uptake pattern (focal vs non-focal), subjective suspicion level [3 (equivocal), 4 (moderate), 5 (high)], and lesion location were noted. Targeted biopsies of the identified lesions with histologic analysis were completed. Statistical significance was determined using univariate regression analysis.

RESULTS

17/50 (34.0%) targeted lesions were positive for recurrent cancer. Compared to negative lesions, targeted positive lesions had significantly ($p<0.01$) higher mean SUVmax of lesion (6.62±1.70 vs 4.92±1.27), TBR (marrow) (2.57±0.81 vs 1.69±0.51), and TBR (blood pool) (4.10±1.17 vs 3.00±1.01) at the first time-point, and remained significant at the later time-point except TBR (blood pool). Focal uptake (OR 12.07, [95% CI 2.98-48.80], $p<0.01$) and subjective high (5) suspicion level (OR 10.91, [95% CI 1.19-99.69], $p=0.03$) correlated with true positivity. All other parameters did not significantly correlate with true positivity. Of the 17 targeted lesions with focal uptake and subjective high suspicion, 11/17 (64.7%) were true positive. 16/33 (48.5%) false positive targeted lesions had evidence of prostatitis or radiation changes.

CONCLUSION

True positivity of fluciclovine targeted prostate biopsy in non-prostatectomy treated patients correlates with focal uptake, higher SUV, target-to-background (blood pool and marrow) ratios and subjective high suspicion level. These parameters may be utilized for future modification of interpretative criteria. Research Support: NIH (CA156775, CA204254 and CA176684)

CLINICAL RELEVANCE/APPLICATION

Targeted biopsy of lesions with focal uptake and subjective high suspicion on fluciclovine PET-CT increases the true positivity rate from 34.0% to 64.7% in non-prostatectomy treated patients.

RC211-15 Evaluation of 18F-DCFPyL PSMA-Based PET/CT and mpMRI in Patients with Localized Prostate Cancer

Monday, Nov. 26 11:05AM - 11:15AM Room: S505AB

Participants
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PURPOSE

To assess the ability of 18F-DCFPyL PET/CT to predict prostate cancer Gleason grade and its role as a potential adjunct to multiparametric prostate MRI.

METHOD AND MATERIALS

Patients with prostate cancer (PCa) underwent multi-parametric MRI (mpMRI) and 18F-DCFPyL PET/CT imaging. MpMRI lesion characteristics (PIRADS, ADCmean, ADCmin, ADC10, MRIvol) were derived manually and 18F-DCFPyL PET/CT metrics SUVmax, SUVmean, MTV and TLG (SUVmean*MTV) were extracted from tracer-specific regions of interest (ROI). Lesion metrics were correlated with each other using the Spearman rank test, and their ability to differentiate tumor pathology Gleason grade (GG) <3 vs. GG 3-5 was performed using the Wilcoxon rank sum test.

RESULTS

Thirteen patients with high-risk PCa were included in the study, with 25 (12 GG<3, 12 GG 3-5) lesions found across the two modalities (median age 70.6, MRI volume 62mL, and PSA 18.87ng/mL). Seven patients did not have findings suspicious for metastatic disease on 18F-DCFPyL-PET/CT. MpMRI and 18F-DCFPyL PET/CT both detected 22/25 lesions, while 3 were not detected by any of the two modalities. 18F-DCFPyL PET/CT (SUVmax, SUVmean and TLG) as well as mpMRI metrics (ADCmin and MRI size) were significantly associated with GG 3-5 pathology (p=0.017, 0.020, 0.004, 0.028, 0.008, respectively). Additionally, MRI size correlated significantly with SUVmax, MTV and TLG (p=0.01, 0.02, 0.02, respectively) and SUVmax, SUVmean correlated significantly to ADCmin. All SUV metrics correlated positively with PIRADS 5 lesions vs. the remaining categories. In some cases, MRI findings did not entirely colocalize with PET avidity indicating MRI underestimation of functional burden.

CONCLUSION

18F-DCFPyL PET-identified prostatic lesions and mpMRI findings correlate with each other, Gleason grades and PIRADS. MpMRI may underestimate the tumor burden seen on 18F-DCFPyL PET/CT imaging, which may aid focal therapy decisions.

CLINICAL RELEVANCE/APPLICATION

Quantitative metrics of 18F-DCFPyL PET/CT and mpMRI correlate well with each other and with PCa Gleason grade and PIRADS. 18F-DCFPyL PET/CT adds additional functional metrics which may be meaningful in determining tumour heterogeneity and burden.

RC211-16 Quantification of the Pharmacokinetics of Ga-68 PSMA-11 in Prostate Cancer Patients using Hybrid Positron Emission Tomography and Magnetic Resonance Imaging

Monday, Nov. 26 11:15AM - 11:25AM Room: S505AB

Participants
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PURPOSE

To quantify Ga-68 PSMA-11 uptake by pharmacokinetic modeling using arterial blood sampling and hybrid positron emission tomography and magnetic resonance (PET/MR) imaging in primary prostate cancer.

METHOD AND MATERIALS

This observational prospective study was approved by our Institution's Ethics Committee. Eleven patients with clinically significant prostate cancer underwent a 60-minute dynamic PET/MR scan of the pelvis with an injected dose of Ga-68 HBED-CC-PSMA (Ga-68 PSMA-11). Simultaneously, axial T1 Dixon, T2 and diffusion-weighted MR images were acquired. Arterial blood activity was measured by an automatic arterial blood sampling device during the first 10 min. Manual blood samples at time points 3, 7, 15, 25, 40 and 60 min were collected for metabolite analysis and for blood to plasma transformation to derive an arterial input function. Time-activity curves of lesion, prostate and muscle were generated and mean standardized uptake values (SUVmean) calculated. An irreversible two-tissue compartment model, with rate constants K1, k2 and k3, were fitted to the data and the net influx rate Ki=K1k3/(k2+k3) was calculated. Ki was correlated to SUVmean, patient data and MR parameters.

RESULTS

In total 13 lesions located in the prostate were identified. Ga-68 PSMA-11 was stable in-vivo, not necessitating metabolite correction. The mean plasma-to-blood ratio was 1.63, stable over time. The kinetics could be described by an irreversible two-tissue compartment model. K1, k3 and Ki were all significantly higher in lesion compared to normal tissue ($p<0.05$): mean K1 in lesion, prostate and muscle 0.086, 0.063 and 0.018 mL/min/mL, mean k3 in lesion, prostate and muscle 0.075, 0.033 and 0.034 min^{-1} and mean Ki in lesion, prostate and muscle 0.031, 0.011 and 0.003 min^{-1}. Ki showed strong correlation with SUVmean (Spearman rho 0.92, $p<0.001$). There was no significant correlation between Ki and patient data and MR parameters ($p>0.060$).

CONCLUSION

The kinetics of Ga-68 PSMA-11 can be described by an irreversible two-tissue compartment model. SUVmean showed strong correlation with Ki and can be used in clinical practice to quantify Ga-68 PSMA-11 uptake.

CLINICAL RELEVANCE/APPLICATION

Pharmacokinetic modeling is the gold standard for PET quantification. SUV strongly correlates with net influx rate Ki and can therefore be used in clinical practice to quantify Ga-68 PSMA-11 uptake.

RC211-17 Localization and Restaging of Carcinoma Prostate by 68Ga PSMA PET/CT in Patients with Biochemical Recurrence: A Descriptive Study

Monday, Nov. 26 11:25AM - 11:35AM Room: S505AB

Participants
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PURPOSE

Prostate cancer is the most common solid cancer in men. Following definitive treatment of prostate cancer by radical prostatectomy (RP) or radiotherapy, cancer recurrence is heralded by an increase in serum prostate-specific antigen (PSA) which is called biochemical recurrence. We investigate the relationship between prostate specific antigen (PSA) level and detection of suspected cancer recurrence using 68 Ga-PSMA PET/CT in patients with biochemical recurrence after radical prostatectomy (RP) or radiotherapy.

METHOD AND MATERIALS

We analyzed retrospective data of 150 men with carcinoma prostate post RP and post radiotherapy with biochemical recurrence from May 2014 to Jan 2018 by 68 Ga-PSMA PET/CT We included men with suspected recurrent prostate cancer based on an elevated post treatment PSA level. The data collected analyzed the relationship of the pre-scan PSA level to the probability of a positive scan finding for recurrent prostate cancer.

RESULTS

Our cohort included 150 men, all had adenocarcinoma of prostate, 126/150 had a previous RP and 24/150 had prior radiotherapy. The mean PSA of the RP group was 4.8 ng/mL and 22.8 ng/mL in the radiotherapy group. In the post RP cohort, the detection rate of 68 Ga-PSMA PET/ CT was 39.3% for PSA 0.2 to <0.5 ng/mL, 45.3% for PSA 0.5 to <1 ng/mL, 88.2% for PSA 1 to <2 ng/mL and 95.5% for PSA >=2. Lymph node metastasis post RP was identified in 52% of men with suspected disease recurrence. In the post radiotherapy cohort the detection rate was 96.1 % for PSA 2 to 4 ng/mL, 99.2% for PSA 4 to 6 ng/ mL and 100% for PSA >=6. Local recurrence after radiotherapy was present in 62 % of the cohort and 58 % had lymph node metastasis.

CONCLUSION

68Ga-PSMA PET/CT provides a novel imaging modality for the detection of prostate cancer recurrence and metastasis. Suspected PSMA avid metastatic lesions are common and are identified at low post treatment PSA levels, which if detected will help direct appropriate salvage treatments.

CLINICAL RELEVANCE/APPLICATION

PSMA PET/CT should be considered a routine part of follow-up of treated prostate cancer patients since metastasis may present with low PSA levels leading to delay in addressing relapses.

RC211-18 68Ga-PSMA PET/PSMA for Prostate Cancer Staging Correlated to Prostatectomy Specimen

Monday, Nov. 26 11:35AM - 11:45AM Room: S505AB

Participants
Thais Mussi, MD,PhD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
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PURPOSE

To evaluate the accuracy of 68Ga-PSMA PET/PSMA for prostate cancer staging using prostatectomy specimen as gold standard for local staging.

METHOD AND MATERIALS

IRB approved retrospective study. We reviewed our database from February 2016 to February 2018 and found 214 patients who had submitted to a 68Ga-PSMA PET/PSMA and had no prior prostatectomy. 162 patients were excluded because had no prostatectomy in our hospital and eight had not performed lymphadenectomy. A total of 44 patients were included in the study.

RESULTS

Histology in 16, 17, 5 and 6 patients were ISUP 2, 3, 4 and 5, respectively. From the 44 patients, six had lymph node uptake and ten had uptake in bone lesions suggestive of benignity/fibrous dysplasia. On pathology, tree patient had lymph nodes metastasis, not seen on PET/PSMA. Sensitivity for lymph node was 62% and specificity was 95%.

CONCLUSION

68Ga-PSMA PET/PSMA showed high specificity for lymph node metastasis and low specificity for bone lesions.

CLINICAL RELEVANCE/APPLICATION

68Ga-PSMA PET/PSMA is an advance in a new imaging method for prostate cancer staging, with high level of specificity for lymph node metastasis.

RC211-19 Panel Discussion

Monday, Nov. 26 11:45AM - 12:00PM Room: S505AB

Participants
Nancy M. Swanston, RT, Houston, TX (*Presenter*) Nothing to Disclose
Ephraim E. Parent, MD,PhD, Ponta Vedra Beach, FL (*Presenter*) Research support, Blue Earth Diagnostics Ltd; Research support, Advanced Accelerator Applications SA
Steve Cho, MD, Madison, WI (*Presenter*) Imaging Endpoints; General Electric Company

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LEARNING OBJECTIVES

1) Assess the appropriate clinical indications for 18F-fluciclovine PET and understand the diagnostic accuracy of 18F-fluciclovine PET for local and metastatic prostate cancer. 2) Develop 18F-fluciclovine PET protocols for image optimization. 3) Apply the correct 18F-fluciclovine PET interpretation for local and metastatic prostate cancer and benign physiologic variants.

ABSTRACT

Anti-1-amino-3-[18F]-flurocyclobutane-1-carboxylic acid (18F-fluciclovine) is a non-naturally occurring amino acid PET radiotracer that is recently United States Food and Drug Administration approved for detection of suspected recurrent prostate cancer. The tumor imaging features of this radiotracer mirror the upregulation of transmembrane amino acid transport that occurs in prostate cancer due to increased amino acid metabolism for energy and protein synthesis. This refresher course provides an overview of 18F-fluciclovine PET diagnostic accuracy for identifying primary and metastatic disease, as well as proper 18F-fluciclovine PET imaging protocols. Correct interpretation criteria will be explored in detail to identify physiologic and pathologic 18F-fluciclovine uptake patterns and potential pitfalls.

RC212

MR Angiography: 2018 Update

Monday, Nov. 26 8:30AM - 10:00AM Room: E352

MR VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Martin R. Prince, MD,PhD, New York, NY (*Moderator*) Patent agreement, General Electric Company; Patent agreement, Hitachi, Ltd; Patent agreement, Siemens AG; Patent agreement, Canon Medical Systems Corporation; Patent agreement, Koninklijke Philips NV; Patent agreement, Nemoto Kyorindo Co, Ltd; Patent agreement, Bayer AG; Patent agreement, Lantheus Medical Imaging, Inc; Patent agreement, Bracco Group; Patent agreement, Mallinckrodt plc; Patent agreement, Guerbet SA;
Maureen N. Hood, PhD,RN, Bethesda, MD (*Moderator*) Research support, General Electric Company

Sub-Events

RC212A MRA Techniques

Participants
Scott B. Reeder, MD, PhD, Madison, WI (*Presenter*) Institutional research support, General Electric Company; Institutional research support, Bracco Group; Founder, Calimetrix, LLC; Shareholder, Elucent Medical; Consultant, ArTara

LEARNING OBJECTIVES

1) Understand the fundamental principles of contrast enhanced MRA2) Understand the fundamental principles of non-contrast enhanced MRA3) Understand the fundamental principles of phase velocity MRA

RC212B Thoracic MRA: Clinical Applications

Participants
P. Gabriel Peterson, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Identify common clinical applications for thoracic MRA. 2) Describe the role for non-contrast versus contrast-enhanced thoracic MRA.

RC212C Abdominal/Pelvic MRA: Clinical Applications

Participants
Pamela J. Lombardi, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe current contrast enhanced and non contrast MR angiography techniques. 2) Present clinical applications of MR angiography. 3) Introduce future perspectives for MRA.

RC212D MR Safety Concerns in Cardiovascular Patients

Participants
Maureen N. Hood, PhD,RN, Bethesda, MD (*Presenter*) Research support, General Electric Company

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LEARNING OBJECTIVES

1) Discuss the importance of an MR Safety Program in your institution. 2) List several safety concerns in MR exams for cardiovascular patients. 3) Explain the evaluation MR safety procedures for electronic devices. 4) Describe safety concerns related passive and active cardiovascular devices.

Active Handout:Maureen Nanette Hood

http://abstract.rsna.org/uploads/2018/18002591/RC 212D Hood MR Safety Concerns 2018 RC212D.pdf

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104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC213

Pediatric Series: Pediatric Chest/Cardiovascular Imaging

Monday, Nov. 26 8:30AM - 12:00PM Room: E353B

CA CH PD

AMA PRA Category 1 Credits ™: 3.00
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants

Edward Y. Lee, MD, Boston, MA (*Moderator*) Nothing to Disclose
Ladonna J. Malone, MD, Aurora, CO (*Moderator*) Nothing to Disclose
David M. Biko, MD, Philadelphia, PA (*Moderator*) Nothing to Disclose
Randolph K. Otto, MD, Seattle, WA (*Moderator*) Nothing to Disclose
Demetrios A. Raptis, MD, Saint Louis, MO (*Moderator*) Nothing to Disclose

Sub-Events

RC213-01 Cardiac CT in Neonates

Monday, Nov. 26 8:30AM - 8:50AM Room: E353B

Participants
Ladonna J. Malone, MD, Aurora, CO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe different cardiac CT techniques used in infants with congenital heart disease. 2) Discuss the common scenarios that cardiac CT can be useful in infants including evaluation of a. systemic arteries, b. pulmonary arteries and veins, c. evaluation of common shunts performed for palliation (BT, Sano, central), d. coronary arteries, and e. Heterotaxy.

RC213-02 Image Quality and Incidental Findings of Chest MRI in a Large Pediatric Population-Based Study

Monday, Nov. 26 8:50AM - 9:00AM Room: E353B

Participants
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PURPOSE

To describe image quality (IQ) and incidental findings (IF) of chest MRI in a large pediatric cohort from a population-based prospective multi ethnic study.

METHOD AND MATERIALS

Two end-inspiratory (INSP) and end-expiratory (EXP) breath-old chest MRI scans were performed in 2498 healthy children using a spirometry-gated 3D spoiled gradient echo sequence (TR/TE/FA/voxel-resolution=1.6ms/0.7ms/2°/2mm isotropic) in a 3 Tesla scanner. IQ was assessed using 5-point scale from poor (score 1) to excellent (score 5). IFs were classified in clinically relevant or non clinically relevant. Imaging artifacts included four main categories (motion, wrap, ghosting, low signal-to-noise ratio). Analysis was conducted by two indipendent observers. Descriptive statistic was used to assess IQ, IFs and artifacts. Inter-observer agreement of IQ was assessed with Intra-class Correlation Coefficient (ICC) and Bland-Altman plots. Significant differences between IQ-INSP and IQ-EXP were assessed with Wilcoxon test.

RESULTS

47 children were excluded for missing data (i.e. no inspiratory or expiratory scans). Final analysis included 2451 children (median age 9.9 years, range 9.5-11.9). Median IQ was good to excellent 4.5 (Interquartile Range, IQR=4-5). Median IQ-INSP and IQ-EXP was 4.5 (IQR=4-5) for both. Despite deemed excellent, IQ-EXP was significantly lower than IQ-INSP ($Z=-8.487$, $p<0.0001$). 1,7% of the cohort subjects had clinically relevant IFs, 45% had non-clinically relevant IFs. Clinically relevant IFs included pulmonary nodules (diameter >10 mm), severe tracheomalacia (collapse>70%), severe trapped-air (>25% lung lobe volume) and congenital abnormalities (i.e. sequester). Non-clinically relevant IFs were: mild trapped-air (23,8%), atelectasis (15,4%) and mild tracheomalacia (4,5%). IQ was mostly affected by motion artifact (31,9%), fat ghosting (7,9%) or both (6,3%). Inter-observer agreement for IQ was good (ICC=0.7, 95% C.I 0.48-0.83).

CONCLUSION

Chest MRI is a robust technique for large cohort studies in children. Clinically relevant IFs are rare in children, but a large percentage of the cohort had non-clinically relevant IFs.

CLINICAL RELEVANCE/APPLICATION

Trapped-air, atelectasis and mild tracheomalacia are common non-clinically relevant incidental findings on chest MRI in healthy children.

RC213-03 Pediatric Heart Transplant Patients Demonstrate Altered Regional Left and Right Ventricular Velocities

Monday, Nov. 26 9:00AM - 9:10AM Room: E353B

Participants
Haben Berhane, Chicago, IL (*Presenter*) Nothing to Disclose
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Michael Markl, PhD, Chicago, IL (*Abstract Co-Author*) Institutional research support, Siemens AG; Consultant, Circle Cardiovascular Imaging Inc;
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PURPOSE

Endomyocardial biopsy is the gold standard for rejection monitoring after heart transplantation (Tx) at the expenses of invasiveness, cost and possible sampling errors. Alternatively, MRI has emerged as a potential noninvasive tool for assessing changes in left ventricular (LV) adult Tx graft structure (e.g. T2-mapping) and function (e.g. strain). However, few have studied these findings in children or explored post-Tx right ventricular (RV) function. Our goal was to apply MRI tissue phase mapping (TPM), which quantifies 3-directional biventricular myocardial velocities, to investigate LV and RV mechanics and interventricular dyssynchrony in pediatric Tx patients compared to healthy controls.

METHOD AND MATERIALS

Cardiac MRI, including TPM, was performed on 1.5T system Siemens Aera for 17 pediatric Tx patients (age: 16.1 ± 2.9 yrs, 9 males, time after Tx: 5±5 yrs) and 10 healthy controls (age: 15.3 ± 2.5 yrs, 4 males). TPM was acquired during breath-holding in short axis orientation at base, mid, and apex (TR=20.8-24.8 ms, in-plane voxel size=1.5-2.5 mm2, slice thickness=5-8 mm, venc = 25 cm/s). TPM data analysis involved endo- and epicardium contouring and the transformation of the acquired velocities into radial, circumferential, and long-axis motion components (vr, vφ, vz). Peak systolic and diastolic vr and vz were calculated from time-velocity curves and mapped onto an extended 16+10 AHA segment LV-RV model. Peak velocity twist was quantified from the difference in vφ between base and apex. Cross-correlations between slice-averaged LV and RV velocity time courses were used to assess interventricular dyssynchrony.

RESULTS

Global (averaged over segments) peak systolic and diastolic vz in the LV and RV were significantly lower in Tx patients compared to controls ($p<0.01$). RV peak twist showed significant reduction in systole ($p<0.01$) and diastole ($p<0.05$). Tx patients also showed increased interventricular circumferential ($p<0.01$) and long-axis ($p<0.05$) dyssynchrony compared to controls. Moreover, diastolic LV peak vr was inversely correlated to time after Tx ($r=-0.52$, $p=0.03$).

CONCLUSION

The findings of this feasibility study indicate the potential of TPM for noninvasive monitoring of graft function.

CLINICAL RELEVANCE/APPLICATION

Tissue phase mapping can detect alterations in LV and RV myocardial velocities in pediatric Tx patients and may add to noninvasive monitoring of graft function.

RC213-04 First Experience of Application in Pediatric Cardiac CT: 640-Slice Volume Computed Tomography Angiography in Children with Congenital Heart Disease

Monday, Nov. 26 9:10AM - 9:20AM Room: E353B

Participants
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PURPOSE

to evaluate the quality of the images and radiation dose (RD) in children with congenital heart disease (CHD) with a heart rate of up to 180 beats/min.

METHOD AND MATERIALS

48 patients from 1 month to 18 years, weighting 4,5 to 52 kg, heart rate 81-172 (117.3±27.26) were examined. The amount of contrast agent (CA) was 1-1.5 ml/kg, kV80/100, mA200/350, the effective radiation dose (ERD) was 0.9-3.2mSv. ERD was calculated using DLP (mGy*cm) multiplied to e (e is the dose coefficient for the corresponding anatomical region (0.017mSv/mGy*cm)) and multiplied by the age coefficient. Patients were divided: A - HR of up to 120beats/min(one volume scanning) (27patients 56,25%), B-HR over 120 beats/minute (two volumes) (21patients 43,75%). 5 patients underwent postoperative control CTA of the heart.

RESULTS

RD in group A-1,57±0,62mSv; B-1,84±0,58, mean dispersion within the group was 0,36, intergroup dispersion 0.018, total dispersion 0.387, and the empirical correlation ratio was 0.22, which clearly demonstrates the weak effect of heart rate on the choice of the scan mode. The CTA results coincided with the intraoperative in 100% of cases.

CONCLUSION

Volume CTA of the heart in children can adapt heart rate even 180 beats/min and provides high image quality with low RD up to 0.92mSv.

CLINICAL RELEVANCE/APPLICATION

Cardiac CT in pediatric: Row-640 MSCT recomending in diagnosting and planning of surgical treatment.

RC213-05 Automatic Computation of Iso-Perimetric Ratio as Quantitative Index for Degree of Left Ventricular Trabeculation in Adolescents and Young Adults: Potential Indicator for Left Ventricular Non-Compaction

Monday, Nov. 26 9:20AM - 9:30AM Room: E353B

Participants
Amol Pednekar, PhD, Houston, TX (*Presenter*) Nothing to Disclose
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PURPOSE

The purpose of this study is to assess the discriminating power of fractal analysis and perimetric ratio to distinguish between pathologic left ventricular noncompaction (LVNC) and physiologic variant of hyper-trabeculation in bright blood cine balanced steady-state free precession (bSSFP) MR images at end-diastole using an automated analysis tool in a pediatric population.

METHOD AND MATERIALS

Short-axis stack of end-diastolic balanced SSFP images from 26 (age 15±4.9, range 8-31yrs, 21m) LVNC positive (non-compacted(NC)/compacted(C) length ratio (LR)>2.3 and mass ratio(MR)>35%), 20 (age 16±6.6, range 6-35yrs, 12m) hyper trabeculated (NC/C LR<2.3 and MR>35%), and 18 (age 16±5.5, range 6-28yrs, 12m) LVNC negative (NC/C LR<2.3 and MR<35%, anomalous coronary origins or Kawasaki) patients with normal anatomy, preload and afterload, were analyzed with an automated tool. Manually drawn epicardial contours were used to automatically segment the blood pool and extract endocardial boundaries. Using blood pool edges and endocardial contour fractal dimension (FD) and iso-perimetric ratio (PR) i.e. ratio of blood pool to endocardial contour perimeter, are computed for each slice. Mean of top half - 50 percentile FD (mthFD) and cumulative PR (cPR) were used as geometric markers to quantify degree of hyper-trabeculation. Rays normal to and from epicardial contour are generated to compute Endo-blood/Epi-Endo length ratios. The 95 percentile of length ratios in apical third is used as LR.

RESULTS

Both NC/C LR and MR increase with degree of trabeculation as a continuous spectrum. Values for both mthFD and cPR were statistically significantly higher ($p<0.0001$) for LVNC +ve compared to LVNC -ve subjects. However, mthFD values have overlap between LVNC +ve and -ve subjects.Values for mthFD and cPR for patients with MR>35 and LR<2.3 overlap with both LVNC +ve and LVNC -ve subjects.

CONCLUSION

This study indicates that automatic computation of cPR can be used for quick assessment of degree of trabeculation. This quantification can serve as potential indication for LVNC which can be assessed further by manual drawings of epi- and endocardial contours to check against established diagnostic criteria

CLINICAL RELEVANCE/APPLICATION

Automatic computation of cumulative iso-perimetric ratio as quantitative index for degree of trabeculation is feasible and can serve as a potential indicator for further evaluation of LVNC.

RC213-06 Splenic Switch-Off and Hemodynamic Changes in Pediatric Adenosine Stress Perfusion Cardiac Magnetic Resonance Imaging

Monday, Nov. 26 9:30AM - 9:40AM Room: E353B

Participants
Kenneth K. Cheung, MBBS,FRCR, Toronto, ON (*Presenter*) Nothing to Disclose
Lars Grosse-Wortmann, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Mike Seed, MBBS, FRCR, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Shi-Joon Yoo, MD, Toronto, ON (*Abstract Co-Author*) Owner, 3D HOPE Medical; CEO, IMIB-CHD; Spouse, CEO, 3D PrintHeart;

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PURPOSE

Adenosine stress perfusion cardiac magnetic resonance imaging (CMR) is well established to be useful in detecting adult coronary artery disease. A positive drug response to adenosine is signified by an increase in heart rate and change in blood pressure (haemodynamic response). 'Splenic switch-off' (SSO) has recently been proposed as a new marker for drug response in adults. Due to the different disease spectrum and physiology, the use of adenosine as a stressor agent in children is not well established. By observing the prevalence of haemodynamic response and SSO, we aim to investigate the utility of adenosine as a stressor agent in the paediatric population.

METHOD AND MATERIALS

Retrospective analysis of 52 studies in 48 patients of stress perfusion CMR from July 2014 to March 2018 using adenosine was performed. Visual and semi-quantitative analysis of SSO was performed. Haemodynamic changes (blood pressure and heart rate changes of more than 20% of baseline rates) and imaging findings in the stress perfusion CMR examination were correlated with presence of SSO.

RESULTS

Splenic switch-off was visualised in 46.2% (24/52) cases, and was present in 66.7% (16/24) of patients with positive haemodynamic response. Both rates were lower than the reported rates in adults. Splenic switch-off was not associated with haemodynamic response (p=0.22). Presence of inducible stress perfusion defects was associated with positive SSO (p=0.01), but not with positive haemodynamic response (p=0.47). The optimal threshold for SIR as an indicator of SSO was 0.44 (sensitivity = 91.7%, specificity=89.3%, AUC=0.94). Use of general anaesthesia (GA) was associated with less overall haemodynamic response (p=0.001), a drop in systolic blood pressure (p=0.01) and reduced increase in heart rate (p<0.001) on adenosine infusion, but was not associated with absence of splenic switch-off (p=0.25).

CONCLUSION

Presence of inducible stress perfusion defects was associated with positive splenic switch-off, which may signify adequate stress response. There was a lower rate of splenic switch-off and absent association with haemodynamic response in children. Children under GA displayed less overall haemodynamic response to adenosine.

CLINICAL RELEVANCE/APPLICATION

Adenosine may not be a reliable stressor agent in children. A lower incidence of splenic-switch off may infer a higher incidence of understress even with a standard pharmacological protocol.

RC213-07 Imaging of Tetralogy of Fallot

Monday, Nov. 26 9:40AM - 10:00AM Room: E353B

Participants
Randolph K. Otto, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the classic imaging findings in tetralogy of Fallot. 2) Recognize, differentiate, and describe common variants and anomalies with this syndrome. 3) Understand requisite imaging data used for pre-surgical or pre-interventional planning both initially and in the post-operative patient undergoing surveillance imaging. 4) List the appropriate modality and salient imaging features for reporting. 5) Review current management recommendations.

RC213-08 Lymphatic System in Congenital Heart Disease

Monday, Nov. 26 10:20AM - 10:40AM Room: E353B

Participants
David M. Biko, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Improve knowledge of MR techniques to image the lymphatic system in pediatric congenital heart disease. 2) Understand the relationship between the complications of surgical palliation of congenital heart disease and the lymphatic system. 3) Expand knowledge of lymphatic disorders and how they relate to congenital heart disease.

RC213-09 PedsCheXNet: Deep Learning-Based Automated Detection of Pediatric Thoracic Diseases

Monday, Nov. 26 10:40AM - 10:50AM Room: E353B

Participants
Tae Kyung Kim, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
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Ji Won Shin, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
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Gregory D. Hager, PhD, MSc, Baltimore, MD (*Abstract Co-Author*) Co-founder, Clear Guide Medical LLC CEO, Clear Guide Medical LLC
Haris I. Sair, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Ferdinand K. Hui, MD, Richmond, VA (*Abstract Co-Author*) Speakers Bureau, Terumo Corporation Speakers Bureau, Penumbra, Inc Stockholder, Blockade Medical Inc
Cheng Ting Lin, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

The purpose of this study was to develop and test the performance of a deep convolutional neural network (DCNN) called PedsCheXNet for the automated detection of pediatric thoracic diseases.

METHOD AND MATERIALS

We obtained a subset of 5941 (5.2%) pediatric chest radiographs (CXRs) from the NIH ChestX-ray14 database, the largest publicly-available CXR database containing 112,120 CXRs labeled with 14 thoracic diseases. For each thoracic disease of interest, the 5941 pediatric CXRs were randomly split into training (70%), validation (10%), and test (20%) datasets. In total, we evaluated 11 diseases (Table 1), while excluding fibrosis, hernia, and pneumonia due to low number of positive cases (<30). The CXRs were used to train, validate, and test the ResNet-18 DCNN pretrained on ImageNet for each disease of interest. During each training epoch, each image was augmented by random rotations, cropping, and horizontal flipping. Receiver operating characteristic (ROC) curves with area under the curve (AUC) and standard diagnostic measures were used to evaluate the DCNNs' performance on the test datasets.

RESULTS

Our DCNNs trained on only pediatric patients from the NIH ChestX-ray14 database for detection of thoracic pathology achieved AUCs ranging from 0.66 for atelectasis to 0.94 for pneumothorax, which are comparable to prior state-of-the-art work using the entire NIH ChestX-ray14 database (Figure 1). In some cases, such as pneumothorax, our AUC outperformed that achieved by prior work utilizing the entire database. Accuracy of each DCNN ranged from a low of 81% for infiltrate to a high of 98% for edema; in fact, infiltrate was the only DCNN to have accuracy <90%.

CONCLUSION

PedsCheXNet is our in-house DCNN specifically trained to detect thoracic pathology utilizing a pediatric subset of the NIH ChestX-ray14 database. PedsCheXNet achieved similar overall performance and improved accuracy for certain diagnoses compared to prior DCNNs utilizing the entire database, demonstrating that DCNNs can optimize diagnostic accuracy when stratifying by age.

CLINICAL RELEVANCE/APPLICATION

We have developed a deep convolutional neural network specifically trained to detect pediatric thoracic pathology utilizing a subset of the NIH ChestX-ray14 database with AUC as high as 0.94 for pneumothorax.

RC213-10 Quantifying Dynamic Tracheal Collapse in Neonates with Bronchopulmonary Dysplasia Using Respiratory-gated MRI

Monday, Nov. 26 10:50AM - 11:00AM Room: E353B

Participants
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PURPOSE

Extremely preterm infants face serious chronic lung disease (bronchopulmonary dysplasia, BPD), often complicated by comorbid dynamic tracheal collapse (tracheomalacia, TM). Tracheostomy can be used to bypass segments of the collapsing airway or to provide long-term positive pressure to improve respiratory mechanics in patients with TM or who otherwise struggle to wean from intubated support. Bronchoscopy is the gold standard for diagnosis of airway collapse but requires sedation and increased risk to patients. We present an innovative MRI technique for quantitative evaluation of dynamic tracheal collapse in non-sedated neonates.

METHOD AND MATERIALS

High-resolution (0.7mm isotropic) 3D radial ultrashort echo-time (UTE) MRI was obtained in 23 neonates (11 severe BPD, 1 moderate, 5 mild, 6 non-BPD control [4 preterm control]; gestational age 28±5 wks) on a NICU-sited 1.5T neonatal-sized scanner. Images were retrospectively gated to end-inspiration (EI) and end-expiration (EE) using the respiratory-modulated time-course of the MRI k-space center. Tracheas were segmented from gated images, and airway surfaces were geometrically analyzed to calculate minimum minor:major ratios of tracheal diameter (Rmin) at EI and EE along the trachea. MRI values of Rmin were compared to preterm subjects' clinical need for tracheostomy (required by 7 severe patients 15±13 days after MRI).

RESULTS

EI and EE images demonstrated clear changes in tracheal lumen size during respiration. Severe BPD subjects had significantly smaller values of Rmin at EE (0.69±0.18) than combined control, mild, and moderate subjects (0.80±0.04; P=0.042) and also exhibited a larger Rmin range. Values of Rmin at EE significantly correlated with preterm subjects' need for tracheostomy (0.62±0.20 and 0.80±0.04 for patients who did and did not receive tracheostomy, respectively; P=0.002).

CONCLUSION

This work demonstrates an innovative, quantitative MRI assessment of dynamic tracheal collapse in neonates with BPD, without

requiring invasive procedures, sedation, or ionizing radiation. Excessive tracheal collapse on MRI was predictive of later tracheostomy requirement and thus has potential to be used in a comprehensive clinical evaluation of neonatal BPD.

CLINICAL RELEVANCE/APPLICATION

MRI of neonates with BPD can quantify dynamic tracheal collapse, is predictive of eventual tracheostomy, and advantageously is non-invasive, non-ionizing, and does not require sedation.

RC213-11 Kids Don't Follow the Rules: Underperformance of E-FAST in the Pediatric Population for Detection of Pneumothorax

Monday, Nov. 26 11:00AM - 11:10AM Room: E353B

Participants
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Gina Berg, PhD, Wichita, KS (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Chest trauma is a common cause of pneumothorax in the pediatric population and is often seen associated with rib fractures and pulmonary contusions. Multiple modalities are currently used to evaluate the chest offering variable sensitivities for pneumothorax detection including CT, ultrasound, and chest x-ray. CT is currently the gold-standard for pneumothorax detection, however this modality delivers a higher radiation dose. Therefore radiation-related increased risk of cancer must be outweighed with the potential benefits. Chest ultrasound has been gaining popularity due to reports of superior sensitivity compared to the chest radiograph and it offers a desirable safety profile. The current literature describes sensitivities ranging from 58.9%-98.2%. Despite the growing body of evidence supporting its use in the adult patient, there is a paucity of supporting data in the pediatric population. Therefore we performed a single institution retrospective analysis of chest ultrasound in the trauma patient.

METHOD AND MATERIALS

This was an Institutional Review Board approved retrospective medical record review of pediatric trauma patients that received extended focused assessment with sonography (EFAST) between May 1, 2016 and September 21, 2017. Mean comparison was evaluated using an independent samples t-test with .05 defined as statistically significant. Statistical analysis was performed including the sensitivity, specificity, and accuracy.

RESULTS

403 of the 750 pediatric trauma patients identified underwent EFAST exam as part of the initial work up in the trauma bay. There were 226 patients (56%) whose EFAST findings were confirmed with either a chest x-ray or a CT scan. The remaining 177 (44%) were confirmed by observation and clinical outcome. A total of 11 pneumothoraces were observed of which 6 were were falsely negative on the chest ultrasound compatible with 45.5 % sensitivity and 99.2 % sensitivity.

CONCLUSION

Although there were only a total of 11 confirmed pneumothorax cases (2.7%), chest ultrasound demonstrated a low sensitivity in the pediatric population (45.5%). Further research in the pediatric population is needed to reproduce the findings described in the adult population. Additionally there is a need for a standardized protocol which optimizes the sensitivity while maintaining a time sensitive exam in the trauma setting.

CLINICAL RELEVANCE/APPLICATION

Pediatric E-fast underperforms in excluding pneumothorax.

RC213-12 Evaluation of Respiratory Gated Stationary Digital Chest Tomosynthesis in Pediatric Cystic Fibrosis Patients

Monday, Nov. 26 11:10AM - 11:20AM Room: E353B

Participants
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Otto Zhou, PhD, Chapel Hill, NC (*Abstract Co-Author*) Board of Directors, XinRay Systems Inc
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PURPOSE

Cystic fibrosis is a common disease in the pediatric population reliant on imaging for accurate disease assessment. During imaging extended breath holds can be challenging for younger patients. The primary goal of this study was to perform the first clinical evaluation of our prospective respiratory gated stationary digital chest tomosynthesis (RG s-DCT) system using a carbon nanotube (CNT) x-ray source array.

METHOD AND MATERIALS

Pediatric CF patients undergoing indicated CXR were recruited for this study. Following CXR, patients underwent RG s-DCT using our CNT x-ray source array. Prior to imaging, the respiratory signal was obtained (DTU300 BIOPAC system) and a gating window was

selected at the inspiratory peak. Accuracy of gating was determined by comparing the relative respiratory trace height with the breath with the maximum peak height of the 29 projections. Retrospective analysis was used to remove projections with significant motion. Custom Matlab code measured diaphragm sharpness to evaluate between original s-DCT sets and motion corrected sets. A reader study was performed with three pediatric radiologists to compare CXR and s-DCT. Image quality, motion blur, and CF pathology was assessed. A Wilcoxon sign-rank test was used for statistical analysis.

RESULTS

A total of thirteen pediatric patients were successfully imaged using our system. The average age of the patients was 9.6 +/- 3.4 years. The mean peak breath ratio was 0.89 +/- 0.06. Pixel widths of the diaphragm border were 27.08 +/- 6.20 for the original s-DCT set and 21.31 +/- 6.94 for the corrected set. Comparison yielded a t-value of -3.18, p-value of 0.0079. Summed quality and pathology assessment scores were significantly improved on motion corrected images, z-value-2.76 and p-value 0.006. Blur was also significantly decreased in corrected images, z-value -3.12 and p-value 0.002. CXR scores were significantly higher than s-DCT.

CONCLUSION

Prospective respiratory gated tomosynthesis imaging is possible using our CNT RG s-DCT system. Precision gating and analysis of gating allows for significantly reduced respiratory motion blur. Quality and CF pathology scores determined by reader study are improved in motion corrected sets, however more work is required to reach the quality found on conventional imaging.

CLINICAL RELEVANCE/APPLICATION

Respiratory gated s-DCT has the potential to be an effective method of performing CF imaging without the need for a breath hold.

RC213-13 Magnetic Resonance T1 Mapping And Ultrashort Echo Time (UTE) Magnetic Resonance Imaging (MRI) of the Lung in the Evaluation of Early Regional Pulmonary Disease in Pediatric Cystic Fibrosis (CF) Patients: A Cross-Sectional Pilot Study

Monday, Nov. 26 11:20AM - 11:30AM Room: E353B

Participants
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PURPOSE

To compare the normalized T1 (nT1) relaxation metric and UTE MRI of the lungs in early pediatric pulmonary CF disease with healthy subjects

METHOD AND MATERIALS

In this institutional review board- approved prospective study 5 CF patients (mean 11 ± 3 years) with normal spirometry tests and 5 age and sex -matched healthy subjects (mean 11 ± 4 years) were recruited. Signed informed assents/consents were obtained. Subjects completed a non-contrast chest MRI, using UTE and T1 mapping (modified look-locker inversion recovery) of the lung. Spirometry and CF Respiratory Symptom Diary (CFRSD) questionnaire were obtained on a same day. CF MRI scoring (Eichinger) was performed by two experienced pediatric radiologists blinded to the patients' clinical information. T1 mapping was used as a surrogate for perfusion images for functional scoring. A region of interest analysis on T1 mapping images was used to calculate the mean nT1 values for all lobes. The primary outcome was to assess the differences in mean nT1 and MRI scores between two groups. Correlation between the mean nT1 and MRI scoring with spirometry and CFRSD were evaluated. Reproducibility of T1 mapping images was evaluated by repeating right lung MRI. Statistical analysis was performed by t-test to compare means. A normality assumption was validated by a Shapiro-Wilk normality test. Pearson, Spearman's, and Kendall's correlation tests were conducted to evaluate relationship between two variables. $P < 0.05$ were considered significant.

RESULTS

Mean nT1 values were lower in CF patients compared to healthy subjects ($p<0.05$). Repeat T1 mapping results of the lung were similar to the first results ($p> 0.1$). Negative correlation between mean nT1 and CFRSD was found (r -0.94, p 0.05). No correlation between mean nT1 and spirometry results was found. Morphologic MRI scoring in CF and healthy group was similar (p 0.11), yet the T1 scoring was different (p 0.03)

CONCLUSION

MR T1 mapping of lung was different between our CF patients with normal spirometry and healthy subjects. Combining T1 mapping with a morphologic MRI assessment of the lung can detect early pulmonary disease in pediatric CF patients without risk of radiation or contrast agent.

CLINICAL RELEVANCE/APPLICATION

MR T1 mapping of the lung detects early regional pulmonary CF disease on MRI, before morphologic changes. This can be used to individualize treatment and introduce therapies before irreversible lung damage occurs.

RC213-15 Pediatric Cardiac Masses

Monday, Nov. 26 11:40AM - 12:00PM Room: E353B

Participants
Demetrios A. Raptis, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1. Review the more commonly encountered pediatric cardiac masses2. Distinguish rare tumors and mimickers from the common pediatric cardiac tumors3. Develop an age and location based approach for evaluation of cardiac tumors

LEARNING OBJECTIVES

1) Review the commonly encountered cardiac masses in the pediatric patient and their CT and MRI imaging findings. 2) Develop a differential diagnosis for pediatric cardiac masses based on age, location, and imaging findings. 3) Discuss tips for applying CT and MRI to evaluate pediatric cardiac masses.

RC214

Interventional Series: Embolotherapy

Monday, Nov. 26 8:30AM - 12:00PM Room: E350

IR

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants
Wael E. Saad, MBBCh, Ann Arbor, MI (*Moderator*) Speaker, W. L. Gore & Associates, Inc; Consultant, Siemens AG
Laura K. Findeiss, MD, Atlanta, GA (*Moderator*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Describe rationale of bariatric embolization. 2) Explain the rationale and treatment of high flow malformations. 3) Describe the preparation of cyanoacrylates for embolization. 4) List two complications related to embolization. 5) Recognize the significance of Type III endoleaks. 6) Describe approach to treatment of visceral aneurysms.

Sub-Events

RC214-01 Embolization of Hemorrhoids

Monday, Nov. 26 8:30AM - 8:45AM Room: E350

Participants
Farouk Tradi, MBBS, Marseille, France (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the anatomy of superior rectal arteries. 2) List the indications of embolization of hemorrhoids. 3) Explain the results of embolization of hemorrhoids.

RC214-02 Advanced Endoleak Treatment

Monday, Nov. 26 8:45AM - 9:00AM Room: E350

Participants
Laura K. Findeiss, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To be able to asses the options for access to the source of an endoleak for treatment. 2) To be able to apply knowledge of the behavior of flow channels to select locations for embolization.

RC214-03 TIPS Reduction: A Revising Concept

Monday, Nov. 26 9:00AM - 9:10AM Room: E350

Participants
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PURPOSE

TIPS reduction/occlusion remains a favored option for patients with adverse outcomes from TIPS placement (i.e hepatic encephalopathy and acute hepatic failure)refractory to medical therapy. Herein we review the available data substantiating this practice and present our single-center experience, specifically assessing the role of pre-operative evaluation on patient selection.

METHOD AND MATERIALS

Single center retrospective review was performed for cases of TIPS reduction/occlusion over the past 10 years. Only cases utilizing covered stents grafts were included for review. Clinical data related to their TIPS reduction were gathered from the medical record (including MELD, NH3, hepatic encephalopathy grade and survival). Two-tailed paired students T test when applicable.

RESULTS

Out of a total of 157 TIPS revisions, 7 patient underwent TIPS reduction/occlusion.1 patient was female. Average age was 64. Methods for treatment included placement of a parallel stent graft or an amplatzer plug (TIPS occlusion).Technical success was 100%. Average MELD at reduction was 28 (range: 15-49). Average survival after intervention was 154 days. In fact, if the single surviving patient is removed from the series (MELD=15, currently at over 2 years survival), the average survival plummets to 38 days. 4 patients had significant decreases in serum NH3 after TIPS reduction (p0.05). None of the patients with MELD > 20 and refractory encephalopathy had complete improvement in mental status. No patients had significant decreases in their MELD score post TIPS reduction. Only a weak correlation existed between MELD and average survival (r2=0.23), all 4 patients with MELD score > 20 survived less than 20 days after their TIPS intervention.

CONCLUSION

Our cohort had signifcantly worse clinical outcomes than reported in the literature. This is attributable to the inherently sicker patients included in this review with higher MELD score>20. None of these patients with MELD >20 and refractory encephalopathy had clinical improvement in mental status with overall survival less than 20 days, post reduction. TIPS reduction/occlusion in patients with high MELD score and refractory encephalopathy have guarded outcomes. Larger cohorts need to be evaluated to validate the conclusion.

CLINICAL RELEVANCE/APPLICATION

TIPS reduction/occlusion for patient with high MELD scores for refractory encephalopathy or acute hepatic failure have guarded outcomes.

RC214-04 Bioengineered Liquid Embolic For Vascular Embolization

Monday, Nov. 26 9:10AM - 9:20AM Room: E350

Participants
Hassan Albadawi, MD, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
Avery A. Witting, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
Patrick T. Hangge, MD, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
Ali Khademhosseini, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Rahmi Oklu, MD,PhD, Phoenix, AZ (*Presenter*) Nothing to Disclose

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PURPOSE

We developed a novel class of hemostatic shear-thinning biomaterials (STB) with unique properties. The goal of this study was to examine the embolic property in a model of arterial embolization in rats to rule out STB breakdown/fragmentation that can potentially cause non-target emoblization.

METHOD AND MATERIALS

Rats underwent unilaterial femoral artery (FA) injection with STB containing Iohexol. Hind limb microperfusion was measured using laser speckle imaging. FA tissue was harvested at 0, 3, 7, 21, days after STB injection; extensive histologic, immunohistochemichal and micro-computed tomography (micro-CT) sudies were performed. High resolution micro-CT images of fixed FA tissues were aquired and reconstructed using SkyScan-1275 scanner at 10µm. Structural analyses was performed on binarized volume of interest of each scan with standardized global theshold for all frames. In addition, cytokine arrays were analyzed.

RESULTS

STB injection caused 50% decrease in hind limb perfusion that persisted for 21 days after surgery (p=0.0001); however, digital perfusion was preserved without necrosis. Micro-CT imaging showed intact STB casting FA lumen which remodels by 21 days after injection. Micro-CT structural analysis revealed an increase in surface to volume ratio (p=0.006), surface convexity index (p=0.002), and structure model index (p=0.037) at 21 days compared to baseline at 0 days after injection. Hisology revealed ongoing STB degradation and intraluminal remodling with transient increase in inflammatory cells infiltrated at 3 days and granulation tissue formation at 21 days after injection.

CONCLUSION

STB arterial injection led to persistent focal embolization of FA without migration or fragmentation; there were no distal limb perfusion deficits and motor function was unchanged. Extensive Micro-CT and histologic and cytokine sudies revealed STB biocompatability and biodegradation consistent with expected safety profile. This study suggests STB can be used as a permanent or potentially reversible biocompatable liquid embolic agent.

CLINICAL RELEVANCE/APPLICATION

This novel embolic biomaterial may be an effective embolization agent, which can be delivered through clinical catheters using image guided minimally invasive techniques.

RC214-05 AVM Embolization

Monday, Nov. 26 9:20AM - 9:35AM Room: E350

Participants
William S. Rilling, MD, Milwaukee, WI (*Presenter*) Research support, B. Braun Melsungen AG; Research support, Sirtex Medical Ltd; Research support, Siemens AG; Consultant, B. Braun Melsungen AG; Consultant, Cook Group Incorporated ; Consultant, Terumo

Corporation; Advisory Board, Terumo Corporation

LEARNING OBJECTIVES

View learning objectives under main course title.

RC214-06 Bariatric Embolization

Monday, Nov. 26 9:35AM - 9:50AM Room: E350

Participants
Jafar Golzarian, MD, Minneapolis, MN (*Presenter*) Officer, EmboMedics Inc; Consultant, Boston Scientific Corporation; Consultant, Medtronic plc; Consultant, Penumbra, Inc

LEARNING OBJECTIVES

1) Understand the rationale for GAE. 2) Review the state of the results. 3) Discuss future directions.

RC214-07 Clinical Value of C-Arm Cone-Beam CT in Patients with Hemoptysis for Intra-Procedural Bronchial Artery Embolization Planning

Monday, Nov. 26 9:50AM - 10:00AM Room: E350

Participants
Tanja Zitzelsberger, MD, Tuebingen, Germany (*Presenter*) Nothing to Disclose
Ulrich Grosse, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Gerd Grozinger, MD, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Roland Syha, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Dominik Ketelsen, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Sasan Partovi, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Konstantin Nikolaou, MD, Tuebingen, Germany (*Abstract Co-Author*) Advisory Panel, Siemens AG; Speakers Bureau, Siemens AG; Speaker Bureau, Bayer AG
Rudiger Hoffmann, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Pulmonary hemoptysis is a potentially life-threatening symptom and frequently a sign for underlying severe pulmonary disease. Bronchial artery embolization has been established as a first line approach in pulmonary hemoptysis. Purpose of this study was to evaluate the clinical value of CBCT for embolization procedures in unclear detection of the bronchial arteries (BA) on pre-operative imaging.

METHOD AND MATERIALS

From 11/2016 to 07/2017, 17 patients (64.3±14.7years) with haemoptysis underwent BAE including pre-interventional CT, angiography and CBCT during the procedure. CBCT, angiography and CT were independently evaluated by two interventional radiologists with limited experience (1 and 3 years) with regard to image quality, number and origin of BA and diagnostic confidence. Consensus reading by two experienced interventional radiologists of all available data served as a gold standard (GS). 17 patients who underwent BAE without CBCT guidance served as controls regarding procedural time and number of acquired angiographic series. Spearman rank correlation and Wilcoxon signed-rank test was performed.

RESULTS

Both readers showed a statistically significant increase in diagnostic confidence for CBCT compared to pre-procedural CT (A: $p=0.003$; B: $p=0.03$) and compared to angiography (A&B: $p<0.001$). Regarding the number of detected BA, correlation coefficient between GS and CBCT was: $r=0.8553$ (A), $r=0.8773$ (B); GS and pre-procedural CT: $r=0.2504$ (A), $r=0.3174$ (B); GS and angiography: $r=0.2901$ (A); $r=0.4292$ (B). Time to BA embolization was 32.6±12.5min in the group with CBCT (control group 38.5±24.6min; $p=0.7204$). Significantly less angiographic series were acquired when utilizing CBCT (1.3±0.7 vs. 3.6±2.9; $p=0.0029$). Mean cumulative dose area product didn't show any significant difference between angiography with CBCT (2495.4 ± 1428.5 µGym²) and without CBCT (2347.2 ± 1984.9 µGym², $p=0.6745$).

CONCLUSION

In patients with hemoptysis and pre-procedural CT revealing unclear visualization of bronchial arteries, CBCT is a helpful and reliable technique for improving detection of bronchial arteries and is particularly beneficial for unexperienced interventional radiologists.

CLINICAL RELEVANCE/APPLICATION

This study showed that utilizing CBCT decreased the number of DSA until successful selection of the target bronchial artery. Therefore, especially less experienced interventional radiologists are likely to benefit from CBCT.

RC214-08 Embolization in the Trauma Patient

Monday, Nov. 26 10:00AM - 10:15AM Room: E350

Participants
Ahmed K. Abdel Aal, MD, PhD, Birmingham, AL (*Presenter*) Consultant, Abbott Laboratories; Consultant, Baxter International Inc; Consultant, C. R. Bard, Inc; Consultant, Boston Scientific Corporation; Consultant, W. L. Gore & Associates, Inc; Consultant, Sirtex Medical Ltd

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LEARNING OBJECTIVES

1) The angiographic findings in trauma patients. 2) The different modalities & materials used in treatment of trauma patients. 3) The outcomes of interventional treatment in trauma patients.

RC214-09 Prophylactic Embolization Pre-Y90

Monday, Nov. 26 10:30AM - 10:45AM Room: E350

Participants
Naganathan B. Mani, MD, Chesterfield, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the rationale of prophylactic embolization prior to Y90 treatment. 2) Have a basic understanding of the arterial anatomy relevant to Y90 and specific arteries of interest. 3) Tips and techniques to achieve a safe embolization of hepatoenteric branches. 4) Complications associated with prophylactic embolization. 5) Consensus/update of literature on prophylactic embolization prior to Y90. 6) Devices used to avoid doing prophylactic embolization.

RC214-10 Cost-Effectiveness of Steerable Microcatheter Use in Super-selective Angiography and/or Embolization

Monday, Nov. 26 10:45AM - 10:55AM Room: E350

Participants
Jung H. Yun, Closter, NJ (*Presenter*) Nothing to Disclose
Abieyuwa Eweka, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Jonathan Minkin, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Jason C. Hoffmann, MD, Mineola, NY (*Abstract Co-Author*) Speakers Bureau, Merit Medical Systems, Inc; ;

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PURPOSE

To perform a cost analysis comparing steerable microcatheter (SM) and conventional microcatheter (CM) use in moderate and highly difficult vessel selection.

METHOD AND MATERIALS

IRB-approved single institution prospective cohort analysis of 40 complex angiographic procedures with superselective microcatheter use during a 3-month period in 2017 was performed. Data collected included number and types of microcatheters and microwires used, procedure time, radiation exposure index (dose area product/DAP), time to target vessel selection (TTVS), cost associated with microcatheter/wire use, and time-specific room-related cost (cost per minute to run room). Multivariate statistical analyses were conducted with Microsoft Excel (Microsoft, Redmond, WA). Discrete variables between SM and CM use were evaluated by Wilcoxon and two-tailed t-test. Statistical significance was expressed as a P value of <.05.

RESULTS

A SM (SwiftNINJA, Merit Medical, South Jordan, UT, USA) was used to select 46 vessels in 20 patients. One or more CMs were used in 20 patients to select 34 vessels. Mean vessel selection cost specific to microcatheter and microwire use was $1914.81 (SD $242.03) in the SM group and $878.69 (SD $371.02) in the CM group (P<.05). Mean cost associated with procedure time was $14,319.5 (SD $3,715.31) in the SM group and $19,871.06 (SD $7652.67) in the CM group (P<.05). When combining these variables, the mean total adjusted cost was $16,234.31 (SD $3,789.58) in the SM group and $20,749.75 (SD $7,886.57) in the CM group (P<.05). Median TTVS was 12 seconds (range 4-155 seconds) in the SM group and 47.5 seconds (range 12-480 seconds) in the CM group (P<.001). No guidewire was used when selecting 33 SM vessels, with median guidewire use of 0 in the SM group and 2 in the CM group (P<.001). Median total procedure time in the SM group was 75 minutes and 112 minutes in the CM group (P=0.03). Median DAP (microGray.m2) was 26,948 in the SM group and 30,904 in the CM group (P=0.29).

CONCLUSION

When taking into consideration the dollar value associated with procedural efficiency and resulting procedure room cost, utilization of a steerable microcatheter leads to cost savings in appropriately selected superselective angiography cases.

CLINICAL RELEVANCE/APPLICATION

Steerable microcatheter benefits include improved procedural efficiency, shorter TTVS, and an overall cost benefit that is driven by resultant shorter procedure times and improved efficiency.

RC214-11 Single-Center Experience of Endovascular Repair of 40 Visceral Artery Aneurysms (VAAs) and Pseudoaneurysms (VAPAs) with the Viabahn Stent-Graft: Technical Aspects, Clinical Outcome, and Mid-Term Patency

Monday, Nov. 26 10:55AM - 11:05AM Room: E350

Participants
Luigi Augello, MD, Milan, Italy (*Presenter*) Nothing to Disclose
Massimo Venturini, MD, Milano, Italy (*Abstract Co-Author*) Nothing to Disclose
Paolo Marra, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Simone Gusmini, MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesco A. De Cobelli, MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Alessandro Del Maschio, MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Endovascular repair of VAAs and VAPAs with stent-grafting (SG) can simultaneously allow aneurysm exclusion and vessel preservation, minimizing the risk of ischemic complications. Our aim was to report endovascular repair of 40 VAAs and VAPAs with the Viabahn stent-graft, focusing on technical aspects, clinical outcome and mid-term patency.

METHOD AND MATERIALS

Consecutive patients affected by VAAs-VAPAs and submitted to SG with the self-expandable Viabahn stent-graft (Gore) were retrospectively analyzed. Aneurysm type, patient number, SG clinical setting, procedural data, peri-procedural complications, technical success, 30-day clinical success, 30-day mortality and follow-up period (aneurysm exclusion, stent-graft patency, ischemic complications) were assessed.

RESULTS

SG was performed in 40 patients (24 VAPAs/16 VAAs) and in 44 procedures (25 in emergency, 19 in elective treatments), via transfemoral in 37 cases (transaxillary in 7 cases). One peri-procedural complication was recorded (a splenic artery dissection successfully converted to transcatheter embolization). The overall technical and clinical success rates were, respectively, 96 and 84%, with excellent trend in elective treatments (both 100%). Overall 30-day mortality was 12.5% (septic shock after pancreatic surgery). Stent-graft thrombosis occurred in 2 patients within 3 months, with aneurysm exclusion and without ischemic complications. Stent-graft patency and aneurysm exclusion were confirmed at 6, 12 and 36 months in 18, 12 and 7 patients, respectively.

CONCLUSION

SG of VAAs and VAPAs was safe and effective, particularly in elective treatments. The Viabahn stent-graft, flexible and without shape memory, is suitable for endovascular repair of tortuous visceral arteries.

CLINICAL RELEVANCE/APPLICATION

The self-expandable peripheral Viabahn SG is suitable for the endovascular repair of VAAs and VAPAs.

RC214-12 Prostate Embolization: Lessons Learned

Monday, Nov. 26 11:05AM - 11:20AM Room: E350

Participants
Alex Kim, MD, Bethesda, MD (*Presenter*) Research Grant, Surefire Medical, Inc; Speakers Bureau, Surefire Medical, Inc; Advisory Board, Surefire Medical, Inc; Stockholder, Surefire Medical, Inc; Speakers Bureau, Sirtex Medical Ltd; Proctor, Sirtex Medical Ltd; Stockholder, Pfizer Inc; ;

LEARNING OBJECTIVES

To review the latest literature, technical details and potential complications related to PAE.

RC214-13 Embolization: New Tools and Techniques

Monday, Nov. 26 11:20AM - 11:35AM Room: E350

Participants
D. T. Johnson, MD,PhD, South San Francisco, CA (*Presenter*) Speaker, Surefire Medical, Inc; Consultant, Surefire Medical, Inc; Advisory Board, Bristol-Myers Squibb Company; Speaker, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Advisory Board, Merck & Co, Inc; Advisory Board, Dova Pharmaceuticals

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LEARNING OBJECTIVES

Learners during this session should be able to describe the currently available embolic materials for chemoembolization and be able to describe the proper uses, advantages, and drawbacks for these treatments.

ABSTRACT

There are several choices for treatment of tumors in the liver presently. This presentation seeks to describe the differences of the devices available based on characteristics and performance as well as new devices available for delivery.

RC214-14 Body Composition Changes at Computed Tomography after Left Gastric Artery Embolization in Overweight and Obese Individuals

Monday, Nov. 26 11:35AM - 11:45AM Room: E350

Awards
Student Travel Stipend Award

Participants
Edwin A. Takahashi, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Naoki Takahashi, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Chris Reisenauer, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Michael R. Moynagh, MD, FFR(RCSI), Dublin 7, Ireland (*Abstract Co-Author*) Nothing to Disclose
Sanjay Misra, MD, Rochester, MN (*Abstract Co-Author*) Cardinal Health, Inc

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PURPOSE

Left gastric artery embolization (LGAE) is currently under investigation as a potential bariatric therapy. This study aimed to characterize body composition changes in overweight and obese individuals who underwent LGAE.

METHOD AND MATERIALS

Institutional review board approval was obtained for this study. Eighty-nine patients who underwent LGAE for gastric bleeding

between 1/2006 and 3/2018 were retrospectively reviewed. Of these, 61 patients were excluded for unavailable imaging or follow-up and 12 more patients were excluded for body mass index (BMI) below 25 kg/m2. Computed tomography body composition parameters were analyzed at the L1, L3 and L5 lumbar levels in the remaining 16 overweight or obese patients with semiautomated imaging processing algorithms (MATLAB 13.0, Math Works, MA). Adipose tissue and skeletal muscle area were measured using threshold attenuation values between -190 to -30 Hounsfield Units (HU) and -29 to +150 HU, respectively. Total body fat index (BFI), subcutaneous fat index (SFI), visceral fat index (VFI) and skeletal muscle index (SMI) were determined ([tissue area (cm)]2/[height (m)]2) at each lumbar level and summed. Excess body weight (EBW) was determined based on the Lorentz formula for ideal body weight. Changes in weight and body composition were analyzed with either Wilcoxon signed-rank test or paired Student's t tests based on the normality of the distributions.

RESULTS

Mean follow-up was 1.5 ± 0.8 months. Mean weight and body composition parameters pre-LGAE vs. post-LGAE as well as per cent change were calculated for body weight (87.9±12.5 vs. 82.3±13.9 kg, -6.4%, p=0.03), BMI (30.0±4.3 vs. 28.3±4.9 kg/m2, -6.3%, p=0.005), EBW (23.3±10.6 vs. 17.7±12.6 kg, -24.1%, p=0.003), BFI (128.6±54.7 vs 123.9±59.5 cm2/m2, -3.7%, p=0.03), SFI (81.7±44.5 vs. 78.4±43.7 cm2/m2, -4.1%, p=0.03), VFI (35.8±17.8 vs. 34.3±21.6 cm2/m2, -4.1%, P=0.13) and SMI (44.5±7.2 vs. 41.5±6.9 cm2/m2, -6.8%, p<0.001).

CONCLUSION

Overweight and obese individuals who underwent LGAE had significant weight loss as a result of decreased body fat and skeletal muscle. However, visceral fat did not significantly decrease over the course of follow-up.

CLINICAL RELEVANCE/APPLICATION

This study quantitatively characterized changes in body composition as they pertain to weight loss after LGAE and highlights how this procedure may affect body fat and muscle mass.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Naoki Takahashi, MD - 2012 Honored Educator

RC214-15 Anatomy and Basic Technique for BRTO/BATO

Monday, Nov. 26 11:45AM - 12:00PM Room: E350

Participants
Wael E. Saad, MBBCh, Ann Arbor, MI (*Presenter*) Speaker, W. L. Gore & Associates, Inc; Consultant, Siemens AG

LEARNING OBJECTIVES

1) To recognize standard variceal inflow and outflow anatomy. 2) To understand to basic principles that underlie variceal obliteration. 3) To be familiar with standard technical approaches to variceal obliteration.

RC215

Breast Series: Hot Topics (The In-Person Presentation is Supported by an Unrestricted Educational Grant from Hologic)

Monday, Nov. 26 8:30AM - 12:00PM Room: Arie Crown Theater

AI BR

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Linda Moy, MD, New York, NY (*Moderator*) Nothing to Disclose
Fiona J. Gilbert, MD, Cambridge, United Kingdom (*Moderator*) Research Grant, Hologic, Inc; Research Grant, General Electric Company; Research Grant, GlaxoSmithKline plc; Research Consultant, Alphabet Inc

Sub-Events

RC215-01 Radiomics

Monday, Nov. 26 8:30AM - 8:50AM Room: Arie Crown Theater

Participants
Karen Drukker, PhD, Chicago, IL (*Presenter*) Royalties, Hologic, Inc

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Active Handout:Karen Drukker

http://abstract.rsna.org/uploads/2018/18000478/RSNA2018_Drukker_Handout RC215-01.pdf

LEARNING OBJECTIVES

1) Identify the scientific premise, motivation, and increasing role of radiomics in medical imaging. 2) Compare 'conventional' radiomics methods and deep learning-based radiomics methods. 3) Assess some of the challenges for radiomics-based decision support systems in becoming powerful players in modern precision medicine.

RC215-02 Quantitative Diffusion-Weighted MRI of Estrogen Receptor-Positive, Lymph Node-Negative Invasive Breast Cancer: Association between Whole-Lesion Apparent Diffusion Coefficient Metrics and Recurrence Risk

Monday, Nov. 26 8:50AM - 9:00AM Room: Arie Crown Theater

Participants
Jin You Kim, MD, Busan, Korea, Republic Of (*Presenter*) Nothing to Disclose
Lee Hwangbo, MD, Pusan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Joo Kim, MD, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Suk Kim, MD, Pusan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To investigate possible associations between quantitative apparent diffusion coefficient (ADC) metrics derived from whole-lesion histogram analysis and breast cancer recurrence risk in patients with estrogen receptor (ER)-positive, lymph node-negative invasive breast cancer who underwent the Oncotype DX assay.

METHOD AND MATERIALS

Institutional review board approval was obtained for this retrospective study, which was conducted on 74 women (mean age, 49.3 years) with ER-positive, lymph node-negative invasive breast cancer who underwent the Oncotype DX assay and preoperative diffusion-weighted MRI from July 2015 to January 2018. Histogram analysis of pixel-based ADC data of whole tumors was performed by two radiologists using a software tool and various ADC histogram parameters (mean, minimum, maximum, and 5th, 25th, 50th, 75th, and 95th percentile ADCs) were extracted. The ADC difference value (defined as the difference between minimum and maximum ADC) was calculated to assess intratumoral heterogeneity. Associations between quantitative ADC metrics and Oncotype DX risk groups (low [recurrence score (RS) <18], intermediate (RS 18-30), and high [RS >30]) were evaluated by receiver operating characteristic (ROC) curve and logistic regression analyses.

RESULTS

Whole-lesion histogram analysis showed minimum ADCs, maximum ADCs, and ADC difference values were significantly different between low and non-low (ie, intermediate and high) risk groups (0.604, 1.478, and 0.874 × 10-3mm2/s versus 0.374, 1.687, and

1.321 × 10-3mm2/s, respectively; P<0.001, P=0.010, and P<0.001, respectively). The ADC difference value yielded the largest area under the ROC curve (0.771; 95% confidence interval [CI]: 0.650, 0.891; P<0.001) for differentiating the two groups. Multivariate regression analysis showed that the ADC difference value was the only significant factor associated with low Oncotype DX risk group (adjusted odds ratio = 0.998; 95% CI: 0.996, 0.999; P<0.001).

CONCLUSION

The ADC difference value derived from whole-lesion histogram analysis could be helpful for identifying ER-positive, lymph node-negative invasive breast cancer patients with low risk of recurrence.

CLINICAL RELEVANCE/APPLICATION

In estrogen receptor-positive, lymph node-negative breast cancer, the ADC difference value derived from whole-lesion histogram assessments might serve as quantitative biomarkers of recurrence risk.

RC215-03 Radiomic Phenotypes of Tumor Heterogeneity from Pre-Operative DCE-MRI Predict Breast Cancer Recurrence after 10-Year Follow-Up: Phenotype Discovery and Independent Validation

Monday, Nov. 26 9:00AM - 9:10AM Room: Arie Crown Theater

Participants
Rhea Chitalia, Philadelphia, PA (*Presenter*) Nothing to Disclose
Jennifer Rowland, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Elizabeth S. McDonald, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Lauren Pantalone, BS, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Eric A. Cohen, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Aimilia Gastounioti, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Kathleen M. Thomas, BS, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Rebecca Batiste, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Michael D. Feldman, MD, PhD, Philadelphia, PA (*Abstract Co-Author*) Advisory Board, Inspirata Inc Advisory Board, Koninklijke Philips NV Advisory Board, XIFIN, Inc
Mitchell D. Schnall, MD, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Emily F. Conant, MD, Philadelphia, PA (*Abstract Co-Author*) Grant, Hologic, Inc; Consultant, Hologic, Inc; Grant, iCAD, Inc; Consultant, iCAD, Inc; Speaker, iiCME
Despina Kontos, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To validate intrinsic imaging phenotypes of tumor heterogeneity and evaluate their prognostic performance in predicting 10-year recurrence.

METHOD AND MATERIALS

Pre-treatment DCE-MRI scans of 94 women with primary invasive breast cancer and 10-year follow up data available were retrospectively analyzed from a clinical trial cohort at our institution (2002-2006). For each woman, a signal enhancement ratio map was generated for the most representative slice of the primary lesion from which morphologic features were calculated. Radiomic features (histogram, run-length, structural, and co-occurrence matrix features) were extracted and summarized over tumor quadrants. Intrinsic phenotypes of tumor heterogeneity were identified via unsupervised hierarchical clustering applied to the extracted feature vectors, with significant clusters found using Consensus Clustering and the SigClust method. Differences across phenotypes by hormone receptor status, tumor size, post-surgery therapy, TNM staging, and recurrence outcomes were assessed using Chi-square and Kruskal-Wallis tests. An independent dataset of 116 women diagnosed with primary invasive breast cancer (2002-2006), available via The Cancer Imaging Archive, was used to validate phenotype reproducibility. Survival probabilities across phenotypes were evaluated using Kaplan-Meier curves and phenotype cluster assignments were added to a baseline Cox proportional hazards model with established histopathologic prognostic factors to predict RFS.

RESULTS

Three significant phenotypes of low, medium, and high heterogeneity were identified in the discovery cohort and reproduced in the validation cohort (p<0.001). No recurrent cases were found in the low heterogeneity phenotype (p<0.001). Clinical stage, mitotic grade, lymph invasion, and nuclear grade were different across phenotypes (p<=0.02). Kaplan-Meier curves showed significant differences (p < 0.001) in RFS probabilities across phenotypes. The augmented model including phenotype assignment had a higher discriminatory capacity (c-statistic= 0.80) compared to a baseline model with only established prognostic factors (c-statistic= 0.65, p<0.01).

CONCLUSION

Intrinsic imaging phenotypes of tumor heterogeneity can predict 10-year recurrence as validated in an independent dataset.

CLINICAL RELEVANCE/APPLICATION

Radiomic phenotypes could provide a non-invasive characterization of tumor heterogeneity to augment personalized prognosis and treatment.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Mitchell D. Schnall, MD, PhD - 2013 Honored Educator

RC215-04 Robustness of Computer-aided Diagnosis of Breast Cancer Using Radiomics and Machine Learning Classification of 1,461 Lesions across Populations in China and the United States

Monday, Nov. 26 9:10AM - 9:20AM Room: Arie Crown Theater

Participants
Heather Whitney, PhD, Wheaton, IL (*Presenter*) Nothing to Disclose
Hui Li, PHD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Yu Ji, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Alexandra V. Edwards, Chicago, IL (*Abstract Co-Author*) Research Consultant, QView Medical, Inc; Research Consultant, Quantitative Insights, Inc
John Papaioannou, MSc, Chicago, IL (*Abstract Co-Author*) Research Consultant, QView Medical, Inc
Peifang Liu, MD, PhD, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Maryellen L. Giger, PhD, Chicago, IL (*Abstract Co-Author*) Stockholder, Hologic, Inc; Shareholder, Quantitative Insights, Inc; Shareholder, QView Medical, Inc; Co-founder, Quantitative Insights, Inc; Royalties, Hologic, Inc; Royalties, General Electric Company; Royalties, MEDIAN Technologies; Royalties, Riverain Technologies, LLC; Royalties, Mitsubishi Corporation; Royalties, Canon Medical Systems Corporation

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PURPOSE

To assess the performance of computer aided diagnosis (CADx) in breast lesions imaged with DCE-MR in two patient cohorts, one in China and one in the United States (US), using extracted radiomic features and machine learning classification.

METHOD AND MATERIALS

Dynamic contrast-enhanced magnetic resonance (DCE-MR) images of 1,461 breast lesions (from China, GE scanners: 300 benign lesions, 302 malignant cancers; from the US, Philips scanners: 268 benign lesions, 591 malignant cancers) were collected under HIPAA and IRB compliance. The lesions were segmented automatically using a fuzzy c-means method. Thirty-eight radiomic features describing size, shape, morphology, kinetics, and texture were extracted using previously reported methods. The performance of CADx for classification between benign lesions and malignant cancers was evaluated with two methodologies: (a) independent training and testing of the datasets, with each set serving as a training set while the other served as a testing set; and (b) ten-fold cross validation within each set. Classification was performed using support vector machines with optimization of the hyperparameters. The area under the ROC curve (AUC) served as figure of merit, with its value and standard error determined using the conventional binormal model. The AUCs resulting from (a) and (b) were compared within and between each methodology. Difference in AUC was significantly different when $p < 0.05$.

RESULTS

When radiomic features extracted from MRIs acquired in China were used to train the machine classifiers and independent testing was conducted on MRIs acquired in the US, AUC = 0.77 (0.02), while the reverse resulted in AUC = 0.79 (0.02). For cross-validation within each set, AUC = 0.82 (0.02) for the US database and AUC = 0.80 (0.02) for the China database. AUCs compared across methodologies failed to show significant difference.

CONCLUSION

Computer aided diagnosis of breast lesions demonstrated potential robustness across independent populations in both independent training/testing and in cross validation.

CLINICAL RELEVANCE/APPLICATION

Radiomic features extracted from DCE-MRI may be robust for classifying breast lesions as benign or malignant across two cohorts (one in China, one in US), enhancing translation to clinical use.

RC215-05 Radiogenomics

Monday, Nov. 26 9:20AM - 9:40AM Room: Arie Crown Theater

Participants
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LEARNING OBJECTIVES

1) Define radiogenomics and describe how it differs from radiomics. 2) Examine the limitations of current radiogenomics research. 3) Assess the utility of radiogenomics in clinical practice. 4) Develop a framework to evaluate future radiogenomics research.

RC215-06 Proteomic Expression Underlying Quantitative MRI Features in Breast Cancer: A Radioproteomics Study

Monday, Nov. 26 9:40AM - 9:50AM Room: Arie Crown Theater

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PURPOSE

The complementary analysis of breast cancer via radiology imaging and molecular pathology approaches has spurred radiogenomics and radioproteomics studies. We performed an investigation of the relationships between quantitative radiomic imaging phenotype data and underlying proteomic expression, with the goal of improving precise breast cancer diagnosis and cancer behavior characterization.

METHOD AND MATERIALS

We identified a retrospective cohort of 40 invasive breast cancer patients from a single medical center. Their integrated protein expression data were obtained from The Cancer Genome Atlas study. The proteomic data was acquired via Reverse Phase Protein Array (RPPA) to measure the expression of 217 breast cancer related proteins and phospho-proteins. Dynamic Contrast Enhanced Magnetic Resonance Imaging (DCE-MRI) data of the 40 patients were collected from clinical archive, all acquired with a 1.5T same-vendor scanner. A set of 30 radiomic imaging features were extracted from automatically-segmented tumor volume in all 40 DCE-MRIs to capture tumor morphological and contrast enhancement characteristics. Multivariate linear regression was used to map the associations between each imaging feature with each of the 217 protein expressions, controlling for patient age and cancer stage. A p value was obtained evaluating the significance of the association and was adjusted for multiple comparisons of the selected radiomic feature against every protein. Adjusted p values less than 0.05 were recorded.

RESULTS

The average patient age at scan was 38.7±12 years, 10 (25%) of which were pre- with the rest post-menopausal. We found a variety of expression of cancer related proteins were significantly associated (positively or negatively) with a subset of morphological and contrast enhancement kinetics related imaging features. For example, ERCC5 (a protein responsible for DNA repair following UV-induced damage) is negatively associated with the tumor brightness and contrast agent uptake rates. The full association map is shown in the attached figure.

CONCLUSION

Our study showed that the expression of several cancer related proteins were found to be linearly associated with quantitative DCE-MRI-derived phenotype features in invasive breast tumors.

CLINICAL RELEVANCE/APPLICATION

Radioproteomic studies of cancer can help to decipher how molecular mechanisms may regulate the development of specific tumor phenotypes.

RC215-07 Prediction of 21-gene Recurrence Score in Patients with Estrogen Receptor-positive Early-Stage Breast Cancer Using MRI-based Radiomics Nomogram

Monday, Nov. 26 9:50AM - 10:00AM Room: Arie Crown Theater

Participants
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PURPOSE

To develop a breast MRI-based radiomics nomogram including pathologic factors which can predict low-risk recurrence score (RS) on 21-gene RS assay in patients with estrogen receptor-positive early-stage breast cancer (EBC).

METHOD AND MATERIALS

From 2011 to 2017, a total of 547 tumors in 539 patients with EBC who underwent preoperative breast MRI were retrospectively included in this study. Among them, low-risk was 320 (58.5%), intermediate-risk was 180 (32.9%), and high-risk was 47 (8.6%). We extracted 744 quantitative MR radiomic features from computerized three-dimensional segmentations of each tumor generated computer-extracted image phenotypes (CEIP) within the intratumoral regions of early post-contrast T1-weighted images, percent enhancement (PE) map, signal enhancement ratio (SER) map, and T2-weighted images. We divided 547 cases into a training set (n=365) and a validation set (n=182). Elastic net was used for feature selection and radiomics score building. Multivariate logistic regression analysis was used to develop a prediction model, we incorporated the radiomics score and independent pathologic risk factors and build a radiomics nomogram. Internal validation for an independent validation set (n=182) was performed.

RESULTS

The radiomics score, which consisted of 24 selected CEIPs, was significantly associated with the prediction of recurrence (C-index, 0.769 for training set and 0.745 for validation set). Independent pathologic predictors contained in the nomogram were progesterone receptor status, nuclear grade, histologic grade, extensive intraductal component, lymphovascular invasion, P53, and Ki67 status, and their C-index was 0.858 for training set and 0.774 for validation set. Addition of radiomics score to the pathologic nomogram showed an incremental value of 0.054 and 0.092, respectively. Radiomics nomogram showed good prediction of low-risk RS, with a C-index of 0.912 for training set and 0.866 for validation set.

CONCLUSION

This study shows that a radiomics nomogram which incorporates the MRI-based radiomics score and pathologic features, can be used to help the preoperative individualized prediction of low-risk RS in patients with EBC.

CLINICAL RELEVANCE/APPLICATION

Prediction nomogram using breast MRI-based radiomics score and pathologic predictors can be used to facilitate the preoperative individualized prediction of low-risk RS on 21-gene RS assay in patients with EBC.

RC215-08 Can Histogram Analysis of Dynamic Contrast-Enhanced MRI and Apparent Diffusion Coefficient Map Predict Molecular Subtypes of Invasive Breast Cancers?

Monday, Nov. 26 10:00AM - 10:10AM Room: Arie Crown Theater

Participants
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PURPOSE

To evaluate if histogram analysis of dynamic contrast-enhanced (DCE) MRI and apparent diffusion coefficient (ADC) maps with diffusion-weighted imaging (DWI) can predict molecular subtypes of invasive breast cancers.

METHOD AND MATERIALS

In this HIPAA-compliant and IRB-approved study we retrospectively evaluated 91 consecutive patients from January 2011 to January 2013 with invasive ductal carcinoma of the breast who underwent multiparametric MRI with DCE and DWI at our institution. The exclusion criteria were 1) lesion smaller than 1 cm, 2) previous treatment for breast cancer, 3) pathology report unavailable, and 4) poor image quality. One experienced breast radiologist drew a region of interest on DCE MRI and ADC maps on the slice with the largest diameter of the solid portion of the lesion avoiding cystic areas and biopsy markers. The histogram analysis was performed and the mean, variance, kurtosis and skewness were calculated. Molecular breast cancer subtypes were derived by IHC surrogates. Tumors were classified as luminal A if either ER or PR was positive and HER2 was negative, Luminal B if either ER or PR was positive and HER2 positive, HER2-enriched if ER and PR were negative and HER2 positive and triple-negative if ER, PR and HER2 were negative. Nonparametric Mann-Whitney U test and Kruskal-Wallis were used to compare groups of molecular subtypes. P-values <0.05 were accepted to be statistically significant.

RESULTS

The histogram analysis of DCE images and ADC maps of 91 breast cancers demonstrated no significant difference among breast tumor molecular subtypes. Measurements of the mean, variance, kurtosis and skewness were used to compare luminal A/B with HER-2 enriched/triple-negative cancers, without significant results for both DCE (p-value = 0.405, 0.252, 0.667, 0.809) and ADC (0.204, 0.081, 0.941, 0.574), respectively. Histogram measurements were also used to compare luminal A with other subtypes and also demonstrated no significant difference for DCE (0.659, 0.162, 0.516, 0.833) and ADC (0.204, 0.222, 0.495, 0.896).

CONCLUSION

Histogram analysis of DCE MRI and ADC map cannot predict molecular subtypes of invasive breast cancers.

CLINICAL RELEVANCE/APPLICATION

Despite many valuable applications of histogram analysis in diagnostic imaging, it cannot predict molecular subtypes of invasive breast cancers.

RC215-09 CESM Enhancement Pattern and Intensity and Its Correlation to Breast Cancer Immunophenotype: Preliminary Results

Monday, Nov. 26 10:10AM - 10:20AM Room: Arie Crown Theater

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PURPOSE

The differences in the intensity and pattern of enhancement in CESM between breast carcinomas might result from the differences in the amount of contrast that leaked out from the blood vessels and timely arrested in the interstitium. The aim of this paper is to study the expression of podoplanin in cancer stroma and its relation to breast cancer immunophenotype.

METHOD AND MATERIALS

Patients with lesions enhancing on CESM were subjected to biopsy - material obtained during biopsies was histopathologically verified. In the present study we retrospectively investigated 97 invasive breast carcinomas diagnosed in 94 patients. This study was performed in compliance with the Declaration of Helsinki and it received the approval of Ethical Committee at the Regional Medical Chamber. For each tumor enhancing on CESM, the intensity and the pattern of enhancement were evaluated. The enhancement of contrast agent uptake was qualitatively assessed as weak/medium or strong ,while the pattern as heterogenous or homogenous. Lymphatic vessels were defined as strongly podoplanin-stained structures with lymphatic vessel characteristics , clearly distinguishable from other tissue structures and cells. We classified tumor stroma as: podoplanin-sparse and podoplanin-rich.

RESULTS

Strong enhancement on CESM was found more frequently in: large tumors (pT>1), node-positive carcinomas, in tumors with podoplanin-sparse stroma vs. tumors with podoplanin-rich stroma . We found no relationship between enhancement on CESM and: tumor grade, histological type of cancer, breast cancer immunophenotype and Ki-67LI. However, in luminal A tumors strong enhancement on CESM was insignificantly more frequent as compared to neoplasms with non-luminal A subtype .

CONCLUSION

In our study prognostic significance of selected CESM features was found for the first time: strong and heterogenous enhancement on CESM was related to poor patients' outcome. In this study, the aforementioned correlation was additionally confirmed by the relationship between strong enhancement on CESM and nodal involvement or large tumor size.

CLINICAL RELEVANCE/APPLICATION

Our results may suggest that intensity and pattern of enhancement on CESM might bring (together with the results of diagnostic imaging methods) not only the confirmation of presence or absence of tumor, but also prognostic information.

RC215-10 Development of MRI-based Radiomics Nomogram for the Prediction of Recurrence in Patients with Luminal-type Breast Cancer: A Nested Case-Control Study

Monday, Nov. 26 10:20AM - 10:30AM Room: Arie Crown Theater

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PURPOSE

To determine whether breast MRI-based radiomics nomogram including pathologic factors can predict recurrences or distant metastasis in patients with luminal-type breast cancer (LTBC).

METHOD AND MATERIALS

From 2006 to 2012, a total of 348 patients with LTBC who underwent preoperative breast MRI were retrospectively included in this study. Patients with recurrence were 174. Patients without recurrence were matched in terms of age, stage, and type of chemotherapy, and developed 174 nested case-control pairs. We extracted 804 quantitative MR radiomic features of computerized three-dimensional segmentations of each cancer generated computer-extracted image phenotypes (CEIP) within the intratumoral regions of early post-contrast T1-weighted images, percent enhancement (PE) map, signal enhancement ratio (SER) map, and T2-weighted images. We divided 174 case-control matches into a training set (n=232) and a validation set (n=116). Elastic net was used for feature selection and radiomics score building. Multivariate logistic regression analysis was used to develop the prediction model, we incorporated the radiomics score and independent pathologic risk factors and build a radiomics nomogram. Internal validation for an independent validation set (n=76) was performed.

RESULTS

The radiomics score, which consisted of 14 selected CEIPs, was significantly associated with the prediction of recurrence (C-index, 0.864 for training set and 0.815 for validation set). Independent pathologic predictors contained in the nomogram were progesterone receptor status, P53, lymphovascular invasion, Ki67 status, and lymph node ratio, and their C-index was 0.695 for training set and 0.701 for validation set. Addition of radiomics score to the pathologic nomogram showed an incremental value of 0.211 and 0.177, respectively. Radiomics nomogram showed good prediction of recurrence, with a C-index of 0.906 for training set and 0.878 for validation set.

CONCLUSION

This study shows that a radiomics nomogram which incorporates the MRI-based radiomics score and pathologic features, can be used to help the individualized prediction of local or distant recurrence in patients with LTBC.

CLINICAL RELEVANCE/APPLICATION

Nomogram using breast MRI-based radiomics score and pathologic predictors can be used to facilitate the individualized prediction of recurrence in patients with LTBC.

RC215-11 Horizons with Deep Learning

Monday, Nov. 26 10:40AM - 11:00AM Room: Arie Crown Theater

Participants
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LEARNING OBJECTIVES

1) To understand the importance implementing deep learning tools into a breast imager's workflow. 2) To understand applications of deep learning outside of detection and characterization of breast lesions.

RC215-12 Incorporating Patient Characteristics in Breast Cancer Screening with Deep Convolutional Neural (DCN) Network

Monday, Nov. 26 11:00AM - 11:10AM Room: Arie Crown Theater

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PURPOSE

To determine if the addition of patient characteristics obtained from the electronic health records may improve the ability of a DCN network to detect and classify lesions on screening mammography.

METHOD AND MATERIALS

This is a retrospective study of a DCN network trained on over 250,000 screening mammograms performed at our institution from 2010-2016. The patients were sorted according to the date of their latest exam and divided into training (first 80%), validation (next 10%), and test (last 10%) sets. In the test phase, only the most recent exam was used for each patient. Patient characteristics including age, family history of breast cancer, and history of prior examinations were extracted from the radiologist reports. The original high-resolution images and extracted side information were utilized as inputs by a multi-column DCN network to classify BI-RADS category. The model was evaluated using area under the receiver operating characteristic curve (AUC) analysis. Analysis was also performed after stratifying patients by age-group and breast density (dense vs non-dense).

RESULTS

The overall performance of the DCN network improved with the addition of patient characteristics in comparison to using images alone (AUC 0.750 vs 0.733). This improvement was especially notable for BI-RADS 0 cases, with an AUC of 0.664 vs 0.618. Performance also generally improved with increasing age, with an average AUC of 0.759 in patients over 70 years of age. Finally, performance of the model is superior in dense breasts vs non-dense breasts (AUC 0.740 vs AUC 0.707).

CONCLUSION

The performance of DCN networks in evaluating screening mammograms increases with the addition of patient characteristics information, especially in the abnormal BI-RADS 0 cases which are the most difficult to evaluate.

CLINICAL RELEVANCE/APPLICATION

End-to-end architectures of DCN networks, like ours, support the incorporation of patient characteristics to increase the accuracy of deep learning algorithms in breast cancer screening.

RC215-13 Detecting Breast Cancer in Mammography: A Deep Learning-Based Computer System versus 101 Radiologists

Monday, Nov. 26 11:10AM - 11:20AM Room: Arie Crown Theater

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PURPOSE

To compare the stand-alone performance of a computer-based detection system to that of radiologists in detecting breast cancer on digital mammography (DM).

METHOD AND MATERIALS

Nine multi-reader multi-case (MRMC) study datasets previously used for different performance evaluation purposes in seven countries were collected. Each dataset consisted of DM exams acquired with systems from four different vendors, multiple radiologists' assessments per exam (BI-RADS or probability-of-malignancy scores), and ground truth: yielding a total of 2,458 exams (608 malignant) and interpretations by 101 radiologists (28,373 independent exam interpretations). A deep learning-based computer system (Transpara, ScreenPoint Medical, Nijmegen, The Netherlands) was used to automatically analyze each exam, resulting in a score for suspiciousness of cancer (1-100). Independently for each dataset, the area under the receiver operating characteristic curve (AUC) and the sensitivity at the radiologists' specificity level (case recall) were compared between the computer and radiologists using MRMC analysis of variance.

RESULTS

The performance of the computer system was not significantly different to that of the average of radiologists in eight of nine datasets (AUC differences ranged between -2.6% and +2.5%, P>0.329) and was significantly better in the ninth (+4.6%, P=0.036). At the average specificity of the radiologists, the computer had an equal or higher sensitivity (+0-9%, P>0.083) in all datasets but one (-13%, P=0.066). Comparing individually, the computer had an AUC and sensitivity higher than 53% and 65% of all radiologists, respectively.

CONCLUSION

A computer system based on deep learning has an equivalent performance to radiologists for detecting breast cancer in mammography.

CLINICAL RELEVANCE/APPLICATION

Whether used for decision support (preventing overlook and interpretation errors that are relatively common in the reading of mammography) or as stand-alone readers, computer systems performing at radiologist-like level might herald a breakthrough in the breast cancer detection workflow with mammography. In some situations, where there is a lack of experienced breast radiologists, it might even allow the development or continuation of screening programs.

RC215-14 Improving Accuracy and Efficiency with Concurrent Use of Artificial Intelligence for Digital Breast Tomosynthesis Screening

Monday, Nov. 26 11:20AM - 11:30AM Room: Arie Crown Theater

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PURPOSE

Screening with Digital Breast Tomosynthesis (DBT) improves accuracy but prolongs reading time when compared to Full-Field Digital Mammography (FFDM) alone. A reader study evaluated concurrent use of Artificial Intelligence (AI) to shorten reading time, while maintaining or improving sensitivity and specificity.

METHOD AND MATERIALS

An AI system based on deep convolutional neural networks was developed to identify suspicious soft tissue and calcific lesions in DBT slices. Findings are outlined in slices, indicating AI's confidence of malignancy with 0-100 scores. A retrospective, fully-crossed, multi-reader, multi-case designed study compared performance of 24 radiologists reading 260 DBT cases both with and without AI. The case set included 65 cancer cases with 66 malignant lesions and 65 cases with biopsy-proven benign lesions. Readings with and without AI occurred in 2 visits separated by a memory washout period of at least 4 weeks. Performance was assessed by measuring Area Under the ROC Curve (AUC) for malignant lesions with AI versus without AI. Reading time, sensitivity, specificity and recall rate were also assessed.

RESULTS

Radiologist performance for detection of malignant lesions, measured by mean AUC, increased 0.057 with use of AI (95% CI: 0.028, 0.087; $p < 0.01$), from 0.795 without AI to 0.852 with AI. Reading time decreased 52.7% with use of AI (95% CI: 41.8%, 61.5%; $p < 0.01$), from 64.1 sec without AI to 30.4 sec with AI, using a normalizing transformation to appropriately assess reading times that

were not normally distributed. Sensitivity increased from 77.0% without AI to 85.0% with AI (8.0%; 95% CI: 2.6%, 13.4%; $p < 0.01$), specificity increased from 62.7% without AI to 69.6% with AI (6.9%; 95% CI: 3.0%, 10.8%; $p < 0.01$), and recall rate for non-cancers decreased from 38.0% without AI to 30.9% with AI (7.2%; 95% CI: 3.1%, 11.2%; $p < 0.01$).

CONCLUSION

Concurrent use of AI improves cancer detection with increases of 0.057 in AUC, 8.0% in sensitivity, and 6.9% in specificity; and decreases of 7.2% in recall rate and 52.7% in reading time.

CLINICAL RELEVANCE/APPLICATION

Radiologist's concurrent use of AI for DBT with certainty of finding scores increases detection of breast cancer with significant reduction in reading time while improving sensitivity and specificity.

RC215-15 Breast Cancer Temporal Risk Prediction by Deep Learning and Longitudinal Digital Mammogram Images

Monday, Nov. 26 11:30AM - 11:40AM Room: Arie Crown Theater

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PURPOSE

Mammographic breast density is a risk factor and recent studies showed deep learning may identify more predictive imaging risk features than breast density. We performed a study to investigate temporal breast cancer risk prediction by using deep learning models on longitudinal 'normal' screening mammograms acquired prior to diagnosis of breast cancer.

METHOD AND MATERIALS

We conducted a retrospective case-control study on a cohort of 226 patients (1:1 case-control ratio) who underwent standard mammographic screening at our institution during 2006-2013. The unilateral cancer cases (61.3±10.3YO) were all newly diagnosed at 2013 and confirmed by pathology. Asymptomatic cancer-free controls (60.1±10.0 YO) are matched to the cancer cases by age and year of the cancer-diagnosis imaging. All studied women did not have any prior biopsy or recall on mammography. For all cohort, a set of sequential prior 'normal' (negative or benign findings) screening mammogram exams acquired during 2006-2012 were collected (2-8 exams per patient), generating a total of 3263 'normal' images (913 for cancer cases, and 2350 for controls). Those prior images of the cancer-affected breast (for cancer cases) and side-matched breast (for controls) were used to predict the outcome (i.e., case/control status). We compared the prediction in terms of three time periods: (A) all priors from 2006 to 2012, (B) recent priors (1548 images) from 2010 to 2012, and (C) distant priors (1715 images) from 2006 to 2009. The outcome prediction was based on a pre-trained convolutional neural network model (ResNet-50) that was further fine-tuned on our mammograms. 10-fold cross-validation and AUC were used to measure model performance.

RESULTS

81% of cancers and 82% of controls were post- with the rest pre-menopausal, and neither menopausal status nor family history of breast cancer was associated with the outcome. AUC was 0.84 when using all priors, while it was 0.77 or 0.75 when using only the recent or only the distant priors, respectively.

CONCLUSION

Sequential recent or distant prior 'normal' screening mammograms can predict, and their combination is more predictive of, breast cancer development using deep learning models.

CLINICAL RELEVANCE/APPLICATION

Deep learning modeling on longitudinally acquired prior 'normal' screening mammogram images through up to 7 years earlier can enhance temporal prediction of breast cancer development.

RC215-16 Novel Radiomic Descriptor of Tumor Vascular Morphology Identifies Responders to Neo-Adjuvant Chemotherapy on Pre-Treatment Breast MRI

Monday, Nov. 26 11:40AM - 11:50AM Room: Arie Crown Theater

Awards
Trainee Research Prize - Medical Student

Participants
Nathaniel Braman, Cleveland, OH (*Presenter*) Nothing to Disclose
Prateek Prasanna, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Maryam Etesami, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Donna M. Plecha, MD, Strongsville, OH (*Abstract Co-Author*) Research Grant, Hologic, Inc
Anant Madabhushi, PhD, Cleveland, OH (*Abstract Co-Author*) Research funded, Koninklijke Philips NV

For information about this presentation, contact:

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PURPOSE

Despite significant interest in predicting treatment response prior to breast cancer neo-adjuvant chemotherapy (NAC) from DCE-MRI, prior work has focused on textural patterns of the tumor or parenchyma or deep learning-based approaches that lack direct biological interpretability. In this work, we introduce functional radiomic descriptors of vascular network disorder (VND) and evaluate whether differences in the complexity of tumor-associated vasculature on pre-treatment DCE-MRI can discriminate between patients who do and do not respond to NAC.

METHOD AND MATERIALS

1.5 or 3T DCE-MRI scans of 76 NAC recipients, 24 of whom had surgically confirmed pathological complete response (pCR), were retrospectively analyzed. Average pixel width and slice thickness were .77 mm and 1.22 mm, respectively. Patients were randomly divided into training (n=53, 14 pCR) and testing (n=23, 10 pCR) sets. A semi-interactive scheme was employed to segment the tumor and vascular network. Within a sliding window, vessel orientation was computed for a series of 2-dimensional representations of the vasculature relative to the tumor centroid. Statistics (mean, median, st. dev, skewness, and kurtosis) of the distribution of vessel orientations for each representation were computed, yielding 20 VND features total. Top VND features were selected in the training set using the Wilcoxon rank sum test via three-fold cross validation, then used to train a linear discriminant analysis classifier to predict response in the test set. Performance was compared against (1) intra- and peri-tumoral texture features and (2) a 3 layer LeNet convolutional neural network (CNN).

RESULTS

The top 4 VND features distinguished pCR with an AUC=0.75. pCR was characterized by reduced vascular disorder relative to non-pCR. VND performed comparably or better than other state of the art radiomic approaches, including intra- and peri-tumoral texture (AUC=.75) and deep learning (AUC=.67). Combining predictions from VND, texture features, and CNN yielded the best response prediction accuracy (AUC=0.80).

CONCLUSION

VND features, which capture chaotic vessel network architecture, appear to be associated with NAC response and added predictive value to established radiomic and deep learning approaches.

CLINICAL RELEVANCE/APPLICATION

Quantitative assessment of vessel network architecture as a functional radiomic biomarker could provide interpretable NAC response prediction in breast cancer.

RC215-17 Using Machine Learning to Assess Tumor Metastatic Lymph Nodes and Ki-67 Expression Aggressiveness from Breast MRI Using a Large Clinical Dataset of 300 Cancers from China

Monday, Nov. 26 11:50AM - 12:00PM Room: Arie Crown Theater

Participants
Yu Ji, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Hui Li, PHD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Alexandra V. Edwards, Chicago, IL (*Abstract Co-Author*) Research Consultant, QView Medical, Inc; Research Consultant, Quantitative Insights, Inc
John Papaioannou, MSc, Chicago, IL (*Abstract Co-Author*) Research Consultant, QView Medical, Inc
Peifang Liu, MD, PhD, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Maryellen L. Giger, PhD, Chicago, IL (*Abstract Co-Author*) Stockholder, Hologic, Inc; Shareholder, Quantitative Insights, Inc; Shareholder, QView Medical, Inc; Co-founder, Quantitative Insights, Inc; Royalties, Hologic, Inc; Royalties, General Electric Company; Royalties, MEDIAN Technologies; Royalties, Riverain Technologies, LLC; Royalties, Mitsubishi Corporation; Royalties, Canon Medical Systems Corporation

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PURPOSE

To evaluate quantitative MRI radiomics in the task of identifying metastatic versus nonmetastatic axillary lymph nodes and Ki-67 expression aggressiveness.

METHOD AND MATERIALS

Our research involved a HIPAA-compliant, DCE-MRI database of 300 breast cancer cases. The average age was 47.2 years with a standard deviation of 9.6 years and a range from 25 to 77 years with a median of 47 years. The clinical cohort included 48 low Ki-67 expression (Ki-67 proliferation index < 14%) and 252 cases with high Ki-67 expression (Ki-67 proliferation index >= 14%), indicating a range of tumor aggressiveness. The cohort also included 93 cases with axillary lymph node metastasis and 201 cases without metastasis. The images had been obtained with a gadodiamide-enhanced T1-weighted spoiled gradient-recalled acquisition in the steady state sequence. Primary lesions underwent computerized radiomic analysis in which tumor segmentation and extraction were automatically conducted on an existing CADx workstation. These computer-extracted features included MRI-based phenotypes from six categories: size, shape, morphology, enhancement texture, kinetics, and enhancement-variance kinetics. Radiomic features were input to a Bayesian artificial neural network classifier (BANN) and underwent leave-one-case-out cross validation. Area under the ROC curve (AUC) served as the figure of merit in the classification tasks.

RESULTS

In the task of identifying Ki-67 expression and lymph node status, the analyses of the various radiomic phenotypes yielded AUCs ranging from 0.50 (se = 0.05) to 0.69 (se = 0.04). The Ki-67 MRI-based tumor signature produced an AUC value of 0.71 (se = 0.04). In the task of assessing the status of axillary lymph nodes, the radiomics tumor signature yielded an AUC value of 0.67 (se = 0.03). Both signatures were found to be statistically different from random guessing.

CONCLUSION

Quantitative MRI radiomics conducted on depicted primary breast tumors can contribute to identifying aggressive tumors, including identifying Ki-67 expression and discriminating between metastatic and nonmetastatic lymph nodes, yielding automatic MRI-based prognostic markers for ultimate use in radiogenomics and patient care.

CLINICAL RELEVANCE/APPLICATION

The ability to assess automatically the potential aggressiveness of tumors may elucidate the characteristics of breast cancers for radiogenomics and for use in helping clinician estimate prognosis.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC216

Medicolegal Issues for Radiologists-To Divulge or Not to Divulge: Diagnostic Misses and Errors (Sponsored by the RSNA Professionalism Committee)

Monday, Nov. 26 8:30AM - 10:00AM Room: N230B

PR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Ronald L. Eisenberg, MD, JD, Boston, MA (*Moderator*) Nothing to Disclose
Priscilla J. Slanetz, MD, MPH, Belmont, MA (*Presenter*) Nothing to Disclose
Stephen D. Brown, MD, Boston, MA (*Presenter*) Nothing to Disclose
Brent J. Wagner, MD, West Reading, PA (*Presenter*) Nothing to Disclose
Darlene King, Lancaster, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Describe the responsibilities of the radiologist in terms of the peer review role inherent in the assessment of a comparison study. 2) Develop an approach to a robust peer review program that encourages reporting and review of diagnostic errors. 3) Define the parameters that impact the balance of error disclosure in the context of the potential missed finding.

ABSTRACT

The radiologic interpretation involves multiple facets. Most importantly, it is intended to convey a meaningful assessment that will result in either the exclusion of a diagnosis - in which case the clinical evaluation can proceed along a different path - or the establishment of a diagnosis (or set of diagnostic possibilities) to guide further management. For a wide variety of reasons, imaging findings often identified in retrospect were not detected during the initial interpretation. This is especially problematic when balancing two distinct functions of a diagnostic interpretation - the review of the current examination and the comparison to (and, therefore, independent review of) a prior study dictated by a colleague. When there is a difference in the assessment of the prior study, the radiologist is potentially faced with two competing obligations. The first is the overriding interests of the individual patient. The second is the critical role of a structured peer review process that is now an inherent part of modern-day safety culture and professional quality improvement. This exercise in peer review requires us to examine the nuances involved in distinguishing 'missed diagnoses,' 'interpretative errors,' and 'findings identified in retrospect.' While radiologists recognize the ethical argument concerning respect for patient autonomy and the patient's right to know everything about one's own body and health, it is also important for radiologists to know how to communicate such imaging findings with care, sensitivity, and a lack of defensiveness.

RC217

Emerging Technology: Elastography - Update 2018

Monday, Nov. 26 8:30AM - 10:00AM Room: S504CD

GI MR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Richard L. Ehman, MD, Rochester, MN (*Moderator*) CEO, Resoundant, Inc Stockholder, Resoundant, Inc

LEARNING OBJECTIVES

1) To understand how elastography measurements are integrated into the management of patients with chronic liver disease. 2) To learn imaging techniques and protocols of ultrasound and MR elastography. 3) To compare US and MR elastography in assessing liver fibrosis. 4) To review emerging clinical indications of US and MR elastography. 5) To understand limitations of current elastography techniques.

Sub-Events

RC217A Elastography of the Liver: What the Clinician Wants to Know

Participants
Mindie Nguyen, MD, Stanford, CA (*Presenter*) Consultant, Intercept Pharmaceuticals, Inc; Consultant, Johnson & Johnson; Consultant, Gilead Sciences, Inc; Consultant, Alynam Pharmaceuticals, Inc; Consultant, Dynavax Technologies Corporation; Consultant, Spring Bank Pharmaceuticals, Inc; Consultant, Novartis AG; Consultant, Eisas; Research Grant, Johnson & Johnson; Research Grant, Gilead Sciences, Inc; Research Grant, Bristol-Myers Squibb Company; Research Grant, Pfizer Inc

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC217B Ultrasound Elastography: How and When?

Participants
Richard G. Barr, MD, PhD, Campbell, OH (*Presenter*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Canon Medical Systems Corporation; Research Grant, Esaote SpA; Research Grant, BK Ultrasound; Research Grant, Hitachi, Ltd

LEARNING OBJECTIVES

1) Understand the clinical indications of ultrasound elastography (USE). 2) Learn about the various techniques and imaging protocols of USE. 3) Review the diagnostic accuracy of USE in the assessment of elasticity in liver fibrosis and other clinical applications in the body. 4) Compare USE with MR elastography. 5) Understand current limitations of USE.

ABSTRACT

Ultrasound elastography (USE) is a general term for various techniques available for objectively and quantitatively assessing tissue stiffness using ultrasonic techniques, creating noninvasive images of mechanical characteristics of tissues. Elastography is based on the fact that the elasticity of a tissue is changed by pathological or physiological processes. For example, cancer or fibrosis associated with various disease processes including chronic liver disease or chronic pancreatitis result in increased tissue stiffness.Recently, various USE techniques have been cleared by the FDA and all major ultrasound companies offer different approaches of measuring tissue stiffness on their ultrasound machines.The objective of this talk is to familiarize the audience with the clinical indications, imaging techniques and protocols, interpretation, diagnostic accuracy, and limitations of the various USE technique for assessment of tissue stiffness, with special focus on assessment of fibrosis in chronic liver disease.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Richard G. Barr, MD, PhD - 2017 Honored Educator

RC217C MR Elastography: How and When?

Participants
Richard L. Ehman, MD, Rochester, MN (*Presenter*) CEO, Resoundant, Inc Stockholder, Resoundant, Inc

LEARNING OBJECTIVES

1) To be able to understand the basic physical principles of MR Elastography (MRE). 2) To be able to describe the clinical indications for MRE in liver disease. 3) To be able to describe published evidence on the diagnostic performance of MRE in assessing liver fibrosis. 4) To be able to compare ultrasound based elastography to MRE. 5) To be able to describe the current limitations of MRE.

Honored Educators

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RC218

Whole-body MRI for Oncologic Decision Making in Bone Disease

Monday, Nov. 26 8:30AM - 10:00AM Room: S103AB

BQ MR MK OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Evis Sala, MD, PhD, Cambridge, United Kingdom (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the limitations of current imaging modalities in evaluation of metastatic bone disease. 2) Learn the added value of whole body MRI in evaluation of metastatic bone disease in various malignancies including prostate cancer and multiple myeloma. 3) Understand the role of quantitative whole body MRI in delivering precision medicine in oncology.

Sub-Events

RC218A Imaging of Metastatic Bone Disease: Current Limitations

Participants
Hebert Alberto Vargas, MD, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the challenges associated with the diagnosis and interpretation of bone findings in patients with metastatic disease.

ABSTRACT

Conventional imaging of metastatic disease to the bone is notoriously difficult. Unlike soft tissue metastases, significant cortical disruption is required before a bone metastases is visible on CT, and bone scan demonstrates the effect of the metastases on bone, rather than the metastases themselves. MR partially overcomes these limitations, as early bone metastases can be detected. However, even after bone metastases are apparent on imaging, it is difficult to assess their evolution with regards to therapy response.

RC218B WB-MRI of Metastatic Bone: MET- RADS

Participants
Anwar R. Padhani, MD, FRCR, Northwood, United Kingdom (*Presenter*) Advisory Board, Siemens AG ; Speakers Bureau, Siemens AG ; Speakers Bureau, sanofi-aventis Group; Speakers Bureau, Johnson & Johnson

For information about this presentation, contact:

anwar.padhani@sticklandscanner.org.uk

LEARNING OBJECTIVES

1) To show how measurements are acquired distinguishing between tumor detection (core) and response assessment (comprehensive) protocols that are MET-RADS compliant. 2) To highlight and review the MET-RADS response assessment criteria and their application. 3) To illustrate MET-RADS usage with case examples and to provide data on MET-RADS use in clinical practice. 4) Outline the next steps for MET-RADS development.

ABSTRACT

MET-RADS provides the minimum standards for whole body MRI with DWI regarding image acquisitions, interpretation, and reporting of both baseline and follow-up monitoring examinations of patients with advanced, metastatic cancers. MET-RADS is suitable for guiding patient care in practice (using the regional and overall assessment criteria), but can also be incorporated into clinical trials when accurate lesion size and ADC measurements become more important (the recording of measurements is not mandated for clinical practice). MET-RADS enables the evaluation of the benefits of continuing therapy to be assessed, when there are signs that the disease is progressing (discordant responses). MET-RAD requires validation within clinical trials initially in studies that assess the effects of known efficacious treatments. METRADS measures should be correlated to other tumor response biomarkers, quality of life measures, rates of skeletal events, radiographic progression free survival and overall survival. The latter will be needed for the introduction of WB-MRI into longer term follow-up studies, that will allow objective assessments of whether WB-MRI is effective in supporting patient care.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Anwar R. Padhani, MD, FRCR - 2012 Honored Educator

RC218C WB-MRI in Multiple Myeloma: My-RADS

Participants
Christina Messiou, MD, BMBS, London, United Kingdom (*Presenter*) Nothing to Disclose

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Christina.Messiou@rmh.nhs.uk

LEARNING OBJECTIVES

1) List indications for WB-MRI in multiple myeloma. 2) Describe the core and comprehensive protocols for WB-MRI in multiple myeloma. 3) Apply a systematic approach to reporting WB-MRI in multiple myeloma as outlined in MY-RADS. 4) Review the MY-RADS criteria for assessing disease phenotype, burden and response assessment with case examples.

ABSTRACT

Acknowledging the increasingly important role of WB-MRI for directing myeloma patient care, a multidisciplinary international expert panel of radiologists, medical physicists and haematologists convened to discuss the performance standards, merits and limitations of WB-MRI in myeloma. The MY-RADS imaging recommendations are designed to promote standardization and diminish variations in the acquisition, interpretation, and reporting of WB-MRI in myeloma both in the clinical setting and within clinical trials. MY-RADS comprehensive disease classification requires validation within clinical trials including assessments of reproducibility.

Active Handout:Christina Messiou

http://abstract.rsna.org/uploads/2018/18001097/Handout. Messiou Final RSNA 2018 RC218C.pdf

RC218D Quantitative WB-MRI for Promoting Precision Oncology

Participants
Dow-Mu Koh, MD,FRCR, Sutton, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the quantitative parameters that can be derived from WB-MRI studies. 2) To understand the evolving role of quantitative WB-MRI for the evaluation of metastatic bone disease. 3) To appreciate the application of quantitative WB-MRI for precision oncology in assessing tumour treatment response and disease heterogeneity.

RC220

What Radiologists Need to Know about the Evolving Treatment of Brain Metastases?

Monday, Nov. 26 8:30AM - 10:00AM Room: S404CD

NR RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Timothy J. Kruser, MD, Chicago, IL (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

tkruser@nm.org

LEARNING OBJECTIVES

1) Identify clinical factors that may favor radiosurgery versus whole brain RT. 2) Describe the imaging changes seen when immunotherapy is combined with radiosurgery. 3) Define current Response Assessment in Neuro-Oncology Brain Metastases guidelines. 4) Differentiate the role of steroids and bevacizumab in management of post-radiosurgery inflammation.

Active Handout:Timothy J. Kruser

http://abstract.rsna.org/uploads/2018/18001718/Brain met RSNA kruser handout RC220.pdf

Sub-Events

RC220A The Evolving Role of Radiosurgery and Whole Brain RT in Brain Metastases

Participants
Timothy J. Kruser, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

Active Handout:Timothy J. Kruser

http://abstract.rsna.org/uploads/2018/18001719/Brain met RSNA kruser handout RC220A.pdf

RC220B Combining Stereotactic Radiosurgery with Immunotherapy/Targeted Therapy for Brain Metastases

Participants
Veronica Chiang, MD, New Haven, CT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

Active Handout:Veronica Chiang

http://abstract.rsna.org/uploads/2018/18001720/RC220B 11.24.pdf

RC220C Imaging Response Assessment for Brain Metastases

Participants
Timothy J. Kaufmann, MD, Rochester, MN (*Presenter*) Consultant, SpineThera

LEARNING OBJECTIVES

View learning objectives under main course title.

RC220D Reirradiation of Brain Metastases; Management of Local Failures

Participants
Caroline Chung, MD, FRCPC, Houston, TX (*Presenter*) Research Grant, Elekta AB; Research Grant, RaySearch Laboratories AB; Advisory Board, RaySearch Laboratories AB; Advisory Board, Novocure Ltd

LEARNING OBJECTIVES

View learning objectives under main course title.

RC221

Advances in CT: Technologies, Applications, Operations-Special Purpose CT

Monday, Nov. 26 8:30AM - 10:00AM Room: S102CD

BR MK CT IR PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc
Lifeng Yu, PhD, Chicago, IL (*Coordinator*) Nothing to Disclose

ABSTRACT

CT has become a leading medical imaging modality, thanks to its superb spatial and temporal resolution to depict anatomical details. New advances have enabled extending the technology to depict physiological information. This has enabled a wide and expanding range of clinical applications. These advances are highlighted in this multi-session course. The course offers a comprehensive and topical depiction of these advances with material covering CT system innovations, CT operation, CT performance characterization, functional and quantitative applications, and CT systems devised for specific anatomical applications. The sessions include advances in CT system hardware and software, CT performance optimization, CT practice management and monitoring, spectral CT techniques, quantitative CT techniques, functional CT methods, and special CT use in breast, musculoskeletal, and interventional applications.

Sub-Events

RC221A Breast CT Applications

Participants
John M. Boone, PhD, Sacramento, CA (*Presenter*) Patent agreement, Isotropic Imaging Corporation Consultant, RadSite

LEARNING OBJECTIVES

1) Introduce the technology of cone beam breast CT to audience. 2) Show both qualitative parameters describing image quality and qualitative images. 3) Demonstrate breast CT performance using metrics such as anatomical noise metrics, computer and human observer studies. 4) Illustrate the future potential of breast CT in diagnostic and screening breast imaging.

RC221B MSK CT Applications

Participants
Wojciech Zbijewski, PhD, Baltimore, MD (*Presenter*) Research Grant, Carestream Health, Inc; Research Grant, Siemens AG

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Explain the technology of musculoskeletal (MSK) cone-beam CT (CBCT). 2) Identify key differences between MSK CBCT and other orthopedic imaging modalities. 3) Discuss emerging clinical applications of MSK CBCT.

RC221C Interventional CT Applications

Participants
Christopher P. Favazza, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

RC222

Functional MR Imaging for Tumor Targeting in Radiotherapy

Monday, Nov. 26 8:30AM - 10:00AM Room: S502AB

MR PH RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Kristy K. Brock, PhD, Houston, TX (*Moderator*) License agreement, RaySearch Laboratories AB

Sub-Events

RC222A State of the Art in Functional MR Imaging for Tumor Targeting

Participants
R. Jason Stafford, PhD, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Identify some advanced and emerging MRI techniques which inform on tumor physiology and metabolism. 2) Explain the relevance of functional MR observations to basic underlying tumor physiology and biology. 3) Understand key limitations and tradeoffs of functional MR techniques for tumor assessment.

RC222B Clinical Need for Functional MR Imaging for Tumor Targeting in Radiation Therapy

Participants
Michelle M. Kim, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

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michekim@med.umich.edu

LEARNING OBJECTIVES

1) Describe the major limitations of anatomic imaging for tumor target delineation in radiation therapy2) Identify key physiologic and functional MRI techniques of value in radiation treatment planning3) Explain emerging concepts of radiation treatment-individualization using advanced MRI techniques

RC222C Technical Challenges in the Integration of Functional MR Imaging for Tumor Targeting into Radiotherapy

Participants
Ning Wen, PHD, Detroit, MI (*Presenter*) Nothing to Disclose

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nwen1@hfhs.org

LEARNING OBJECTIVES

This presentation is going to review the technical challenges to integrate the functional MR Imaging into radiotherapy including the following aspects: 1) Patient positioning variation; 2) geometrical accuracy consideration; 3) reproducibility of functional imaging across different institutions/scanners/protocols; 4) precision to identify the boundary of the targets; 5) quantitative relationships among different imaging modalities.

RC223

ACR Accreditation Updates II

Monday, Nov. 26 8:30AM - 10:00AM Room: E260

PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
James M. Kofler JR, PhD, Jacksonville, FL (*Coordinator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn new and updated information for the ACR breast x-ray imaging accreditation program. 2) Become familiar with the requirements for the ACR ultrasound accreditation program, including data acquisition methods and common deficiencies. 3) Understand how to prepare for an ACR site visit.

Sub-Events

RC223A ACR Breast X-Ray Imaging Accreditation Update

Participants
Eric A. Berns, PhD, Denver, CO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the ACR Mammography accreditation program requirements. 2) Understand the 2D and DBT recent changes. 3) Review frequently asked questions on the program. 5) Present resources for personnel and facilities undergoing accreditation.

RC223B ACR US Accreditation Update

Participants
Zheng Feng Lu, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand ACR ultrasound accreditation requirements. 2) Describe the methods and tools for ultrasound QA/QC with an explanation of common deficiencies. 3) List key resources for ACR ultrasound accreditation.

Active Handout:Zheng Feng Lu

http://abstract.rsna.org/uploads/2018/18001931/Presentation Title Here Presentation Subtitle RC223B.pdf

RC223C ACR Accreditation: Preparing for a Site Visit

Participants
Heidi A. Edmonson, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify key elements of an ACR Accreditation Program. 2) Understand what data to prepare for an ACR Site Visit. 3) Improve departmental organization for continual accreditation readiness.

Active Handout:Heidi A. Edmonson

http://abstract.rsna.org/uploads/2018/18001932/Edmonson_PrepForACRSiteVisit RC223C.pdf

RC224

CT Dose Monitoring: Nuts, Bolts, and Tools... and What We Need to Build

Monday, Nov. 26 8:30AM - 10:00AM Room: N229

CT PD SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Donald P. Frush, MD, Durham, NC (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

donald.frush@duke.edu

LEARNING OBJECTIVES

1) To learn fundamental elements of a CT dose monitoring program. 2) To review current programs (products) and resources available. 3) To understand current status, including challenges of dose monitoring in adults. 4) To be able to describe current status, including challenges of dose monitoring in children. 5) To be able to discuss potential advances in dose monitoring.

Sub-Events

RC224A Fundamentals (Nuts and Bolts) and Current Products (Tools)

Participants
Sarah E. McKenney, PhD, Sacramento , CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

semckenney@ucdavis.edu

LEARNING OBJECTIVES

1) Evaluate clinical needs for radiation dose monitoring within their institution. 2) Identify resources necessary to ensure a successful monitoring program. 3) Classify the different features of dose monitoring software.

Active Handout:Sarah Eva McKenney

http://abstract.rsna.org/uploads/2018/18003143/Fundamentals Ideal and Current Dose MonitoringRC224A.pdf

RC224B CT Dose Monitoring Status in Adults (Including Diagnostic Reference Levels)

Participants
Kalpana M. Kanal, PhD, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kkanal@uw.edu

LEARNING OBJECTIVES

1) To discuss CT dose monitoring for adults. 2) To learn about diagnostic reference levels in CT. 3) To understand how to implement dose monitoring and diagnostic reference levels in practice.

RC224C CT Dose Monitoring Status in Children (Including Diagnostic Reference Levels)

Participants
Donald P. Frush, MD, Durham, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

donald.frush@duke.edu

LEARNING OBJECTIVES

1) To understand the unique considerations in CT dose monitoring program for children. 2) To learn challenges and obstacles in CT dose monitoring programs in children. 3) To be able to discuss future opportunities for CT dose monitoring program in children.

RC224D Designing the Program of the Future

Participants
Ehsan Samei, PhD, Durham, NC (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

LEARNING OBJECTIVES

1) To understand the importance of analytics in extracting meaningful and actionable knowledge from performance data. 2) To

1) To understand the importance of analytics in extracting meaningful and actionable knowledge from performance data. 2) To understand the role and components of image quality characterization based on patient images. 3) To understand performance monitoring as the overarching objective of dose monitoring.

RC225

Mini-course: Image Interpretation Science - Clinical Foundations of Medical Image Perception: Why Study Radiologists

Monday, Nov. 26 8:30AM - 10:00AM Room: S104A

PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Coordinator*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

For information about this presentation, contact:

ekrupin@emory.edu

LEARNING OBJECTIVES

1) Define the perception factors and considerations in interpreting a medical image. 2) Delineate how perception considerations impact the radiologist's practice in terms of increasing sensitivity and reducing errors. 3) Describe perceptual factors while interpreting medical images including cognitive overload, satisfaction of search, CAD influence, color presentation, image processing, and graphical user interface. 4) Describe the origins of the inter and intra-observer variability issue. 5) Trace the roots of visual search studies in radiology. 6) Show when Receiver Operating Characteristic (ROC) analysis comes into the picture. 7) Delineate why vision models are important for image perception research. 8) Describe the role of medical image perception in modern medicine. 9) Outline the cost, frequency, and patient care impact of image interpretation. 10) Provide an overview of common issues explored in studies of interpretation processes. 11) Delineate what difference perception considerations can make in day-to-day practice of radiology.

ABSTRACT

Medical images constitute a core portion of the information physicians utilize to render diagnostic and treatment decisions. At a fundamental level, the diagnostic process involves two aspects - visually inspecting the image (perception) and rendering an interpretation (cognition). Key indications of expert interpretation of medical images are consistent, accurate and efficient diagnostic performance, but how do we know when someone has attained the level of training required to be considered an expert? How do we know the best way to present images to the clinician in order to optimize accuracy and efficiency? The advent of digital imaging in many clinical specialties, including radiology, pathology and dermatology, has dramatically changed the way that clinicians view images, how residents are trained, and thus potentially the way they interpret image information, emphasizing our need to understand how clinicians interact with the information in an image during the interpretation process. With improved understanding we can develop ways to further improve decision-making and thus improve patient care.

Sub-Events

RC225A Clinical Relevance of Perceptual Issues in Radiology

Participants
Francine L. Jacobson, MD, MPH, Boston, MA (*Presenter*) Research Grant, Hummingbird Diagnostics GmbH

For information about this presentation, contact:

fjacobson@bwh.harvard.edu

LEARNING OBJECTIVES

1) Define the perception factors and considerations in interpreting a medical image. 2) Delineate how perception considerations impact the radiologist's practice in terms of increasing sensitivity and reducing errors. 3) Describe perceptual factors while interpreting medical images including cognitive overload, satisfaction of search, CAD influence, color presentation, image processing, and graphical user interface.

ABSTRACT

In the 21st Century, technology has led to increased workloads for radiologists with advanced modalities and image processing dramatically increasing the volume of images to be studied by the Radiologist. Information overload is not limited to visual data in the era of the electronic medical record. Increasingly, radiologists are being asked to perform the physical examination of the patient without the opportunity to interact with the patient directly to localize pain and acquire additional history about prior ilnesses and surgical treatments. Set against a background of changing diagnostic criteria and individualization of treatment, critical decisions are increasingly made by radiologists using a variety of diagnostic and non-diagnostic quality image displays. Perception science provides keys to evolving the human visual processes in evaluating medical images. It is through perception science that we can move with technology to newer image presentation paradigms and maintain the efficacy of radiology.

RC225B A Short History of Image Perception in Radiology

Participants
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ekrupin@emory.edu

LEARNING OBJECTIVES

1) Describe the origins of the inter and intra-observer variability issue. 2) Trace the roots of visual search studies in radiology. 3) Show when Receiver Operating Characteristic (ROC) analysis comes into the picture. 4) Delineate why vision models are important for image perception research.

ABSTRACT

Medical images constitute a core portion of the information physicians utilize to render diagnostic and treatment decisions. At a fundamental level, the diagnostic process involves two aspects - visually inspecting the image (perception) and rendering an interpretation (cognition). Key indications of expert interpretation of medical images are consistent, accurate and efficient diagnostic performance, but how do we know when someone has attained the level of training required to be considered an expert? How do we know the best way to present images to the clinician in order to optimize accuracy and efficiency? The advent of digital imaging in many clinical specialties, including radiology, pathology and dermatology, has dramatically changed the way that clinicians view images, how residents are trained, and thus potentially the way they interpret image information, emphasizing our need to understand how clinicians interact with the information in an image during the interpretation process. With improved understanding we can develop ways to further improve decision-making and thus improve patient care.

Honored Educators

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RC227

Patient Centered Imaging: Research, Dissemination and Practice

Monday, Nov. 26 8:30AM - 10:00AM Room: E353A

HP RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Moderator*) Nothing to Disclose

Sub-Events

RC227A Patient Engagement and Comparative Effectiveness Research in Imaging

Participants
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Summarize the state of comparative effectiveness research (CER) in imaging. 2) Discuss concepts of patient engagement in imaging CER.

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RC227B Patient Centered Research in Imaging Care Delivery

Participants
Hanna M. Zafar, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Ilana F. Gareen, PhD, Providence, RI (*Presenter*) Nothing to Disclose
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Illustrate patient-centered research in care delivery using contemporary examples.

RC227C Emerging Topics in Patient Centered Research and Dissemination

Participants
Sheetal M. Kircher, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Bruce J. Hillman, MD, Wake Forest, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bjh8a@virginia.edu

skirche1@nm.org

LEARNING OBJECTIVES

1) Introduce concepts of financial burden of care. 2) Understand the arguments posed for researchers supplying their raw data as a pre-requisite of publication. 3) Familiarize themselves with how medical journals are dealing with patient demands for greater access to and clarity of research findings.

RC229

MRI Safety Issue for Implants, Devices, and Contrast: Update 2018 (Interactive Session)

Monday, Nov. 26 8:30AM - 10:00AM Room: N228

MR SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Jeffrey C. Weinreb, MD, New Haven, CT (*Moderator*) Consultant, Bracco Group; Author, Siemens AG

For information about this presentation, contact:

jeffrey.weinreb@yale.edu

LEARNING OBJECTIVES

1) Understand the various MRI issues that impact passive and active, implants and devices. 2) Define the terms applied to MRI labeling of implants and devices. 3) Appreciate the controversies that exist for certain implants and understand the latest labeling information for implanted medical products. 4) Describe current data about safety of gadolinium-based contact agents. 5) Compare the association of various GBCAs with NSF and gadolinium retention. 6) Review updated recommendations about use of gadolinium-based contrast agents. 7) Through case presentation format multiple common clinical scenarios will be presented that reflect potential MRI safety events. 8) Best practices and literature will be reviewed to inform participants on how to best address these scenarios with an emphasis on MR and patient safety principles.

Sub-Events

RC229A MRI Issues for Implants and Devices

Participants
Frank G. Shellock, PhD, Playa Del Rey, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

frank.shellock@gte.net

LEARNING OBJECTIVES

1) Understand the various MRI issues that impact passive and active, implants and devices. 2) Define the terms applied to MRI labeling of implants and devices. 3) Know the differences in the labeling information that is applied to passive and active medical products. 4) Appreciate the controversies that exist for certain implants and comprehend the latest labeling information for implanted medical products.

RC229B Update on the Risks of Gadolinium-Based Contrast Agents

Participants
Jeffrey C. Weinreb, MD, New Haven, CT (*Presenter*) Consultant, Bracco Group; Author, Siemens AG

LEARNING OBJECTIVES

1) Describe current data about safety of gadolinium-based contact agents. 2) Compare the association of various GBCAs with NSF and gadolinium retention. 3) Review updated recommendations about use of gadolinium-based contrast agents.

Honored Educators

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RC229C Common Clinical MRI Safety Scenarios

Participants
Jay K. Pahade, MD, New Haven, CT (*Presenter*) Consultant, General Electric Company

LEARNING OBJECTIVES

1) Through case presentation format multiple common clinical scenarios will be presented that reflect potential MRI safety events. 2) Best practices and literature will be reviewed to inform participants on how to best address these scenarios with an emphasis on MR and patient safety principles.

RC229D Questions and Answers

Participants

Frank G. Shellock, PhD, Playa Del Rey, CA (*Presenter*) Nothing to Disclose
Jay K. Pahade, MD, New Haven, CT (*Presenter*) Consultant, General Electric Company
Jeffrey C. Weinreb, MD, New Haven, CT (*Presenter*) Consultant, Bracco Group; Author, Siemens AG

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RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC231

Hands-on Musculoskeletal Ultrasound: A Forum for Question and Answer (Hands-on)

Monday, Nov. 26 8:30AM - 10:00AM Room: E258

MK US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Marnix T. van Holsbeeck, MD, Detroit, MI (*Presenter*) Minor stockholder, Koninklijke Philips NV; Minor stockholder, General Electric Company; Stockholder, MedEd3D; Grant, Siemens AG; Grant, General Electric Company;
Lodewijk J. van Holsbeeck, MD, Lansing, MI (*Presenter*) Nothing to Disclose
Joseph H. Introcaso, MD, Neenah, WI (*Presenter*) Nothing to Disclose
Humberto G. Rosas, MD, Madison, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize and identify pitfalls of scanning that lead to false positive or false negative musculoskeletal ultrasound results. 2) Perform skills for scanning difficult patients. 3) Follow rigorous protocols for the examination of different anatomic regions. 4) Position patients for more complicated musculoskeletal ultrasound examinations. 5) Recognize and integrate the importance of tissue movement in judging the functionality of the extremities.

ABSTRACT

In this Musculoskeletal Ultrasound Master class, an opportunity will be given to participants to start a written dialogue in advance to RSNA 2018. The electronically submitted questions will be sorted by instructors and organized per topic. A select number of recurrent themes in these questions will be prepared for dialogue on stage. When the questions focus on a particular scanning skill, the authors of the questions will be invited on the examination platform to show problems they encounter in their practice. By using a step-by step approach in solving the scanning issues, all who are present should benefit from the technical interactions on stage. Cameras will project scanning details on large screens. The seating in the class will guarantee close proximity for an enriching interaction between audience and stage.

RC232

Burnout of a Radiology Physician Workforce

Monday, Nov. 26 8:30AM - 10:00AM Room: N226

LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Cheri L. Canon, MD, Birmingham, AL (*Moderator*) Royalties, The McGraw-Hill Companies

For information about this presentation, contact:

ccanon@uabmc.edu

Sub-Events

RC232A Burnout in Radiology

Participants
Felix S. Chew, MD, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

fchew@uw.edu

LEARNING OBJECTIVES

1) Define burnout and discuss its prevalence and potential causes in radiologists. 2) Discuss burnout among radiologist trainees and its potential effects on their education. 3) Describe approaches to mitigating burnout in the radiologist's workplace.

Honored Educators

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RC232B How to Address Radiology Trainees' Burnout

Participants
Stacy E. Smith, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC232C Remedies to Mitigate Burnout in the Workplace

Participants
Cheri L. Canon, MD, Birmingham, AL (*Presenter*) Royalties, The McGraw-Hill Companies

For information about this presentation, contact:

ccanon@uabmc.edu

LEARNING OBJECTIVES

1) List activities that can mitigate burnout.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC250

Targeted Treatment and Imaging of Liver Cancers: Basic to Advanced Techniques in Minimally-Invasive Therapies and Imaging

Monday, Nov. 26 8:30AM - 10:00AM Room: E261

GI OI IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants

John J. Park, MD,PhD, Duarte, CA (*Moderator*) Proctor, Sirtex Medical Ltd; Speaker, Medtronic plc; Speaker, Galil Medical Ltd; Speaker, BTG International Ltd; Speaker, Biocompatibles International plc; Consultant, Biocompatibles International plc; Consultant, BTG International Ltd; Advisory Board, Eisai Co, Ltd
Jinha Park, MD, PhD, Iowa City, IA (*Moderator*) Nothing to Disclose
John J. Park, MD,PhD, Duarte, CA (*Presenter*) Proctor, Sirtex Medical Ltd; Speaker, Medtronic plc; Speaker, Galil Medical Ltd; Speaker, BTG International Ltd; Speaker, Biocompatibles International plc; Consultant, Biocompatibles International plc; Consultant, BTG International Ltd; Advisory Board, Eisai Co, Ltd
Jinha Park, MD, PhD, Iowa City, IA (*Presenter*) Nothing to Disclose
Marcelo S. Guimaraes, MD, Charleston, SC (*Presenter*) Consultant, Baylis Medical Company; Consultant, Terumo Corporation; Consultant, General Electric Company; Consultant, Medtronic plc
Andrew C. Price, MD, Gilbert, AZ (*Presenter*) Nothing to Disclose
Sandeep T. Laroia, MD, Iowa City, IA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Andrew.Price@bannerhealth.com

jinha-park@uiowa.edu

LEARNING OBJECTIVES

1) Discuss the role of the interventional radiologist in the treatment and management of patients with primary and metastatic liver cancer as part of the multidisciplinary team. 2) Learn best practice techniques in the treatment of liver cancers, with emphasis on both locoregional and focal therapeutic approaches, and indications for treatment. 3) Explore various tips and tricks for each treatment modality and learn how to avoid complications through good patient selection, choosing the appropriate techniques, and knowing what common mistakes to avoid. 4) Learn about newer and developing techniques and devices, their potential roles and indications, and potential pitfalls. 5) Explore advanced imaging modalities in the detection of tumors and for monitoring treatment response.

ABSTRACT

Primary and metastatic liver disease may benefit from combined techniques such as bland/chemoembolization and liver ablation. The presentation will provide the rationale for the association of techniques, patient selection, tips and tricks, equipment and supplies necessary, protective techniques and how to avoid complications. Also, it will be discussed the results and current literature to support the association of techniques.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC252

Carotid and Renal Doppler (Hands-on)

Monday, Nov. 26 8:30AM - 10:00AM Room: E264

GU VA US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Gowthaman Gunabushanam, MD, New Haven, CT (*Presenter*) Nothing to Disclose
Shweta Bhatt, MD,MBBS, Rochester, NY (*Presenter*) Nothing to Disclose
Wui K. Chong, MD, Houston, TX (*Presenter*) Nothing to Disclose
Corinne Deurdulian, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Vikram S. Dogra, MD, Rochester, NY (*Presenter*) Editor, Wolters Kluwer nv;
Ulrike M. Hamper, MD, MBA, Baltimore, MD (*Presenter*) Nothing to Disclose
Davida Jones-Manns, Hampstead, MD (*Presenter*) Nothing to Disclose
Mark E. Lockhart, MD, Birmingham, AL (*Presenter*) Author, Oxford University Press; Author, JayPee Brothers Publishers; Editor, John Wiley & Sons, Inc; Deputy Editor, Journal of Ultrasound in Medicine
Margarita V. Revzin, MD, Wilton, CT (*Presenter*) Nothing to Disclose
Michelle L. Robbin, MD, Birmingham, AL (*Presenter*) Consultant, Koninklijke Philips NV; Speaker, Koninklijke Philips NV;
Leslie M. Scoutt, MD, New Haven, CT (*Presenter*) Speaker, Koninklijke Philips NV
Ravinder Sidhu, MD, Rochester, NY (*Presenter*) Nothing to Disclose
Sadhna Verma, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
William D. Middleton, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

corinne.deurdulian@med.usc.edu

Drsadhnaverma@gmail.com

mrobbin@uabmc.edu

LEARNING OBJECTIVES

1) Describe the technique and optimally perform carotid Doppler ultrasound. 2) Describe the technique and optimally perform renal Doppler ultrasound. 3) Review qualitative and quantitative criteria for diagnosing abnormalities in carotid and renal ultrasound Doppler examinations.

ABSTRACT

This hands-on course will provide participants with a combination of didactic lectures and an extended 'live' scanning opportunity on normal human volunteers, as follows: Didactic lectures (30 minutes): Carotid Doppler ultrasound: scanning technique, diagnostic criteria and interesting teaching cases. Renal Doppler ultrasound: scanning technique, diagnostic criteria and interesting teaching cases. Mentored scanning (60 minutes): Following the didactic lectures, the participants will proceed to a scanning area with normal human volunteers and ultrasound machines from different manufacturers. Participants will be able to perform live scanning with direct assistance, as needed, by faculty. Faculty will be able to offer feedback, help participants improve their scanning technique as well as answer any questions. Time permitting, faculty will also be available to answer general questions relating to all aspects of vascular ultrasound, not just limited to carotid and renal Doppler studies.

Active Handout:Wui Kheong Chong

http://abstract.rsna.org/uploads/2018/15000037/RSNA doppler 2018 RC252.pdf

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RC253

Preparing your Radiology Practice and IT Department for Big Data

Monday, Nov. 26 8:30AM - 10:00AM Room: S503AB

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Paul J. Chang, MD, Chicago, IL (*Moderator*) Co-founder, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Bayer AG; Advisory Board, Bayer AG; Advisory Board, Aidoc Ltd; Advisory Board, EnvoyAI; Advisory Board, Inference Analytics

LEARNING OBJECTIVES

1) The potential of applying "Big Data" approaches to radiology will be discussed. 2) The participant will be introduced to the importance of developing a comprehensive IT architecture and capability beyond the EMR in order to effectively use "Big Data" tools. 3) Strategies for preparing IT for "Big Data" will be discussed.

ABSTRACT

Current and near future requirements and constraints will require radiology practices to continuously improve and demonstrate the value they add to the enterprise. Merely 'managing the practice' will not be sufficient; groups will be required to compete in an environment where the goal will be measurable improvements in efficiency, productivity, quality, and safety. This will require optimally leveraging IT enabled business intelligence, analytics, and data driven workflow. In many ways, this challenge can be described as a "Big Data" problem, requiring the application of newer "Big Data" approaches and tools. Unfortunately, many have discovered that an "EMR centric" IT perspective may severely limit the ability for the enterprise to maximally leverage these newer tools to create differentiable value. This session will provide an introduction to the importance of developing a comprehensive architectural strategy to augment the existing EMR to more effectively consume "Big Data" tools.

Sub-Events

RC253A Getting Your IT Infrastructure Ready for Big Data

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Bayer AG; Advisory Board, Bayer AG; Advisory Board, Aidoc Ltd; Advisory Board, EnvoyAI; Advisory Board, Inference Analytics

LEARNING OBJECTIVES

1) The potential of applying "Big Data" and noSQL approaches to radiology will be discussed. 2) The participant will be introduced to the importance of developing a comprehensive IT architecture and capability beyond the EMR in order to effectively use "Big Data" tools. 3) Strategies for preparing IT for business intelligence and analytics will be discussed.

ABSTRACT

Current and near future requirements and constraints will require radiology practices to continuously improve and demonstrate the value they add to the enterprise. Merely 'managing the practice' will not be sufficient; groups will be required to compete in an environment where the goal will be measurable improvements in efficiency, productivity, quality, and safety. This will require optimally leveraging IT enabled business intelligence, analytics, and data driven workflow. In many ways, this challenge can be described as a "Big Data" problem, requiring the application of newer "Big Data" approaches and tools. Unfortunately, many have discovered that an "EMR centric" IT perspective may severely limit the ability for the enterprise to maximally leverage these newer tools to create differentiable value. This session will provide an introduction to the importance of developing a comprehensive architectural strategy to augment the existing EMR to more effectively consume "Big Data" approaches and fully leverage business intelligence and analytics.

RC253B NoSQL Approaches: Beyond the Traditional Relational Database

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Bayer AG; Advisory Board, Bayer AG; Advisory Board, Aidoc Ltd; Advisory Board, EnvoyAI; Advisory Board, Inference Analytics

LEARNING OBJECTIVES

1) The distinction between the traditional relational (SQL) database and "NoSQL" approaches will be discussed. 2) The attendees will be given a basic introduction to how "NoSQL" tools, such as Hadoop, MapReduce, MongoDB can be complementary to existing approaches. 3) NoSQL applications and their relevance to radiology will be discussed.

ABSTRACT

Current and near future requirements and constraints will require radiology practices to continuously improve and demonstrate the value they add to the enterprise. Merely 'managing the practice' will not be sufficient; groups will be required to compete in an environment where the goal will be measurable improvements in efficiency, productivity, quality, and safety. This will require optimally leveraging IT enabled business intelligence, analytics, and data driven workflow. These approaches will require the ability to consume and utilize all available enterprise data, including unstructured reports, multimedia objects, etc. Other industries have realized that traditional IT approaches, such as the relational (SQL) database, cannot optimally address these "difficult" data

objects. Many outside of the medical domain have successfully augmented traditional approaches by newer "Big Data" and "NoSQL" methodologies, such as Hadoop, MapReduce, MongoDB, etc. In this session, an introduction to these newer tools will be presented.

RC253C Radiologist Workflow and AI: Challenges and Opportunities

Participants
William W. Boonn, MD, Philadelphia, PA (*Presenter*) Officer, Nuance Communications, Inc; Shareholder, Nuance Communications, Inc

LEARNING OBJECTIVES

1) A technical overview of machine learning and deep learning will be presented. 2) Applications of machine learning and deep learning in radiology will be illustrated. 3) Challenges in deploying machine learning and deep learning in radiologist workflow and productivity demands will be discussed.

ABSTRACT

Computers in radiology have often promised to deliver faster clinical decisions, more accurate diagnoses, and transformative visualizations. Computer aided diagnostics (CAD) has been deployed to guide radiologists in their detection of abnormalities and identification of disease. Historically, CAD has been based on domain-driven heuristics, and more recently used simple machine learning on structured data. Both of these require extensive manual engineering making them very slow to build, limited in their flexibility, and less accurate than we would like. Deep learning is a new paradigm that offers a transformative solution. Instead of demanding countless human hours of painstaking feature generation and selection, deep learning automatically discovers clinically-relevant features by first architecting a hierarchy of patterns (loosely modelled on the brain's own neural neural networks) and then updating those patterns upon observing examples. As radiology requires complex associative pattern recognition, deep learning is the ideal companion tool. Enlitic is developing a deep neural network of the entire human body that will offer a new way forward in which the radiologist has immediate access to the most relevant clinical information. In this talk, we will present a technical overview of machine learning and deep learning, illustrate its applications in radiology, and detail some of the challenges improving radiological workflow using deep learning poses.

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RC254

Next Frontier in Imaging: Disease-specific Radiology Reports

Monday, Nov. 26 8:30AM - 10:00AM Room: S402AB

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Olga R. Brook, MD, Boston, MA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

obrook@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Demonstrate the advantages of disease-specific reporting over organ-system-based reporting. 2) Provide specific examples of the disease-specific templates that have been shown to improve value of imaging in diagnostic and interventional radiology

Sub-Events

RC254A Contextual Radiology Reporting: The Next Generation of Structured Reports

Participants
Mark D. Mamlouk, MD, Santa Clara, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mark.d.mamlouk@kp.org

LEARNING OBJECTIVES

1) Define what contextual reporting is and demonstrate how to create disease-specific templates. 2) Explain the advantages of contextual reporting over conventional structured reporting through the use of imaging examples and contextual templates.

RC254B Reporting Prostate MRI: Optimizing Content for Referring Providers

Participants
Benjamin D. Spilseth, MD, Minneapolis, MN (*Presenter*) Consultant, NxThera, Inc

For information about this presentation, contact:

spil0042@umn.edu

LEARNING OBJECTIVES

1) Learn urologists' and radiologists' opinions on prostate MRI reporting. 2) Learn how reports and reporting templates can be improved to include the most relevant clinical data. 3) Understand patterns in how referring provider's opinions may be different from radiologists on optimal imaging report content.

RC254C Interventional Radiology Standardized Reporting: Latest Developments and Opportunities

Participants
Stephanie Dybul, MBA,RT, Milwaukee, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand how to integrate IR standardized reports in your practice. 2) Understand the intent behind IR standardized report design and data element selection, as well as how data is collected in the IR Registry.

RC254D Why RADS? Standardized Terminologies and Templates Allow Unambiguous Communication of Risk

Participants
Thomas W. Loehfelm, MD, PhD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

twloehfelm@ucdavis.edu

LEARNING OBJECTIVES

1) Understand basic principles of clear communication, recognize quirky dictation habits that confound communication. 2) Learn the advantages of structured declarations to unambiguously convey meaning.

RC254E Disease-specific Structured Reporting in Thoracic Imaging: Added Value from a Quality Perspective

Participants
Jonathan H. Chung, MD, Chicago, IL (*Presenter*) Royalties, Reed Elsevier; Consultant, Boehringer Ingelheim GmbH ; Consultant, F. Hoffmann-La Roche Ltd; Consultant, Applied Clinical Intelligence LLC; Consultant, Veracyte, Inc; Speakers Bureau, Boehringer Ingelheim GmbH; Speakers Bureau, F. Hoffmann-La Roche Ltd

LEARNING OBJECTIVES

1) Understand that structured reports encourage positive radiologist behavior. 2) Recognize how structured, disease specific templates can aid in quality improvement. 3) Understand how structured, disease specific templates can help our clinical colleagues.

Honored Educators

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104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RCB21

Deploying an Open-Source DICOM Archive and Web Viewer with OHIF and Orthanc (Hands-on)

Monday, Nov. 26 8:30AM - 10:00AM Room: S401CD

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Simon Rascovsky, MD, MSc, Bogota, Colombia (*Moderator*) Director, Nucleus Health, LLC
Marc D. Kohli, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Ross W. Filice, MD, Chevy Chase, MD (*Presenter*) Co-founder, DexNote, LLC; Research Grant, NVIDIA Corporation; Advisor, BunkerHill Health, Inc
Simon Rascovsky, MD, MSc, Bogota, Colombia (*Presenter*) Director, Nucleus Health, LLC

For information about this presentation, contact:

ross.w.filice@gunet.georgetown.edu

LEARNING OBJECTIVES

1) Learn how to deploy an instance of Orthanc and OHIF on your personal machine in a way that's translatable to your server architecture back home. 2) Learn how to query, retrieve, and store images to the DICOM archive as well as view these images in the OHIF viewer.

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RCC21

Getting Stuff Done: A Mindful Approach to Personal Productivity

Monday, Nov. 26 8:30AM - 10:00AM Room: S501ABC

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Puneet Bhargava, MD, Seattle, WA (*Moderator*) Nothing to Disclose
Matthew B. Morgan, MD, Sandy, UT (*Presenter*) Consultant, Reed Elsevier
Puneet Bhargava, MD, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Bhargp@uw.edu

LEARNING OBJECTIVES

1) Introduce the concept of "Getting Things Done.' Learn the concepts of Inbox Zero and other email management techniques. 2) Using tools such as note-taking applications, citation and password managers.3) Using self-inquiry techniques, review how to make meaningful and powerful changes in how we engage with technology.

Active Handout:Puneet Bhargava

http://abstract.rsna.org/uploads/2018/18001626/Productivity Primer RCC21.pdf

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MSAS22

Evolving Imaging Methods for the Cancer Patient - Part 2 (Sponsored by the Associated Sciences Consortium) (Interactive Session)

Monday, Nov. 26 10:30AM - 12:00PM Room: S105AB

NM OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

Nancy McDonald, MS, Chicago, IL (*Moderator*) Nothing to Disclose
William A. Undie, PhD, RT, Houston, TX (*Moderator*) Nothing to Disclose
Bernie McKay, BS, Chicago, IL (*Presenter*) Employee, Triad Isotopes
Katie Tucker, BS, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Improve basic knowledge and skills relevant to new imaging procedures and treatments for the cancer patient. 2) Assess the potential applications to clinical practice and the treatments to these patients. 3) Assess the potential of new radiopharmaceuticals to imaging and the treatment of the cancer patient. 4) How Nuclear Medicine is integrated with other modalities in the treatment of the cancer patient.

MSCM22

Case-based Review of Magnetic Resonance (Interactive Session)

Monday, Nov. 26 10:30AM - 12:00PM Room: S100AB

GI GU MR MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Jorge A. Soto, MD, Boston, MA (*Director*) Royalties, Reed Elsevier

Sub-Events

MSCM22A MRI of the Kidneys, Adrenals, and Retroperitoneum

Participants
Christine O. Menias, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

menias.christine@mayo.edu

LEARNING OBJECTIVES

1) Discuss MR imaging features of several GU cases in a case-based format. 2) Review imaging pitfalls and differential diagnoses of GU cases at MR imaging. 3) Pathology of the kidneys, bladder, seminal vesicles, testes, retroperitoneum , and adrenals will be discussed in a case based format.

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MSCM22B MRI of the Female Pelvis

Participants
Marcia C. Javitt, MD, Haifa, Israel (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn appropriate use of and technique for female pelvic MRI. 2) Recognize imaging patterns of benign and malignant disease, triage emergencies, and analyze key findings that enable an informed interpretation. 3) Be mindful of the need for accurate, safe, and efficient patient management.

ABSTRACT

This presentation will review basics for performance and interpretation of pelvic MRI with emphasis on differential diagnosis of common findings. Important and unusual complications of common problems will be reviewed.

MSCM22C MRI of the Ankle and Foot

Participants
Hilary R. Umans, MD, Ardsley, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To better understand the MR imaging findings in a series of cases that emphasize common and clinically important disorders of the ankle and foot. 2) To present MR imaging features that allow accurate differential diagnosis among other diagnostic possibilities for each of these cases.

MSCM22D MRI of the Shoulder

Participants
Bruce B. Forster, MD, Vancouver, BC (*Presenter*) Stockholder, Canada Diagnostic Centres

For information about this presentation, contact:

bruce.forster@vch.ca

LEARNING OBJECTIVES

1) Recognize common pathology of the rotator cuff on MRI, including differentiating tendinopathy from partial and full thickness tears, and to understand how imaging findings potentially change management. 2) Differentiate normal labral variants from labral tears on MR arthrography, and appreciate the appearance of Bankart tear variants. 3) Understand the role of 1.5T and 3T MRI vs arthrography in the workup of rotator cuff disease and shoulder instability.

MSMC22

Cardiac CT Mentored Case Review: Part II (In Conjunction with the North American Society for Cardiovascular Imaging) (Interactive Session)

Monday, Nov. 26 10:30AM - 12:15PM Room: S406A

CA CT

AMA PRA Category 1 Credits ™: 1.75
ARRT Category A+ Credits: 2.00

Participants
Jill E. Jacobs, MD, New York, NY (*Director*) Nothing to Disclose
Charles S. White, MD, Baltimore, MD (*Moderator*) Consultant, Koninklijke Philips NV

For information about this presentation, contact:

jill.jacobs@nyumc.org

LEARNING OBJECTIVES

1) Identify cardiac and coronary artery anatomy. 2) Recognize cardiac disease processes, including coronary atherosclerosis, as diagnosed on CT. 3) Understand methods of cardiac CT and coronary CT angiography post-processing.

Sub-Events

MSMC22A Coronary Atherosclerosis I

Participants
Geoffrey D. Rubin, MD, Durham, NC (*Presenter*) Consultant, Fovia, Inc; Consultant, HeartFlow, Inc; Consultant, General Electric Company;

LEARNING OBJECTIVES

View learning objectives under main course title.

MSMC22B Coronary Atherosclerosis II

Participants
Karin E. Dill, MD, Worcester, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

MSMC22C Valves and Cardiac Function

Participants
Suhny Abbara, MD, Dallas, TX (*Presenter*) Royalties, Reed Elsevier; Institutional research agreement, Koninklijke Philips NV; Institutional research agreement, Siemens AG

LEARNING OBJECTIVES

View learning objectives under main course title.

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MSMI22

Molecular Imaging Symposium: Oncologic MI Applications

Monday, Nov. 26 10:30AM - 12:00PM Room: S405AB

BQ GU MR MI OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Peter L. Choyke, MD, Rockville, MD (*Moderator*) Nothing to Disclose
Vikas Kundra, MD, PhD, Houston, TX (*Moderator*) Institutional license agreement, Introgen Therapeutics, Inc; Research Grant, General Electric Company

For information about this presentation, contact:

pchoyke@nih.gov

LEARNING OBJECTIVES

1) To understand current advances in PET molecular imaging and clinical applications. 2) To understand new applications of advanced MRI techniques. 3) To improve understanding of theranostic agents based on targeted imaging agents.

Sub-Events

MSMI22A Hyperpolarized MRI of Prostate Cancer

Participants
Daniel B. Vigneron, PhD, San Francisco, CA (*Presenter*) Research Grant, General Electric Company;

LEARNING OBJECTIVES

1) To understand the biochemical information that Hyperpolarized pyruvate MRI can provide. 2) Learn the value of detecting increased conversion of pyruvate to lactate in cancer reflecting upregulated lactate dehydrogenase expression. 3). To describe initial results in prostate cancer, brain tumors and metastatic lung cancers.

MSMI22B Somatostatin Receptor Imaging

Participants
Corina Millo, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

millocm@nih.gov

LEARNING OBJECTIVES

1) Identify clinical scenarios in which performing 68Ga-somatostatin PET/CT imaging can benefit patient's care based on published appropriate use criteria. 2) Examine a range of 68Ga-somatostatin PET/CT cases from basic to complex and/or unusual. 3) Discuss peptide receptor radiotherapy (PRRT).

ABSTRACT

68Ga-labeled somatostatin analogs (DOTATATE, DOTATOC and DOTANOC) PET/CT imaging provides both higher resolution and enhanced receptor affinity compared with In-111-DTPA-octreotide, with less radiation, comparable cost, and imaging completion within 2 hours vs. 2-3 days. 68Ga-somatostatin analogs have a higher impact on patient management than In-111-DTPA-octreotide, including the ability to identify patients likely to benefit from PRRT. This activity will provide results from the literature and the author's experience to illustrate the potential of 68Ga-somatostatin analogues PET/CT in imaging of neuroendocrine tumors.

MSMI22C Multimodal MI in Oncology

Participants
Mukesh G. Harisinghani, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand imaging applications for commercially available iron oxide nanoparticles. 2) To understand mechanism of action for magnetic iron oxide nanoparticles. 3) To describe MR technique for imaging with magnetic nanoparticles.

MSMI22D Imaging of Delivered Gene Expression

Participants
Vikas Kundra, MD, PhD, Houston, TX (*Presenter*) Institutional license agreement, Introgen Therapeutics, Inc; Research Grant, General Electric Company

MSMI22E PSMA Imaging in Prostate Cancer

Participants
Peter L. Choyke, MD, Rockville, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

pchoyke@nih.gov

LEARNING OBJECTIVES

1) Describe the various forms of PSMA PET ligands. 2) Illustrate the most common uses of PSMA PET. 3) Demonstrate pitfalls of interpreting PSMA PET.

MSRO22

BOOST: CNS-Case-based Multidisciplinary Review (Interactive Session)

Monday, Nov. 26 10:30AM - 12:00PM Room: S103AB

NR OI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

Christina I. Tsien, MD, Saint Louis, MO (*Presenter*) Advisory Board, AbbVie Inc; Advisory Board, NovoCure Ltd; Speakers Bureau, Varian, Inc; Speakers Bureau, Merck & Co, Inc
Soonmee Cha, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Roger Stupp, MD, Chicago, IL (*Presenter*) Spouse, Employee, Novartis AG; Research Consultant, Celgene Corporation; Research Consultant, AbbVie Inc; Research Consultant, Boehringer Ingelheim
Gavin P. Dunn, MD, PhD, Saint Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review latest advances in imaging for assessment of gliomas before, during, and after therapy in the context of WHO 2016 molecular/genetic classification gliomas 2) Discuss challenges and strategies for accurate imaging characterization of gliomas following therapy in a case based format. 3) Recognize the need to incorporate molecular/genetic features and types of therapy in imaging assessment of gliomas

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MSRO26

BOOST: Gynecologic-Case-based Multidisciplinary Review (Interactive Session)

Monday, Nov. 26 10:30AM - 12:00PM Room: S103CD

GU OI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Susanna I. Lee, MD,PhD, Boston, MA (*Moderator*) Editor, Wolters Kluwer nv
Lilie Lin, MD, Houston, TX (*Presenter*) Investigator, AstraZeneca PLC
Aoife Kilcoyne, MBBCh, Boston, MA (*Presenter*) Nothing to Disclose
Marcela G. Del Carmen, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

slee0@mgh.harvard.edu

LEARNING OBJECTIVES

1) Understand the surgical treatment of gynecologic cancers based on standard of care current treatment strategies. 2) Understand systemic therapies available for the management of gynecologic cancers based on current standard of care regimens. 3) Understand the use of radiotherapy techniques used for the adjuvant and definitive management of gynecologic cancers. 4) Identify key imaging findings on MR and PET CT pertinent to pre-operative treatment planning as well as post treatment follow up. 5) Detect common pitfalls on MR and PET CT imaging in the pre and post treatment evaluation of patients with gynecologic cancer.

ABSTRACT

This is a case based, multidisciplinary review of gynecologic malignancies.

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RCA22

Case Review: Rectal MRI - Bring Your Own Device (Hands-on)

Monday, Nov. 26 10:30AM - 12:00PM Room: S404CD

GI MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
David H. Kim, MD, Middleton, WI (*Moderator*) Shareholder, Cellectar Biosciences, Inc; Shareholder, Elucent Medical;
Mukesh G. Harisinghani, MD, Boston, MA (*Presenter*) Nothing to Disclose
Courtney C. Moreno, MD, Suwanee, GA (*Presenter*) Researcher, General Electric Company;
Zahra Kassam, MD, London, ON (*Presenter*) Nothing to Disclose
Thomas A. Hope, MD, San Francisco, CA (*Presenter*) Research support, General Electric Company
Gaiane M. Rauch, MD, PhD, Houston, TX (*Presenter*) Nothing to Disclose
Raj M. Paspulati, MD, Cleveland, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Critically evaluate the primary tumor, particularly in the differentiation between T2/early T3 -and- advanced T3 status. 2) Apply criteria to determine regional lymph node status. 3) Recognize relevant anatomic landmarks used in Rectal MR cancer staging.

ABSTRACT

Participants will review cases on their own devices and answer questions. The cases will then be reviewed by the presenters. Note: this activity is best done on a laptop or tablet. Although phones will work, their small size limits optimal image view. This workshop will be led by members of the Society of Abdominal Radiology Rectal Cancer Disease Focused Panel. This group helps set the interpretation standards for rectal cancer MRI in the United States. In this 1.5 hour Hands-on Workshop, the participants will have the opportunity to review a number of rectal staging MRI cases on stand-alone computers or on a personal mobile device. The selected cases are intended to give a broad overview of the common issues encountered in rectal cancer staging, including appropriately categorizing the correct T category of the tumor as well as determining regional lymph node status. The relevant anatomic relationships of the tumor with adjacent structures for surgical and potential neoadjuvant options will be emphasized. An interactive platform will allow participants to see overall class performance for questions posed by the expert reviewer. Each case will be reviewed after a short interval to allow a participant to form an opinion prior to the expert review. This workshop is intended to give a practical, hands-on approach to rectal cancer staging by MRI.

RCB22

Getting Stuff Done: A Hands-on Technology Workshop to Enhance Personal Productivity (Hands-on)

Monday, Nov. 26 10:30AM - 12:00PM Room: S401CD

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Puneet Bhargava, MD, Seattle, WA (*Moderator*) Nothing to Disclose
Matthew B. Morgan, MD, Sandy, UT (*Presenter*) Consultant, Reed Elsevier
Puneet Bhargava, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Amanda Lackey, MD, Springfield, MO (*Presenter*) Nothing to Disclose
Tarun Pandey, MD, FRCR, Little Rock, AR (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Bhargp@uw.edu

LEARNING OBJECTIVES

1) Introduce the concept of "Getting Things Done.' Learn the concepts of Inbox Zero and other email management techniques. 2) Using tools such as note-taking applications, citation and password managers.3) Using self-inquiry techniques, review how to make meaningful and powerful changes in how we engage with technology.

Active Handout:Puneet Bhargava

http://abstract.rsna.org/uploads/2018/18003025/Productivity Primer RCB22.pdf

Active Handout:Tarun Pandey

http://abstract.rsna.org/uploads/2018/18003025/Pandey_RSNA 2018 Productivity Exercises FINAL RCB22.pdf

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RCC22

Using Imaging Informatics to Enable Patient Experience Improvements in Radiology

Monday, Nov. 26 10:30AM - 12:00PM Room: S501ABC

IN LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Ramin Khorasani, MD, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

RCC22A Patient Experience in Radiology: The Case for Urgent Action

Participants
Ramin Khorasani, MD, Boston, MA (*Presenter*) Nothing to Disclose

RCC22B Patient-centered Imaging Informatics Innovations

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (*Presenter*) Royalties, Osler Institute

For information about this presentation, contact:

tessa.cook@uphs.upenn.edu

LEARNING OBJECTIVES

1) Discuss how imaging informatics can be used to design innovations that help patients to better understand their radiology reports as well as to more effectively connect directly with the radiologists caring for them or their family members.

RCC22C Using Patient Experience Survey Results to Motivate Change

Participants
Neena Kapoor, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn how IT tools can help analyze patient experience comments to identify targets for improvement initiatives.

RCC22D Patient Experience: Numbers, Culture, or ?

Participants
Keith D. Hentel, MD, MS, New York, NY (*Presenter*) Nothing to Disclose

RCC22E Patient Challenges and Wish List for Imaging Informatics

Participants
Andrea K. Borondy Kitts, MS,MPH, South Glastonbury, CT (*Presenter*) Stockholder, Abbott Laboratories; Stockholder, AbbVie Inc; Stockholder, F. Hoffmann-La Roche Ltd; Stockholder, Johnson & Johnson; Officer, Prosumer Health; Investor, Prosumer Health

For information about this presentation, contact:

Borondy@msn.com

LEARNING OBJECTIVES

Help radiologists assess the challenges and barriers faced by patients in finding information about imaging tests and procedures on-line, in accessing and understanding radiologist reports on patient portals, and in understanding, arranging for, and committing to, appropriate follow-up. Provide suggestions for interventions for radiologists and radiology practices to use to help patients find and understand information on appropriate imaging tests for their health/medical situation, find and understand their radiologist report, and understand and arrange for appropriate follow-up.

Active Handout:Andrea K Borondy Kitts

http://abstract.rsna.org/uploads/2018/18024154/Patient Challenges and Wish List for Imaging RCC22E.pdf

SPCP21

Australia and New Zealand Present: Clinical Radiology and Radiation Oncology

Monday, Nov. 26 10:30AM - 12:00PM Room: E351

ED IR NR RO VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

LEARNING OBJECTIVES

1) Overview of the RANZCR Clinical Radiology Curriculum and its adoption of the CanMEDS framework. 2) Insight into the aims of RANZCR's 2016-2020 Training and Assessment Reform project and the progress to date. 3) Describe RANZCR assessment processes for radiology training - existing methods and reform initiatives. 4) Understand how RANZCR's approach fits into the broader context of specialty training programs in Australia and New Zealand. 5) Understand how RANZCR's educational model compares with correspondent radiology training programs in North America and Europe.

ABSTRACT

In 2014 the RANZCR commissioned a full review of its assessment and examination processes for Fellowship training, across both its Faculties. Expert educationalists were engaged to evaluate the quality and sustainability of RANZCR's assessment and examination program at both the operational and strategic levels, and to recommend and facilitate suitable strategies for improvement. In 2016 the College commenced a comprehensive set of work packages to implement the recommendations and develop a best-practice medical education program.

Sub-Events

SPCP21A Introduction

Participants
John P. Slavotinek, MBBS, Adelaide, Australia (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

john.slavotinek@sa.gov.au

LEARNING OBJECTIVES

1. To provide a basic overview of Australian and New Zealand demographics in comparison to other entities such as the USA, the European Union and the UK. 2. To convey brief insight into similarities and differences between the Australian and New Zealand health care environments and other countries. 3. To give perspective regarding radiology and radiation oncology services in Australia and New Zealand compared to other entities such as the USA, Europe and the UK.

SPCP21B Education, Training and Reform Initiatives in Australia and New Zealand in Radiology

Participants
Dinesh K. Varma, FRANZCR, Brighton, Australia (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Overview of the RANZCR Clinical Radiology Curriculum and its adoption of the CanMEDS framework. 2) Insight into the aims of RANZCR's 2016-2020 Training and Assessment Reform project and the progress to date. 3) Describe RANZCR assessment processes for radiology training - existing methods and reform initiatives. 4) Understand how RANZCR's approach fits into the broader context of specialty training programs in Australia and New Zealand. 5) Understand how RANZCR's educational model compares with correspondent radiology training programs in North America and Europe.

ABSTRACT

In 2014 the RANZCR commissioned a full review of its assessment and examination processes for Fellowship training, across both its Faculties. Expert educationalists were engaged to evaluate the quality and sustainability of RANZCR's assessment and examination program at both the operational and strategic levels, and to recommend and facilitate suitable strategies for improvement. In 2016 the College commenced a comprehensive recommend and facilitate suitable strategies for improvement. In 2016 the College commenced a comprehensive set of work packages to implement the recommendations and develop a best-practice medical education program.

SPCP21C Radiation Oncology and Interventional Oncology: A Marriage Made in Heaven

Participants
Lizbeth Kenny, MD, FRANZCR, Herston, Australia (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lizkenny@bigpond.net.au

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

Radiation Oncology and Radiology started as the one discipline with all knowledge housed within one person and one specialty, they diverged and are now coming closer together once more. Both, by their very nature are imaging guided specialties. Interventional Radiology and in particular Interventional Oncology and Radiation Oncology are two sides of a coin, same aim, different modalities. Radiation Oncology has a century of science and collaboration behind its practice, with a massive evidence base, hard core clinical practice and a robust research capability. Interventional Oncology internationally, is still at its infancy, but in partnership with radiation oncology, we can refocus the importance of local cancer control which the world has largely forgone in pursuit of systemic therapy. The partnership can provide a robust framework within which to practice and research. The partnership between radiation oncology and interventional oncology will rapidly propell the importance of local cancer treatment and the amazing benefit that this brings to patients and to the system. This partnership can not only help the world at large to refocus on the importance of local cancer control, but can help us reshape the evidence paradigm, which using current accepted international criteria, makes it almost impossible to obtain high level evidence in our fields of rapidly evolving technology. With a major re-focus on patient reported outcome measures, quality of life and overall economic burden, local image guided therapy, by any modality, can bring great benefit to patients and to the system alike. This is a time for overt collaboration, given the burden of cancer in the community and the lack of resources world wide. With a clear appreciation of the overall benefit of such a relationship, within Australia and New Zealand, Interventional Oncology has now formed a special interest group within our highly successful bi-national radiation oncology research group - the Trans Tasman Radiation Oncology Group (TROG) and a number of major hospital facilities in Australia are considering partnership arrangments within their services.

SPCP21D A Journey in Vascular Interventional Research: Lessons Learnt and Future Prospects

Participants
Andrew H. Holden, FRANZCR, Auckland, New Zealand (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

SPCP21E The Role of Iron in Neurodegeneration

Participants
Patricia Desmond, MD, Melbourne, Australia (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Learning objectives 1. Understand the importance of iron in normal brain function 2. Understand how iron can led to neurodegeneration 3. Appreciate that Iron can be measured and imaged with MRI 4. Give insight into the role that iron may play in predicting cognitive decline.

ABSTRACT

Iron plays an essential role in normal brain function. It is important in synaptic transmission, mitochondrial respiration and myelin synthesis. Iron in the brain increase with age. However, too much iron is toxic and leads to oxidative stress and neurodegeneration. Iron is associated with neurodegeneration in Parkinson's disease and Parkinson's dementia and has also been linked to other neurodegenerative diseases including Alzheimer's disease. Increase iron levels and found in the brain of AD patients at post mortem. Increase iron in the CSF is a predictor of cognitive decline in amyloid positive patients Amyloid imaging has revolutionised our understanding of AD disease. It points to a long preclinical phase, 20 to 30 years of gradual build up before the onset of clinical disease. However, amyloid does not tell us about when a patient will dement. Approximately 30% of normal healthy elderly will have a positive amyloid scan. Iron can now be imaged quantitatively with MRI by a technique known as Quantitative Susceptibility Mapping (QSM). Increase iron in the hippocampus, measured with QSM in amyloid positive patients predicts decline 5 years before onset. Iron chelation in amyloid positive patients is currently being trialed as a way of delaying onset of cognitive impairment

SPCP21F Closing Remarks

Participants
Vijay M. Rao, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

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RCA23

Introduction to Machine Learning and Texture Analysis for Lesion Characterization (Hands-on)

Monday, Nov. 26 12:30PM - 2:00PM Room: S401AB

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Kevin Mader, DPhil,MSc, Basel, Switzerland (*Moderator*) Employee, 4Quant Ltd; Shareholder, 4Quant Ltd
Kevin Mader, DPhil,MSc, Basel, Switzerland (*Presenter*) Employee, 4Quant Ltd; Shareholder, 4Quant Ltd
Barbaros S. Erdal, PhD, Columbus, OH (*Presenter*) Nothing to Disclose
Joshy Cyriac, Basel, Switzerland (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mader@biomed.ee.ethz.ch

joshy.cyriac@usb.ch

LEARNING OBJECTIVES

1) Review the basic principles of machine learning. 2) Learn what texture analysis is and how to apply it to medical imaging. 3) Understand how to combine texture analysis and machine learning for lesion classification tasks. 4) Learn the how to visualize and analyze results. 5) Understand how to avoid common mistakes like overfitting and incorrect model selection.

ABSTRACT

During this course, an introduction to machine learning and image texture analysis will be provided through hands on examples. Participants will use with open source as well as freely available commercial platforms in order to achieve tasks such as image feature extraction, statistical analysis, building models, and validating them. Imaging samples will include both 2D and 3D datasets from a variety of modalities (CT, PET, MR). The course will begin with a brief overview of important concepts and links to more detailed references. The concepts will then be directly applied in visual, easily understood workflows where the participants will see how the images are processed, features and textures are extracted and how publication ready statistics and models can be built and tested.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RCB23

A Hands-on Introduction to Using the NIH/NCI's Cancer Imaging Archive (TCIA) (Hands-on)

Monday, Nov. 26 12:30PM - 2:00PM Room: S401CD

BQ IN RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Justin Kirby, Rockville, MD (*Presenter*) Nothing to Disclose
Lawrence R. Tarbox, PhD, Little Rock, AR (*Presenter*) Nothing to Disclose
John B. Freymann, BS, Rockville, MD (*Presenter*) Nothing to Disclose
Fred W. Prior, PhD, Little Rock, AR (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn how to publish your research data by sharing it in TCIA. We accept a variety of 'primary' data types including radiology images, pathology images, and clinical data. Additionally researchers can submit 'analysis data' of existing primary data such as radiologist annotations, segmentations, and computer-extracted radiomic or deep learning features. 2) Review the full scope of TCIA functionality for searching, visualizing and downloading data. We provide several different ways to discover our data sets and will review each of them during the class. 3) Identify support resources that include the TCIA helpdesk, FAQs, and system documentation.

ABSTRACT

Access to large, high quality data is essential for researchers to understand disease and precision medicine pathways, especially in cancer. However HIPAA constraints make sharing medical images outside an individual institution a complex process. The NCI's Cancer Imaging Archive (TCIA) addresses this challenge by providing hosting and de-identification services which take the burden of data sharing off researchers. TCIA now contains over 80 unique data collections of more than 30 million images. Recognizing that images alone are not enough to conduct meaningful research, most collections are linked to rich supporting data including patient outcomes, treatment information, genomic / proteomic analyses, and expert image analyses (segmentations, annotations, and radiomic / radiogenomic features). This hands-on session will teach the skills needed to fully access TCIA's existing data as well as learn how to submit new data for potential inclusion in TCIA.

RCC23

Structured Reporting and the RSNA/ESR Reporting Initiative

Monday, Nov. 26 12:30PM - 2:00PM Room: S501ABC

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Marta E. Heilbrun, MD, Salt Lake City, UT (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn how to implement structured reporting across your department to make radiology reports more consistent and improve quality. 2) Describe national and international efforts to share best-pracitce radiology report templates. 3) Explore how RSNA's reporting initiative adds value to the healthcare enterprise.

Sub-Events

RCC23A Successfully Implementing a Department-wide Standardized Reporting Program

Participants
David B. Larson, MD, MBA, Stanford, CA (*Presenter*) Grant, Siemens AG ; Grant, Koninklijke Philips NV

LEARNING OBJECTIVES

1) Understand critical interpersonal elements to consider in implementing and managing a department-wide standardized structured report program. 2) Understand the technical challenges associated with implementing and managing a department-wide standardized structured report program.

ABSTRACT

Modern voice recognition technology has made department-wide standardized structured reporting feasible. However, the most significant challenges often lie in the interpersonal and organizational aspects.The author will discuss his experience in implementing and maintaining department-wide standardized structured reporting programs at two academic institutions, highlighting critical steps, major pitfalls, and strategies for success. The session will focus on those who might wish to develop department-wide structured reporting programs at their own institutions.

Honored Educators

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RCC23B ESR Reporting Initiative

Participants
Emanuele Neri, MD, Pisa, Italy (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the background and rationale for RSNA's reporting initiative. 2) Describe recent advances in the technologies for radiology reporting. 3) Explore how reporting can add augment radiology's value to the healthcare enterprise. 4) Envision the latest directions and opportunities for radiology reporting.

ABSTRACT

Since 2007, the RSNA has taken a leading role in developing tools and clinical content to help radiologists improve their reporting practices. RSNA's library of best-practice reporting templates (www.radreport.org) has seen more than 2 million views and downloads. The 'Management of Radiology Report Templates' (MRRT) profile and a DICOM standard for transmitting template-based reports into the electronic health record (EHR) have been recently developed. These standards, and a set of tools that use them, provide new opportunities for information from radiology reports to be integrated into the clnical enterprise. The 'Open Template Library' (open.radreport.org) allows any RSNA member to contribute report templates, and the open-source 'T-Rex' template editor simplifies the editing process. Through partnerships with other organizations, RSNA is seeking to improve and extend these approaches. This presentation will highlight recent advances and new directions in radiology reporting.

RCC23C radreport.org: Publishing Your Templates

Participants
Marta E. Heilbrun, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand how to share templates on open.radreport.org. 2) Know how templates from open.radreport.org are promoted to

radreport.org. 3) Describe the active collaborations with the European Society of Radiology (ESR) and other societies with the RSNA structured reporting effort.

ABSTRACT

As a component of the RSNA structured reporting initiative a select template library was created and is available at www.radreport.org. In order to facilitate the exchange of templates and to identify best practices, a resource for hosting templates created by RSNA members and affiliated societies has been created at the www.open.radreport.org site. This presentation will walk the audience through the process for sharing templates on open.radeport.org and using the T-Rex editor to create MRRT templates. Additionally, the activities of the Template Library Advisory Panel (TLAP), a joint collaboration between the RSNA and the ESR will be described. The TLAP is responsible for promoting the crowd-sourced templates to the the select template library will be described.

MSAS23

Global Initiatives and Relief Efforts (Sponsored by the Associated Sciences Consortium) (Interactive Session)

Monday, Nov. 26 1:30PM - 3:00PM Room: S105AB

OT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Catherine Gunn, MBA,RT, Halifax, NS (*Moderator*) Nothing to Disclose

Sub-Events

MSAS23A A Multidisciplinary Approach to Global Radiology Outreach: RAD-AID's Experience

Participants
Karyn A. Ledbetter, MD, Detroit, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

karynl@rad.hfh.edu

LEARNING OBJECTIVES

1) Describe the current state of radiology resources in the developing world. 2) Understand the history and mission of RAD-AID. 3) Discuss what makes RAD-AID a unique organization in the area of global radiology outreach. 4) Appreciate special considerations that must be made when providing imaging in underserved areas. 5) Assess future volunteer opportunities with a more thorough understanding of the complexity involved.

MSAS23B Healthcare Aid in Africa: A Volunteer's Experience with Mercy Ships

Participants
William Creene, RT, Halifax, NS (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

wcreene@gmail.com

LEARNING OBJECTIVES

1) Describe the medical and surgical need in developing nations. 2) Examine numerous conditions endemic to developing nations which require surgical intervention. 3) Describe the unique challenges of healthcare delivery and access in developing nations. 4) Assess the role of non-governmental organizations such as Mercy Ships in relieving the medical and surgical needs in developing nations.

ABSTRACT

This presentation will be a synopsis of the speaker's experiences volunteering as a radiological technologist in West Africa aboard the world's largest non-governmental hospital ship, the *MV Africa Mercy*. The ship is operated by Mercy Ships, an NGO which provides free surgical care to people of developing nations. Topics will include orthopedics, maxillofacial, general surgery, and women's health. Experiences and challenges related to healthcare delivery in the developing world will be discussed. A diverse range of CT and X-ray case studies with pathology unique to the developing world will be presented.

MSCA21

Case-based Review of the Abdomen (Interactive Session)

Monday, Nov. 26 1:30PM - 3:00PM Room: S100AB

ER GI GU PD

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Julie H. Song, MD, Providence, RI (*Director*) Nothing to Disclose

For information about this presentation, contact:

jsong2@lifespan.org

Sub-Events

MSCA21A Pediatric Abdomen

Participants
Edward Y. Lee, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss typical clinical presentation of pediatric patients with congenital and acquired abdominal disorders. 2) Review current imaging techniques for assessing abdominal disorders in pediatric patients. 3) Learn characteristic imaging findings to narrow the differential diagnoses of abdominal disorders in infants and children.

MSCA21B Women's Imaging

Participants
Christine O. Menias, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

menias.christine@mayo.edu

LEARNING OBJECTIVES

1) Review Imaging of Gynecologic disorders in a case-based format. 2) Highlight common pitfalls and differential diagnosis in GYN. 3) Emphasize Imaging features that should not be overlooked.

ABSTRACT

Case based review of MR features of Gynecologic and other female pelvis disorders in a case based format

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MSCA21C Abdominopelvic Emergency

Participants
Michael N. Patlas, MD,FRCPC, Hamilton, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

patlas@hhsc.ca

LEARNING OBJECTIVES

1) To discuss common pitfalls in interpretation of challenging acute abdominal cases. 2) To review the use of different cross-sectional imaging modalities in patient with acute abdomen. 3) To reduce unnecessary imaging.

MSCA21D Abdominal Trauma

Participants
Jorge A. Soto, MD, Boston, MA (*Presenter*) Royalties, Reed Elsevier
Stephan W. Anderson, MD, Cambridge, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review Imaging of abdominal trauma in a case-based format. 2) Discuss common pitfalls and clinically relevant differential diagnosis in abdominal trauma. 3) Discuss protocol considerations to optimize diagnostic yield in abdominal trauma.

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MSMC23

Cardiac CT Mentored Case Review: Part III (In Conjunction with the North American Society for Cardiovascular Imaging) (Interactive Session)

Monday, Nov. 26 1:30PM - 3:00PM Room: S406A

CA CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jill E. Jacobs, MD, New York, NY (*Director*) Nothing to Disclose
Karen G. Ordovas, MD, San Francisco, CA (*Moderator*) Advisor, Arterys Inc

For information about this presentation, contact:

karen.ordovas@ucsf.edu

jill.jacobs@nyumc.org

LEARNING OBJECTIVES

1) Identify cardiac and coronary artery anatomy. 2) Recognize cardiac disease processes, including coronary atherosclerosis, as diagnosed on CT. 3) Understand methods of cardiac CT and coronary CT angiography post-processing. 4) Understand the role of coronary artery calcium scoring. 5) Understand the role of Cardiac CTA in coronary artery pathologies including aneurysms, fistulae and other anomalies.

Sub-Events

MSMC23A Pulmonary Veins and Pericardial Disease

Participants
Harold I. Litt, MD, PhD, Philadelphia, PA (*Presenter*) Research Grant, Siemens AG ; ; ;

LEARNING OBJECTIVES

1) Describe normal versus anomalous pulmonary venous anatomy. 2) Understand the imaging findings of complications of ablation for atrial fibrillation. 3) Describe abnormalities of the pulmonary veins identifiable on routine CT. 4) Identify the most common pericardial abnormalities evaluated with CT.

MSMC23B Coronary Atherosclerosis III

Participants
Elliot K. Fishman, MD, Baltimore, MD (*Presenter*) Institutional Grant support, Siemens AG; Institutional Grant support, General Electric Company; Co-founder, HipGraphics, Inc

For information about this presentation, contact:

efishman@jhmi.edu

LEARNING OBJECTIVES

1) To provide a more complete understanding of cardiac CTA through a series of illustrative cases. 2) Discuss calcium scoring and its current role in a range of clinical scenarios, coronary artery anomalies, coronary artery fistulae, coronary artery aneurysms, and coronary artery challenging cases.

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MSMI23

Molecular Imaging Symposium: Neurologic MI Applications

Monday, Nov. 26 1:30PM - 3:00PM Room: S405AB

AI MI NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Alexander Drzezga, MD, Cologne, Germany (*Moderator*) Consultant, Siemens AG; Consultant, Bayer AG; Consultant, General Electric Company; Consultant, Eli Lilly and Company; Consultant, The Piramal Group; Speakers Bureau, Siemens AG; Speakers Bureau, Bayer AG; Speakers Bureau, General Electric Company; Speakers Bureau, Eli Lilly and Company; Speakers Bureau, The Piramal Group
Satoshi Minoshima, MD, PhD, Salt Lake City, UT (*Moderator*) Consultant, Hamamatsu Photonics KK; Research Grant, Hitachi, Ltd; Research Grant, Nihon Medi-Physics Co, Ltd;

Sub-Events

MSMI23A Brain MI in Dementia

Participants
Alexander Drzezga, MD, Cologne, Germany (*Presenter*) Consultant, Siemens AG; Consultant, Bayer AG; Consultant, General Electric Company; Consultant, Eli Lilly and Company; Consultant, The Piramal Group; Speakers Bureau, Siemens AG; Speakers Bureau, Bayer AG; Speakers Bureau, General Electric Company; Speakers Bureau, Eli Lilly and Company; Speakers Bureau, The Piramal Group

LEARNING OBJECTIVES

1) Gain overview on types of molecular neuropathology involved in the development of different forms of dementia and understand currently discussed disease concepts. 2) Learn about the currently available methods for imaging molecular pathology such as amyloid-deposition and tau-aggregation in dementia and their current status of validation. 3) Gain insights on the clinical value of the individual available methods and their combination with regard to earlier detection, more reliable diagnosis and therapy monitoring of disease.

MSMI23B Dopaminergic Imaging in Parkinsonian Syndrome

Participants
Kirk A. Frey, MD, PhD, Ann Arbor, MI (*Presenter*) Consultant, MIM Software Inc; Stockholder, General Electric Company; Stockholder, Johnson & Johnson; Stockholder, Novo Nordisk AS; Stockholder, Bristol-Myers Squibb Company; Stockholder, Merck & Co, Inc;

LEARNING OBJECTIVES

1) Understand the molecular targets available for imaging of presynaptic dopaminergic synapses. 2) Appreciate the diagnostic characteristics of dopamine transporter imaging in movement disorder syndromes. 3) Master the appropriate use settings for clinical application of dopamine transporter imaging. 4) Appreciate alternative molecular imaging approaches that may offer value in distinction between movement disorders in the future.

MSMI23C Clinical Trials and Approval Process for New Brain MI

Participants
Peter Herscovitch, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

herscovitch@nih.gov

LEARNING OBJECTIVES

1) Describe the U.S. Food and Drug Administration (FDA) approval process for new radiopharmaceuticals for molecular brain imaging. 2) Describe the U.S. Medicare approval process for new radiopharmaceuticals for molecular brain imaging. 3) Explain the features and current results of the IDEAS Study: Imaging Dementia-Evidence for Amyloid Scanning Study. 4) List the evolving requirements for demonstrating the value of diagnostic imaging, with emphasis on radiopharmaceuticals for molecular brain imaging.

ABSTRACT

The final steps in clinical translation of molecular imaging radiopharmaceuticals for brain studies are approval by the U.S. Food and Drug Administration (FDA) for marketing and by insurance carriers for reimbursement. Given the age of patients most likely to require brain imaging studies for neurodegenerative disorders, coverage approval by the U.S. Centers for Medicare and Medicaid (CMD, 'Medicare') is crucial. This talk will discuss the FDA requirements for approval of a radiopharmaceutical, with a focus on amyloid brain imaging. It should be noted that FDA approval does not necessarily lead to Medicare approval, especially for PET agents. The CMS approval process will be outlined, including the increasing need to demonstrate the ability of PET imaging to provide improved health outcomes. CMS coverage with evidence development (CED) of PET amyloid imaging agents will be described, with a focus on the design, implementation, and current results of

the Imaging Dementia-Evidence for Amyloid Scanning (IDEAS) Study.

MSMI23D Machine Learning in Brain MI

Participants
Satoshi Minoshima, MD, PhD, Salt Lake City, UT (*Presenter*) Consultant, Hamamatsu Photonics KK; Research Grant, Hitachi, Ltd; Research Grant, Nihon Medi-Physics Co, Ltd;

LEARNING OBJECTIVES

1) Gain insights on available methods of molecular imaging in dementia and their significance. 2) Gain insights in principles and value of dopaminergic imaging in Parkinsonian syndromes. 3) Gain understanding in approval processes for new brain molecular imaging tracers and ongoing clinical trials.

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SPPH21

Basic Physics Lecture for the RT: Dual Energy CT Applications in Radiation Therapy

Monday, Nov. 26 1:30PM - 2:45PM Room: S402AB

CT PH RO

AMA PRA Category 1 Credits ™: 1.25
ARRT Category A+ Credits: 1.50

Participants
Scott J. Emerson, MS, Royal Oak, MI (*Moderator*) Nothing to Disclose
Jessica Miller, PhD, Madison, WI (*Presenter*) Research Grant, Siemens AG

For information about this presentation, contact:

scott.emerson@beaumont.org

LEARNING OBJECTIVES

1) Explain basic dual-energy CT principles. 2) Compare current dual-energy CT techniques and associated limitations. 3) Identify dual-energy CT applications in radiation therapy.

ABSTRACT

Nearly all patients treated with radiation therapy receive a computed tomography (CT) simulation scan for treatment planning purposes. Dual-energy CT (DECT) allows for the reconstruction of supplementary information during the CT simulation process, such as relative electron density and effective atomic number information, virtual monoenergetic images, and the differentiation of materials. The additional information gained through DECT has potential to aid in several aspects of the radiation therapy process. This course will outline the basic principles of DECT and compare different vendor solutions for acquisition of DECT images. DECT applications for radiation therapy will be discussed, including improving dose calculation accuracy, improving tumor and healthy tissue delineation, characterizing treatment response, and identifying and sparing functional healthy tissue.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
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November 25–30 | McCormick Place, Chicago

SPPH22

Physics Symposium: Highlights of Medical Physics Leadership Academy (MPLA) Summer School

Monday, Nov. 26 1:30PM - 5:45PM Room: S503AB

LM PH

ARRT Category A+ Credit: 0
AMA PRA Category 1 Credits ™: 4.25

Participants
Jennifer Lynn Johnson, PHD, Houston, TX (*Presenter*) Nothing to Disclose
Daniel Pavord, MS, Poughkeepsie, NY (*Presenter*) Nothing to Disclose
Robert J. Pizzutiello JR, MS, Victor, NY (*Presenter*) Nothing to Disclose
Michael Howard, PHD, Chattanooga, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ms_jl_johnson@yahoo.com

LEARNING OBJECTIVES

Understand the need to manage others' perceptions of medical physics. Develop awareness, knowledge and skills to create and maintain a positive influence on others to achieve desired results. Analyze the integration of leadership, management and medical physics in day-to-day practice.

ABSTRACT

Medical physicists are respected for their technical expertise and contributions of physics principles and applications in biology and medicine. In all work environments, however, medical physicists' technical and functional skills are not enough, especially as they advance in their career. No matter what career level, leadership and interpersonal skills are necessary. The 2016 AAPM Summer School provided a focused and hands-on environment for leadership and management skill development interwoven into the context of medical physics. Session attendees will learn a working definition of leadership and the AAPM Medical Physics Leadership Academy (MPLA) program. Session attendees will also analyze operation and human resources scenarios by way of using personal and interpersonal knowledge and skills.

URL

https://www.aapm.org/meetings/2016SS/default.asp

Active Handout:Jennifer Lynn Johnson

http://abstract.rsna.org/uploads/2018/18002094/2018 RSNA MPLA slides comb updated SPPH22.pdf

SPSP21

Evaluación Post-tratamiento en el Paciente Oncológico: Post Cirugía, Quimioterapia, Radioterapia, Inmunoterapia: Sesión del Colegio Interamericano de Radiología (CIR) en Espanol / Post-treatment Evaluation in the Oncological Patient: Post Surgery, Chemotherapy, Radiotherapy, Immunotherapy: Session of the Interamerican College of Radiology (CIR) in Spanish

Monday, Nov. 26 1:30PM - 3:30PM Room: E451A

CH GU OI

AMA PRA Category 1 Credits ™: 2.00
ARRT Category A+ Credits: 2.25

FDA Discussions may include off-label uses.

Participants
Jose L. Criales, MD, Mexico City, Mexico (*Moderator*) Nothing to Disclose
Jorge A. Soto, MD, Boston, MA (*Moderator*) Royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Identify the morfological and functional modifications post treatment in oncological patients / Identificar los cambios morfologicos y funcionales post tratamiento en el paciente oncológico. 2) Review potential pitfalls in the evaluation of imaging studies performed on patients who received therapy for malignant neoplasms / Revisar causas de posibles errores diagnosticos en la evaluacion de imagenes post tratamiento de neoplasias malignas. 3) Describe the most appropriate imaging tests for identification of possible recurrence of malignant tumors after therapy / Describir los estudios de imagenes mas apropiados para identificar recurrencias de tumores malignos post tratamiento

Sub-Events

SPSP21A Bienvenida / Welcome

Participants
Jose L. Criales, MD, Mexico City, Mexico (*Presenter*) Nothing to Disclose
Jorge A. Soto, MD, Boston, MA (*Presenter*) Royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Identify the morfological and functional modifications post treatment in oncological patients / Identificar los cambios morfologicos y funcionales post tratamiento en el paciente oncológico. 2) Review potential pitfalls in the evaluation of imaging studies performed on patients who received therapy for malignant neoplasms / Revisar causas de posibles errores diagnosticos en la evaluacion de imagenes post tratamiento de neoplasias malignas.3) Describe the most appropriate imaging tests for identification of possible recurrence of malignant tumors after therapy / Describir los estudios de imagenes mas apropiados para identificar recurrencias de tumores malignos post tratamiento

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SPSP21B Cáncer de Pulmón / Lung Cancer

Participants
Fernando R. Gutierrez, MD, Saint Louis, MO (*Presenter*) Spouse, Stockholder, UnitedHealth Group

For information about this presentation, contact:

gutierrezf@wustl.edu

LEARNING OBJECTIVES

1) Be familiar with the overall incidence of lung cancer and survival curves in patients undergoing treatment. 2) Learn how new treatment options are being utilized to improve overall outcomes. 3) Understand the difference between the traditional forms of lung cancer treatment such as surgical resection, chemotherapy (adjuvant), radiation therapy and new therapies such as targeted therapy that disrupt the cancer cell ability to reproduce. 4) Be aware of how follow up imaging findings such as those of PET/CT may be different in the traditional treatment than in new forms of therapy.

SPSP21C Linfoma / Lymphoma

Participants
Sebastian A. Rossini SR, Mar del Plata, Argentina (*Presenter*) Educational Exhibit, Baye AG; Educational Exhibit, Boehringer Ingelheim GmbH;

For information about this presentation, contact:

Sebastianrossini@iradiologico.com.ar

LEARNING OBJECTIVES

1) Show the typical images of lymphoma. 2) Method of choice images for pre and post-treatment assessment. 3) Forms of post-treatment presentation in PET-CT. 4) Importance of the correct post-therapeutic imaging evaluation.

SPSP21D Melanoma / Melanoma

Participants
Guillermo Elizondo-Riojas, MD, PhD, Monterrey, Mexico (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

elizondoguillermo@hotmail.com

LEARNING OBJECTIVES

1) Apply the most appropriate imaging examinations to patients with melanoma. 2) Understand the rationale for using a specific imaging test in the follow-up of melanoma patients. 3) Interpret the imaging findings associated with the different therapies for melanoma patients.

SPSP21E Preguntas / Q & A

SPSP21F Presentación del CIR / CIR Update

Participants
Henrique Carrete Jr, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Present the CIR and its main educational activities.2) Address the activities of the CIR throughout the year 2018.3) Outline future directions of CIR.

URL

http://www.webcir.org/

SPSP21G Tumores Neuroendocrinos / Neuroendocrine Tumors

Participants
Giancarlo Schiappacasse, MD, Las Condes, Chile (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

gschiappacasse@gmail.com

LEARNING OBJECTIVES

1) Be familiar with the epidemiology, incidence and survival of neuroendocrine tumors. 2) Know the most appropriate imaging modalities (CT, MRI and PET/CT) for control and follow up. 3) Understand the different therapies such as surgical procedures, conventional chemotherapy, immunotherapy and targeted therapy.

SPSP21H Cáncer Cervico-uterino / Cervical Cancer

Participants
Javier A. Romero, MD, Bogota, Colombia (*Presenter*) Speakers Bureau, Novartis AG; Speakers Bureau, Bristol-Myers Squibb Company

LEARNING OBJECTIVES

1) Describe basic principles of cervical Cancer treatment. 2) Why using MRI in cervical Cancer. 3) MRI findings in post treatment in cervical cancer. 4) Other imaging methods for evaluating patients in post cervical Cancer Theraphy.

SPSP21I Cáncer de Ovario / Ovarian Cancer

Participants
Alice Cristina C. Brandao Salomao, MD, Rio de Janeiro, Brazil (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Postoperative evaluation ovarian cancer How to follow up How to perform recurrence investigation What is the recurrence pattern, typical and atypical

ABSTRACT

Ovarian cancer is the most aggressive gynecological cancer Its standard post treatment is remission and recurrence due to primary and secundary cytoreductive surgery, chemotherapy and immunotherapy During our presentation we aim to evaluate post-therapeutic follow-up, including screening and suspected relapse, identifying which tests should be performed. In addition, we will evaluate the pattern of recurrence, common and unusual.

SPSP21J Preguntas / Q & A

SPSP21K Clausura / Closing

Participants
Jose L. Criales, MD, Mexico City, Mexico (*Presenter*) Nothing to Disclose

Jorge A. Soto, MD, Boston, MA (*Presenter*) Royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Identify the morfological and functional modifications post treatment in oncological patients / Identificar los cambios morfologicos y funcionales post tratamiento en el paciente oncológico. 2) Review potential pitfalls in the evaluation of imaging studies performed on patients who received therapy for malignant neoplasms / Revisar causas de posibles errores diagnosticos en la evaluacion de imagenes post tratamiento de neoplasias malignas. 3) Describe the most appropriate imaging tests for identification of possible recurrence of malignant tumors after therapy / Describir los estudios de imagenes mas apropiados para identificar recurrencias de tumores malignos post tratamiento.

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VSIO21

Interventional Oncology Series: HCC and Cholangiocarcinoma

Monday, Nov. 26 1:30PM - 6:00PM Room: S406B

GI IR

AMA PRA Category 1 Credits ™: 4.00
ARRT Category A+ Credits: 5.00

FDA Discussions may include off-label uses.

Participants
Nadine Abi-Jaoudeh, MD, Orange, CA (*Moderator*) Research collaboration, Koninklijke Philips NV; Research collaboration, Teclison Cherry Pharma Inc; Research support, SillaJen, Inc
Anne M. Covey, MD, New York, NY (*Moderator*) Stockholder, Amgen Inc; Advisory Board, Accurate Medical

Sub-Events

VSIO21-01 BCLC A Tumors: Treatment with Ablation

Monday, Nov. 26 1:30PM - 1:50PM Room: S406B

Participants
Riccardo Lencioni, MD, Pisa, Italy (*Presenter*) Research Consultant, BTG International Ltd; Research Consultant, Guerbet SA; Research Consultant, Eisai Co, Ltd
Anne M. Covey, MD, New York, NY (*Presenter*) Stockholder, Amgen Inc; Advisory Board, Accurate Medical

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Discuss the role of image-guided ablation in the multidisciplinary management of patients with early-stage HCC. 2) Understand advantages and disadvantages of the various ablation technologies used for local treatment of HCC. 3) Describe the status of clinical research investigating potential synergies between image-guided ablation and novel drugs.

VSIO21-02 Systemic Antitumor Immunity was Augmented by Combining Radiofrequency Ablation with Anti-CTLA-4 Therapy in a Multi Subcutaneous Murine Hepatoma Model

Monday, Nov. 26 1:50PM - 2:00PM Room: S406B

Participants
Liang Zhang, MD, Shanghai, China (*Presenter*) Nothing to Disclose

PURPOSE

To evaluate whether antitumor immunity is enhanced bycombining radiofrequency ablation (RFA) and anti-CTLA-4 therapy, and itssynergism anti-tumor effect on untreated tumors.

METHOD AND MATERIALS

Our experiments were approved by the institutional animalcare committee. 40 mice with tumor established on both side flanks wererandomly divided into 4 groups: Control group (no treatment), RFA group (RFA ofthe right flank tumor), Anti-CTLA-4 group (anti-CTLA-4 monotherapy),Combination therapy group (RFA+Anti-CTLA-4). In each group, 8 mice were usedfor untreated tumor evaluation and survival observation, another 2 mice were sacrificed for histopathological study.Then, rechallenge test was performed to confirm whether the systematic antitumorimmunity was established by RFA+Anti-CTLA-4 therapy.

RESULTS

Although untreated tumor volume continued to increase untilthe end of the observation in all groups, SGRs of RFA+Anti-CTLA-4 group weresignificantly smaller than that in other groups (vs. control: $p = 0.003$; vs. RFA: $p = 0.04$; vs. Anti-CTLA-4: $p= 0.10$). Animals in RFA + Anti-CTLA-4 group survived significantly longer than thatin control group ($p = 0.001$),RFA group ($p = 0.000$) andAnti-CTLA-4 group ($p = 0.008$). The tumor metastasis free survival of RFA +Anti-CTLA-4 group was significantly longer than that in control group ($p = 0.006$), RFA group ($p = 0.001$) and Anti-CTLA-4 group ($p =0.014$). Histopathological studyshowed marked CD4 and CD8 positive lymphocyte around the tumor in mice of RFA +anti-CTLA-4 group. In rechallenge test, tumor free survival time was longer in miceof RFA+anti-CTLA-4 group than that in control group ($p = 0.000$), RFA group ($p =0.017$) and anti-CTLA-4 group ($p = 0.001$) and 75% of animals presented tumorrejection.

CONCLUSION

The present study demonstrates that RFA-induced systemicantitumor immunity was enhanced by combine use of anti-CTLA-4 therapy in a multisubcutaneous murine hepatoma model.

CLINICAL RELEVANCE/APPLICATION

This treatment regimen is apotential clinical approach to enhance systemic antitumor immunity in patientswith unresectable

multicentric HCC or multiple liver metastases.

VSIO21-03 BCLC A/B Tumors: The Role of Surgical Resection and Transplant

Monday, Nov. 26 2:00PM - 2:20PM Room: S406B

Participants
Mary Maluccio, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose

VSIO21-04 BCLC B/C Tumors: Arterially Directed Therapies

Monday, Nov. 26 2:20PM - 2:40PM Room: S406B

Participants
Gregory J. Nadolski II, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

gregory.nadolski@uphs.upenn.edu

LEARNING OBJECTIVES

1) Discuss differences between BCLC and Hong Kong Classification system regarding treatment recommendations. 2) Evaluate data regarding embolization for locally advanced HCC. 3) Compare differences in technique, complications, and outcomes for different embolization procedures for BCLC B/C HCC.

VSIO21-05 Lobar versus Selective Conventional Transarterial Chemoembolization: An Interim Report of a Prospective Pharmacokinetic Study

Monday, Nov. 26 2:40PM - 2:50PM Room: S406B

Participants
Lynn J. Savic, New Haven, CT (*Presenter*) Nothing to Disclose
Julius Chapiro, MD, New Haven, CT (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV; Research Grant, Guerbet SA; Consultant, Guerbet SA; Consultant, Eisai Co, Ltd
Teresa White, New Haven, CT (*Abstract Co-Author*) Research Grant, Guerbet SA;
Eliot Funai, BS, Baltimore, MD (*Abstract Co-Author*) Research Grant, Guerbet SA;
Edvin Isufi, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Sophie Stark, BS, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Evan Chen, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Ping He, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Michelle A. Rudek, PharmD,PhD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
James S. Duncan, PhD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Hyun S. Kim, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Rajasekhara R. Ayyagari, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jeffrey S. Pollak, MD, Woodbridge, CT (*Abstract Co-Author*) Nothing to Disclose
Todd Schlachter, MD, Farmington, CT (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To compare the pharmacokinetic (PK) profiles of doxorubicin (DOX) and its metabolite doxorubicinol (DOXOL) after conventional transarterial chemoembolization (cTACE) using lobar or segmental injection.

METHOD AND MATERIALS

This interim report of an ongoing single-site, prospective trial included 22 patients with hepatocellular (n=19), cholangiocellular carcinoma (n=1), and neuroendocrine tumor metastases (n=2), who were treated with lobar (n=7) or selective (n=15) cTACE defined by catheter placement (5/2016-10/2017). cTACE utilized 50mg DOX/10mg mitomycin-C emulsified with Lipiodol followed by embospheres. Peripheral blood was sampled after cTACE (5, 10, 20, 40 min, 1, 2, 4, 24 hrs, 3-4 weeks) to measure drug concentrations by standard non-compartmental analysis. Follow-up included cross-sectional imaging and adverse events (AE) recorded 3-4 weeks post-TACE. Statistics included Pearson coefficient, Mann-Whitney, and Chi-squared test.

RESULTS

Mean age was 62±9.21 years and 19 patients were males. HCC were BCLC stage A in 4, B in 11, and C in 4 patients. According to 3DqEASL criteria available in 20/22, complete and partial response were achieved in 1 and 6, stable and progressive disease in 8 and 5 patients, respectively. Full DOX dose was given in 17/22. DOX concentration peaks occurred earlier (median Tmax 0.25 [0.13-0.98] vs. 0.59 [0.12-1.72hrs]) and were higher after lobar than selective cTACE (mean dose normalized Cmax 4.74±3.6 vs. 3.08±3.11ng/mL/mg) and in nonresponders compared to responders (p=0.022). The DOX area under the curve was significantly larger in patients with higher enhancing tumor volume (p=0.009) or enhancing tumor burden (p=0.033) on baseline imaging. DOXOL was similar whereas DOX concentrations were higher after lobar than selective cTACE at each timepoint but without statistical significance. Both DOX and DOXOL were undetectable 3-4 weeks post-cTACE. AE were rare but occurred more often after lobar cTACE (fever, p=0.040; abdominal pain, p=0.030).

CONCLUSION

The preliminary results of this prospective trial show a consistent trend suggesting higher systemic chemotherapy exposure and toxicity after lobar compared to selective cTACE.

CLINICAL RELEVANCE/APPLICATION

If confirmed in the complete cohort, these findings may lead to a paradigm shift in intra-arterial therapy in favor of selective cTACE

as a safe and efficient treatment for liver cancer.

VSIO21-06 BCLC C Tumors: Systemic and Combination Therapies

Monday, Nov. 26 2:50PM - 3:10PM Room: S406B

Participants
Nadine Abi-Jaoudeh, MD, Orange, CA (*Presenter*) Research collaboration, Koninklijke Philips NV; Research collaboration, Teclison Cherry Pharma Inc; Research support, SillaJen, Inc

LEARNING OBJECTIVES

1) Identify the commonality and particularities of BCLC advanced and metastatic HCC Recognize the multiple biologic and immunotherapy available for the treatment of BCLC C HCC. 2) Learn about strategies to combine local plus systemic therapy for BCLC B and C HCC.

VSIO21-07 Understanding Real-Time Arterial Flow Change During DEB-TACE of HCC Using Intravascular Doppler Wire

Monday, Nov. 26 3:10PM - 3:20PM Room: S406B

Participants
Ethan Y. Lin, MD, Houston, TX (*Presenter*) Nothing to Disclose
Rheun-Chuan Lee, MD, Taipei, Taiwan (*Abstract Co-Author*) Nothing to Disclose
Bruno C. Odisio, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Sanjay Gupta, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To evaluate the real-time hemodynamic change of tumor arterial feeder (TAF) of HCC during drug-eluting beads transarterial chemoembolization (DEB-TACE) by using an intravascular Doppler wire (IVDW) at subsegmental TAF.

METHOD AND MATERIALS

This single-center prospective study included three patients with HCC submitted to DEB-TACE between June 2016 and November 2016. One vial of 100 - 300 µm DEB (Biocompatibles UK) was loaded with 75 mg doxorubicin and mixed in 40 mL 50% diluted contrast medium. A 2-French microcatheter (Asahi Intecc, Aichi, Japan) and a 0.014 inch IVDW (FloWire, Philips, Netherlands) were advanced to the level of subsegmental TAF. The arterial flow velocity was continuously monitored by IVDW during embolization procedure. The embolization procedure protocols were as follows: slow pulsatile infusion of 1mL per minute LC beads solution without contrast reflux ; embolization endpoint as contrast medium washout in 2-5 heartbeats. Average peak velocity (APV) and highest instant peak velocity (IPV-H) were analyzed.

RESULTS

Although the individual arterial flow varied among different patients and tumors, the IVDW measured arterial flow decreased at an early stage of the embolization procedure in all three patients. The APV decreased more than 50% of peak-trough flow difference when beads were infused in 35.7%, 10%, and 7.5% of the total infused beads amount in patient #1, #2, and #3, respectively. The IPV-H decreased more than 50% of peak-trough flow difference when beads were infused in 42.8%, 12.5%, and 17.5% of the total infused beads amount in patient #1, #2, and #3, respectively. The contrast medium washout rate remained less than 0.5 heartbeat when objective arterial flow significantly decreased more than 50%.

CONCLUSION

TAF flow decreases significantly at an early stage during DEB-TACE delivery. The objective TAF flow measurement was not proportional to the contrast medium washout rate.

CLINICAL RELEVANCE/APPLICATION

TAF flow decreased significantly at early stages of DEB-TACE delivery, potentially reducing beads penetration. A thorough investigation of TAF change could shed light on optimal DEB-TACE delivery protocol.

VSIO21-08 Arterially Directed Therapies to Downstage/Bridge to Liver Transplant

Monday, Nov. 26 3:20PM - 3:40PM Room: S406B

Participants
Riad Salem, MD, MBA, Chicago, IL (*Presenter*) Research Consultant, BTG International Ltd; Research Grant, BTG International Ltd; Consultant, Eisai Co, Ltd; Consultant, Exelixis, Inc; Consultant, Bristol-Myers Squibb Company; Consultant, Dove; ;

LEARNING OBJECTIVES

1) Discuss options for downstaging tumors to resection or transplantation. 2) Discuss mechaism of action of trans atrterial therapies.

VSIO21-09 Intrahepatic Cholangiocarcinoma: Treatment Approaches and Survival Trends for Surgically Ineligible Patients

Monday, Nov. 26 3:40PM - 3:50PM Room: S406B

Participants
Johannes Uhlig, Goettingen, Germany (*Presenter*) Nothing to Disclose
Cortlandt Sellers, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose

Hyun S. Kim, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To evaluate current treatment approaches and survival trends among surgically ineligible patients with surgically intrahepatic cholangiocarcinoma (ICC).

METHOD AND MATERIALS

The 2004-2015 National Cancer Database was retrospectively analyzed for histopathologically proven ICC. Interventional oncology (IO) included local tissue destruction and radioembolization. Baseline variables were evaluated as predictors for treatment allocation. Overall survival was analyzed via multivariable Cox models.

RESULTS

9,655 patients with ICC were included, of which 401 patients received IO (4.1%), 776 patients radiation oncology (RO; 8%), 4,749 patients chemotherapy (49.2%), and 3,729 patients remained untreated. Increased likelihood of treatment via interventional oncology was observed for younger male patients, those with Medicare or private insurance, higher income and education, lower comorbidities and cancer stage, and patients treated at academic centers compared to other treatment approaches ($p<0.05$).Interventional oncology yielded highest overall survival compared to all other treatment approaches (2-year overall survival rate: IO 41.5%; RO 28.2%; chemotherapy 17.6%; no treatment 7.2%). After multivariable adjustment for potential confounders, a statistically significant survival benefit was observed for interventional oncology versus radiation oncology (HR=0.86, $p=0.02$), chemotherapy (HR=0.7, $p<0.001$) and no treatment (HR=0.31, $p<0.001$). A significant interaction term between treatment year and approach was evident ($p<0.01$), indicating that treatment effectiveness of IO, RO and chemotherapy increased from 2004-2015.

CONCLUSION

Treatment allocation for surgically ineligible ICC patients shows marked variation depending on socioeconomic and cancer factors. Interventional oncology demonstrated superior overall survival compared to other non-surgical treatment options. Healthcare access and utilization must be targeted to address outcome discrepancies, potentially providing interventional oncology to a broader patient population.

CLINICAL RELEVANCE/APPLICATION

For surgically ineligible ICC, interventional oncology via local tissue destruction or radioembolization offers superior overall survival compared to radiation oncology, chemotherapy and no treatment.

VSIO21-10 Y90/PVE to Facilitate Curative Resection

Monday, Nov. 26 4:10PM - 4:30PM Room: S406B

Participants
David C. Madoff, MD, New York, NY (*Presenter*) Advisory Board, RenovoRx; Consultant, General Electric Company; Consultant, Terumo Corporation; Consultant, Argon Medical Devices, Inc; Consultant, Abbott Laboratories; Consultant, Embolx, Inc

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LEARNING OBJECTIVES

1) To examine the importance of future liver remnant size determination prior to major hepatic resection for hepatocelluar carcinoma and intrahepatic cholangiocarcinoma. 2) To review the role of portal vein embolization and Y90 radiation lobectomy to hypertrophy the liver for faciltation of curative resection. 3) To assess the currently available literature to determine which procedure should be used and when.

VSIO21-11 Interventional Oncology Treatment of Cholangiocarcinoma

Monday, Nov. 26 4:30PM - 4:50PM Room: S406B

Participants
William S. Rilling, MD, Milwaukee, WI (*Presenter*) Research support, B. Braun Melsungen AG; Research support, Sirtex Medical Ltd; Research support, Siemens AG; Consultant, B. Braun Melsungen AG; Consultant, Cook Group Incorporated ; Consultant, Terumo Corporation; Advisory Board, Terumo Corporation

VSIO21-12 Combining TACE with Adopted Iodized Oil Containing Apatinib Inhibits HCC Growth and Metastasis by Inhibiting Angiogenesis in Anoxic Environment

Monday, Nov. 26 4:50PM - 5:00PM Room: S406B

Participants
Chen Zhou, Wuhan, China (*Presenter*) Nothing to Disclose
Qi Yao, Wu Han, China (*Abstract Co-Author*) Nothing to Disclose
Hongsen Zhang, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Chuansheng Zheng, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Bin Xiong, Wu Han, China (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To investigate the therapeutic effect of the Transcatheter arterial chemoembolization (TACE) with adopted iodized oil containing Apatinib in rabbit VX2 hepatocellular carcinoma (HCC) model. The effect and mechanism of Apatinib inhibits tube formation of human umbilical vein endothelial cells (HUVECs) will be explored as well in anoxic environment.

METHOD AND MATERIALS

In this Animal Experiment Committee approved study, 40 New Zealand rabbit VX2 liver tumors were randomly divided into four groups and respectively treated transarterially with saline (Group NS); iodized oil containing Apatinib (Group AI); iodized oil alone (Group I); Apatinib solution (Group A). The tumor growth rates of each group were measured by enhanced CT, Microvessel density (MVD) in the adjacent tissues of implanted VX2 tumor were estimated by detecting the expression of CD34, HIF-1a and VEGF level in tumor adjacent tissues were also examined by Immunohistochemistry. And in vitro experiment, HUVECs were cultured with different concentration gradients Apatinib(0, 1, 10, 50μmol/L, 24h) in the culture medium of HepG2 with normal oxygen or hypoxia, which is manufacturing by 200μM CoCl2. CCK8 method was used to detect the effects of apatinib on HUVECs. And the PI3K-akt, RAF-mek-erk and P38MAPK pathways were detected by western blot method. The Kruskal-Wallis test, Mann-Whitney U test, and Fisher exact test were used to look for statistically significant differences between groups.

RESULTS

The TACE procedure were successfully performed in all experimental rabbits. The observation period of 7 days after embolization, the tumor growth rate of Group AI was significantly lower than other three groups of rabbits ($P=0.000<0.01$). Immunohistochemistry results showed that the microvessel density(MVD) of apatinib loaded lipiodol embolization group (Group AI) was significantly lower than that of the other three groups of rabbits ($P<0.01$). Apatinib have a stronger inhibitory effect of tube formation of HUVECs in anoxic environment rather than in normal circumstances. Apatinib inhibits HUVECs proliferation by down-regulating the PI3K-akt, RAF-mek-erk and P38MAPK pathways.

CONCLUSION

Apatinib inhibits the growth of liver cancer by down-regulating the PI3K-akt, RAF-mek-erk and P38MAPK pathways, and has a stronger inhibitory effect in hypoxic environments

CLINICAL RELEVANCE/APPLICATION

Our findings may provide new treatment options and stragies for the treatment of liver cancer.

VSIO21-13 Assessing Response to Locoregional Therapies

Monday, Nov. 26 5:00PM - 5:20PM Room: S406B

Participants
Julius Chapiro, MD, New Haven, CT (*Presenter*) Research Grant, Koninklijke Philips NV; Research Grant, Guerbet SA; Consultant, Guerbet SA; Consultant, Eisai Co, Ltd

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LEARNING OBJECTIVES

1) To recapitulate and refresh knowledge of conventional tumor response criteria. 2) To learn about the most commonly used imaging-based clinical endpoints of tumor therapies (eg time-to-progression, progression-free-survival). 3) To understand the value of 3D quantitative and computer-assisted tumor analysis techniques. 4) To learn about novel machine-learning based approaches and molecular imaging techniques and decision support systems.

ABSTRACT

This lecture will provide an overview of image analysis techniques and imaging-based endpoints for the assessment of tumor response to loco-regional therapies of liver cancer. The talk will provide an overview of the currently available response criteria (including RECIST, mRECIST, EASL, qEASL) as well as outline the challenges of assessing tumor response in light of novel pharmacotherapeutic agents available in liver cancer, including immuno-modulatory agents as well as novel molecular-targeted agents that are increasingly used in combination or sequentially with loco-regional therapies. Additionally, the talk will touch on novel molecular-imaging based techniques as well as the role of aritifical intelligence and machine learning for the assessment of the tumor microenvironment and tumor response.

VSIO21-14 Panel Discussion: Current Concepts in the Management of Intermediate-advanced HCC

Monday, Nov. 26 5:20PM - 5:35PM Room: S406B

VSIO21-15 Tumor Board

Monday, Nov. 26 5:35PM - 6:00PM Room: S406B

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RCA24

Creating Patient-Specific Anatomical Models for 3D Printing and AR/VR (Hands-on)

Monday, Nov. 26 2:30PM - 4:00PM Room: S401AB

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Nicole Wake, PhD, New York, NY (*Presenter*) In-kind support, Stratasys, Ltd
Amy E. Alexander, MSc, Rochester, MN (*Presenter*) Nothing to Disclose
Andy Christensen, BS, Littleton, CO (*Presenter*) Consultant, Integrum AB; Board Member, Integrum AB; Stockholder, Somaden LLC
Peter C. Liacouras, PhD, Bethesda, MD (*Presenter*) Nothing to Disclose
Jane S. Matsumoto, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Todd Pietila, MBA, Plymouth, MI (*Presenter*) Employee, Materialise NV

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LEARNING OBJECTIVES

1) Classify various image post-processing and 3D modeling software programs for enabling 3D printing or AR/VR applications. 2) Explain the workflow to create patient-specific 3D anatomical models from medical images. 3) Identify and apply image segmentation techniques used to create 3D anatomical models, including thresholding, region growing, and manual editing. 4) Describe and apply image post-processing techniques and 3D design principles required to save models in appropriate file formats (i.e. STL or OBJ). 5) Interface with 3D printing software or AR/VR devices.

ABSTRACT

Advanced image data visualization in the form of 3D printing and AR/VR continues to expand in clinical settings. In order to generate patient-specific models for 3D printing or AR/VR, image data must first be segmented and converted to virtual 3D models which represent the intended anatomy of interest. The RSNA 3D Printing Special Interest Group has adopted a position statement reflecting the FDA recommendation that FDA-cleared software is used when 3D models are created for clinical applications. This course covers the use of industry-standard FDA-cleared software (Mimics InPrint, Materialise, NV) for the design and fabrication of patient-specific 3D models. Cranio-maxillofacial and renal case examples will be shown. Once the virtual 3D models have been created, users will learn how to prepare these files for 3D printing and AR/VR. In order to aid with the hands-on course, an extensive training manual will be provided before the meeting. It is highly recommended that participants review the training manual to optimize the experience at the workstation.

Active Handout:Nicole Wake

http://abstract.rsna.org/uploads/2018/18020316/Hands-On-Handouts RCA24.pdf

RCC24

Clinical Decision Support: From Theory to Clinical Practice

Monday, Nov. 26 2:30PM - 4:00PM Room: S501ABC

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Emanuele Neri, MD, Pisa, Italy (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To explore the strategy of implementation of CDS in US and Europe. 2) To report the clinical implementation and impact of CDS in a real setting. 3) To preview the future implementation of artificial intelligence in CDS.

Sub-Events

RCC24A How Can Radiologists Implement Decision Support Systems in Clinical Routine: ACR View

Participants
Bibb Allen JR, MD, Birmingham, AL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Apply lessons learned from the Medicare Demonstration project to implement effective Cllinical Decision Support (CDS) programs. 2) Formuate strategies for compliance with current regulations requiring CDS.

RCC24B How Can Radiologists Implement Decision Support Systems in Clinical Routine: ESR View

Participants
Boris Brkljacic, MD, PhD, Zagreb, Croatia (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To learn about the use of imaging referral guidelines in Europe. 2) To understand the challenges of implementing a CDS for heterogeneous European countries. 3) To describe the varying experiences of implementing CDS and imaging referral guidelines in different countries.

RCC24C Results and Lessons from Brigham and Women's Hospital

Participants
Ramin Khorasani, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Briefly review existing federal regulations pertinent to imaging clinical decision support. 2) Discuss design, implementation and results of large scale imaging CDS intervention at Brigham and Women's Hospital. 3) Contrast results and discuss implications from CDS interventions that have and have not impacted ordering physician behavior. 4) Recommend strategies to optimize imaging CDS implementation to improve quality and enable and promote evidence-based practice.

RCC24D Application of Machine Learning in Clinical Decision Support Systems

Participants
Tarik K. Alkasab, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

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MSRO24

BOOST: Head and Neck-Case-based Multidisciplinary Review (Interactive Session)

Monday, Nov. 26 3:00PM - 4:15PM Room: E450A

HN NR OI RO

AMA PRA Category 1 Credits ™: 1.25
ARRT Category A+ Credits: 1.50

Participants
Suresh K. Mukherji, MD, Northville, MI (*Presenter*) Nothing to Disclose
Sung Kim, MD, New Brunswick, NJ (*Presenter*) Nothing to Disclose
Francis P. Worden, MD, Ann Arbor, MI (*Presenter*) Grant, Bayer AG; Grant, Eisai Co, Ltd; Grant, AstraZeneca PLC; Grant, IRX Therapeutics; Grant, Galera Therapeutics; Grant, Bristol-Myers Squibb Company; Grant, Merck & Co, Inc; Consultant, Merck & Co, Inc
Chad Zender, MD, Cleveland, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the imaging findings of various head and neck neoplasms in the post treatment setting. 2) Discuss the benefits of various imaging modalities and the scenarios they are most useful in the post treatment setting. 3) Identify imaging findings that change treatment and management.

ABSTRACT

This formal is a multidisciplinary tumor board which will dsicuss a varity of head and neck tumors. The participants will be a Head & Neck surgeon, Radiation Oncologist, Medical Oncologist and Head & Neck Radiologist. The emphasis will be on developing a better understanding of how various imaging modalities can be used in the post treatment setting to differentiate benign post treatment radiographic changes from those that are more concerning for recurrence.

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MSRO28

BOOST: Breast-Case-based Multidisciplinary Review (Interactive Session)

Monday, Nov. 26 3:00PM - 4:15PM Room: S103CD

BR OI RO

AMA PRA Category 1 Credits ™: 1.25
ARRT Category A+ Credits: 1.50

Participants
Nora M. Hansen, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Bethany L. Niell, MD,PhD, Tampa, FL (*Presenter*) Nothing to Disclose
Jean L. Wright, MD, Baltimore, MD (*Presenter*) Nothing to Disclose
Cesar A. Santa-Maria, MD, Baltimore, MD (*Presenter*) Research funded, AstraZeneca PLC; Research funded, Pfizer Inc; Advisory Board, Polyphor

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LEARNING OBJECTIVES

1) Describe the latest advances in breast cancer imaging before, during, and after treatment. 2) Facilitate a multidisciplinary approach to the diagnosis, management, and treatment of breast cancer.

MSAS24

Commitment to Safety: Providing Effective & Efficient Imaging Services (Sponsored by the Associated Sciences Consortium) (Interactive Session)

Monday, Nov. 26 3:30PM - 5:00PM Room: S105AB

SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Craig St George, ARRT,RT, Albuquerque, NM (*Moderator*) Nothing to Disclose
Jody Erickson, RT, BS, Jacksonville, FL (*Presenter*) Nothing to Disclose
Andre Brown, ARRT,MA, Jacksonville, FL (*Presenter*) Nothing to Disclose
Andrew Bowman, MD, PhD, Jacksonville, FL (*Presenter*) Nothing to Disclose
Adam Rubin, ARRT, RT, Jacksonville, FL (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Understand the concept behind the Commitment to Safety process and how it was developed. 2) Identify how Commitment to Safety could be used to improve the work environment. 3) Define goals that could be accomplished through the Commitment to Safety process. 4) Understand how to begin Commitment to Safety initiative. 5) Know how to use results of a Commitment to Safety project to improve a work unit.

MSCA22

Case-based Review of the Abdomen (Interactive Session)

Monday, Nov. 26 3:30PM - 5:00PM Room: S100AB

GI GU

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Julie H. Song, MD, Providence, RI (*Director*) Nothing to Disclose

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Sub-Events

MSCA22A Gastrointestinal Tract

Participants
Jay P. Heiken, MD, Rochester, MN (*Presenter*) Patent agreement, Guerbet SA; Patent agreement, Bayer AG

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LEARNING OBJECTIVES

1) Identify the imaging features of select benign and malignant diseases of the gastrointestinal tract. 2) Discuss the role of CT, MR and fluoroscopy in evaluating diseases of the gastrointestinal tract.

MSCA22B Hepatobiliary Tract

Participants
Karen S. Lee, MD, Boston, MA (*Presenter*) Nothing to Disclose

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kslee@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Identify key typical imaging findings of select hepatic lesions. 2) Develop a differential diagnosis of benign and malignant hepatic lesions based on specific MRI features. 3) Examine the imaging features of diffuse biliary disease processes.

MSCA22C Genitourinary Imaging

Participants
Julie H. Song, MD, Providence, RI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jsong2@lifespan.org

LEARNING OBJECTIVES

1) Improve knowledge base to recognize, analyze, and diagnose select pathology of genitourinary tract. 2) Learn to avoid pitfalls and misdiagnoses of genitourinary tract pathology.

MSCA22D Abdominal Complications of Oncologic Therapy

Participants
Kumaresan Sandrasegaran, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ksandras@iupui.edu

LEARNING OBJECTIVES

1) To understand how the newer targeted biological agents (mabs and nibs) work on cancer cells at membrane receptors, in cytoplasmic signaling pathways or in the nucleus. 2) To learn the side effects of antiangiogenic drugs which may mimic tumor progression. 3) To learn the types of immune therapies, including immune checkpoint drugs, and the pitfalls in interpretation of post treatment imaging studies.

ABSTRACT

In the last 20 years over hundred targeted biological agents have been discovered. These are monoclonal antibodies (mabs) or

In the last 20 years over hundred targeted biological agents have been discovered. These are monoclonal antibodies (mabs) or small molecule inhibiters (nibs) that inhibit tyrosine kinase activity. These drug works at the cell membrane, in the cytoplasmic signaling pathways, such as RAS-RAF pathway, or in DNA replication or transcription in the nucleus. They are different to conventional chemotherapy drugs in that they typically do not cause necrosis. The range of side effects seen on post treatment scans is also different and may mimic tumor progression or post-surgical complications. Another set of drugs act on the immune system, predominantly T lymphocytes, to activate immune cells to destroy cancer cells. These include immune checkpoint drugs, immune vaccines, and oncolytic viruses. They have a unique set of side effects which may be confusing to the unwary radiologist. These drugs usually cause initial increase in tumor size due to the immune response and newer systems of response assessment, such as immune RECIST, need to be used.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Kumaresan Sandrasegaran, MD - 2013 Honored EducatorKumaresan Sandrasegaran, MD - 2014 Honored EducatorKumaresan Sandrasegaran, MD - 2016 Honored EducatorKumaresan Sandrasegaran, MD - 2018 Honored Educator

MSMC24

Cardiac CT Mentored Case Review: Part IV (In Conjunction with the North American Society for Cardiovascular Imaging) (Interactive Session)

Monday, Nov. 26 3:30PM - 5:30PM Room: S406A

CA CT

AMA PRA Category 1 Credits ™: 2.00
ARRT Category A+ Credits: 2.25

Participants
Jill E. Jacobs, MD, New York, NY (*Director*) Nothing to Disclose
Stefan L. Zimmerman, MD, Ellicott City, MD (*Moderator*) Project consultant, Siemens Healthcare; Research grant, American Heart Association;

LEARNING OBJECTIVES

1) Understand the clinical indications for retrospective ECG gated cardiac CT. 2) Illustrate methods to assess myocardial function from cine cardiac CT images. 3) Illustrate methods to assess normal and abnormal valvular function from cine cardiac CT images.

Sub-Events

MSMC24A Coronary Atherosclerosis and Bypass Grafts

Participants
Gregory Kicska, MD, PhD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognizing anatomic subsets coronary artery bypass. 2) Technical considerations when imaging a bypass graft.3) Stenosis and aneurysms in vein grafts.4) Patterns of stenosis in internal mammary grafts.5) Evaluating a bypass patient before reoperation.

ABSTRACT

Cardiac CT is often used to evaluate coronary bypass graft function. To accurately interpret these images, the Imager needs to be familiar with the patterns of stenosis, aneurysms or other complications associated with different bypass types. In addition to assessing function and need for intervention, CT can identify patients with unique risks associated with reoperation.

MSMC24B Congenital Heart Disease

Participants
Carlo N. De Cecco, MD, PhD, Atlanta, GA (*Presenter*) Research Grant, Siemens AG

For information about this presentation, contact:

carlo.dececco@emory.edu

LEARNING OBJECTIVES

1) Recognize the most common congenital heart disease (CHD) findings found in adults with unsuspected CHD. 2) Recognize and understand findings of CHD in patients with known CHD and the findings which may trigger surgical intervention. 3) Recognize the CT findings of commonly performed surgical procedures for palliation of CHD. 4) Develop an organized pattern for search and reporting of CHD findings. 5) Understand why CT is chosen as the advanced imaging modality over MR.

ABSTRACT

Adults with congenital heart disease (CHD) now outnumber children with CHD two to one. Thisphenomenon is due to the success of surgical palliation and medical management of patients with even themost severe forms of CHD. Surgical intervention is often performed at the time of diagnosis and in patientswith residual hemodynamic lesions is often required throughout life.Though echocardiography is typically the initial imaging modality of choice, diagnosis and imagingsurveillance of complex hemodynamic and anatomic CHD lesions is now most often accomplished with CTand MR. CT and CTA imaging techniques may be used to show detailed anatomic and functional images ofthe heart, postoperative changes and long term consequences of CHD.An organized, reproducible approach to identify cardiac anatomy of CHD lesions and surgical palliationshould be adopted in order to accurately and thoroughly describe findings.

MSMC24C Coronary Artery Disease and Incidental Non-cardiac Findings

Participants
Diana Litmanovich, MD, Haifa, Israel (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognizing non-cardiac and non-coronary anatomic structures that can be seen on cardiac CT. 2) Become familiar with possible non-cardiac and non-coronary pathological findings that could be seen on cardiac CT. 3) Review the suggested work-up for patients with incidentally found non-cardiac and non-coronary pathologies on cardiac CTA.

ABSTRACT

ABSTRACT Cardiac CT often includes information about surrounding structures such as lungs, meidastinum, airways, pleura, liver and bones. To accurately interpret the scan and not to overlook the possible non-cardiac pathologies, familiarity with potential incidental findings is required. Clinical importance and severity of incidental findings varies, thus currently existing algorithms for incidental findings on cardiac CT are helpful for further work-up.

MSMI24

Molecular Imaging Symposium: MI Case-based Discussion

Monday, Nov. 26 3:30PM - 5:00PM Room: S405AB

MI NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Munir Ghesani, MD, New York, NY (*Moderator*) Nothing to Disclose
Hubert J. Vesselle, MD, PhD, Seattle, WA (*Moderator*) Consultant, MIM Software Inc

ABSTRACT

Molecular imaging is increasingly being utilized in the initial staging as well as in the follow up of various disease conditions. In addition, several new imaging tracers are either recently approved by FDA. As a result, this modality, while clinically useful, is becoming increasingly complex.

Sub-Events

MSMI24A Assessing Tumor Therapeutic Response with FDG PET and CT: Practical Aspects

Participants
Hubert J. Vesselle, MD, PhD, Seattle, WA (*Presenter*) Consultant, MIM Software Inc

LEARNING OBJECTIVES

1) Use the case-based approach to illustrate utility of molecular imaging in clinical applications and demonstrate how to avoid false positive interpretations.

MSMI24B What You See May Not Be What You Think

Participants
Munir Ghesani, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize that molecular imaging in general is a very sensitive modality but its specificity is relatively lower. 2) Recognize that the specificity can be improved by various measures, such as obtaining detailed patient information, multimodality correlation with recently performed imaging studies and careful comparison with prior imaging studies. 3) Recognize that improved specificity will improve overall patient care by avoiding unnecessary procedures and treatments resulting from false positive interpretations. It will also help in building referring physicians' confidence in the molecular imaging modality.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

MSRO29

BOOST: Head and Neck-eContouring

Monday, Nov. 26 4:30PM - 5:30PM Room: S104B

HN NR OI RO

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Suresh K. Mukherji, MD, Northville, MI (*Presenter*) Nothing to Disclose
Sung Kim, MD, New Brunswick, NJ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Demonstrate how Radiation Oncologists contour head & necks prior to delivering radiation therapy. 2) Review the concepts of GTV, CTV & PTV. 3) Allow participants to contour the tumors and compare this with our experts.

ABSTRACT

This e-contouring session is an interactive session that allows the attendees to contour head and neck tumors and compare their results with the expert. We will also review the important of imaging for idenfying tumor mapping and tumor spread.

RCA25

Image to 3D Prints: How 3D Printing Works (Hands-on)

Monday, Nov. 26 4:30PM - 6:00PM Room: S401AB

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Beth A. Ripley, MD, PhD, Seattle, WA (*Presenter*) Nothing to Disclose
Tatiana Kelil, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Dmitry Levin, Seattle, WA (*Presenter*) Nothing to Disclose
Anish Ghodadra, MD, New Haven, CT (*Presenter*) Advisory Board, axial3D Limited

For information about this presentation, contact:

beth.ripley2@va.gov

LEARNING OBJECTIVES

1) Describe optimal CT and MRI protocols for 3D printing. 2) Explain basic software requirements for converting DICOM images to 3D-printable .STL (standard tessellation language) files. 3) Recognize some common 3D printing artifacts. 4) Apply basic 3D printed model post-processing techniques learned during the session, including UV curing and support material removal.

Honored Educators

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RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RCB25

Intro to Statistics with R (Hands-on)

Monday, Nov. 26 4:30PM - 6:00PM Room: S401CD

IN RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

James E. Schmitt, MD, PhD, Philadelphia, PA (*Moderator*) Nothing to Disclose
James E. Schmitt, MD, PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Nathan M. Cross, MD, MS, Seattle, WA (*Presenter*) Nothing to Disclose
David Gutman, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Install and launch the R software package. Understand how to search for and download external packages to extend R's functionality. 2) Load data from external files such as txt, csv, and xlsx. 3) Perform basic mathematical operations and utilize data structures to manipulate data. 4) Use loops to perform more complex operations over the data, including true/false logic. 5) Understand the basics of creating plots and histograms. 6) Perform common statistical tests including correlation, Chi-square, and ANOVA.

RCC25

Medical 3D Printing Operations and Applications I

Monday, Nov. 26 4:30PM - 6:00PM Room: S501ABC

IN MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Adnan M. Sheikh, MD, Ottawa, ON (*Moderator*) Nothing to Disclose
Frank J. Rybicki III, MD, PhD, Ottawa, ON (*Moderator*) Medical Director, Imagia Cybernetics Inc

For information about this presentation, contact:

frybicki@toh.ca

LEARNING OBJECTIVES

Dr. Rybicki will moderate this session and synethize input from the speakers regarding the operations and applications of medical 3D printing and anatomic modeling.

ABSTRACT

Not applicable (moderator).

Sub-Events

RCC25A Establishing a Radiology-based 3D Medical Printing Practice

Participants
William J. Weadock, MD, Ann Arbor, MI (*Presenter*) Owner, Weadock Software, LLC

LEARNING OBJECTIVES

1) Describe the process of creating a 3D printed model using DICOM images. 2) List the common musculoskeletal applications of 3D printing.

RCC25B Key Technologies for Medical 3D Printing: Applications and Experiences

Participants
Sang Joon Park, PhD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose

RCC25C 3D Printing for Renal Sparing Surgery 3D

Participants
Bernard F. King JR, MD, Rochester, MN (*Presenter*) Nothing to Disclose

RCC25D Medical 3D Printing for MSK Applications

Participants
Adnan M. Sheikh, MD, Ottawa, ON (*Presenter*) Nothing to Disclose

RCC25E FDA Current Practices and Regulations: 3D Printed Patient-Specific Anatomic Models

Participants
Nooshin Kiarashi, PhD, Silver Spring, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

- Overview of FDA Guidance Document: Technical Considerations for Additive Manufactured Medical Devices - Design - Manufacturing - Testing - 3D Printed Patient-specific Anatomic Models - What is considered diagnostic use of these models? - What is regulated? The models, the 3D printers, or the software? - What information is required for FDA clearance? - Who should apply for FDA clearance?

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
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SPDL21

Chest and Abdomen (Case-based Competition)

Monday, Nov. 26 4:30PM - 6:00PM Room: E451B

CH GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Bayer AG; Advisory Board, Bayer AG; Advisory Board, Aidoc Ltd; Advisory Board, EnvoyAI; Advisory Board, Inference Analytics
Neety Panu, MD, FRCPC, Ottawa, ON (*Presenter*) Nothing to Disclose
Ashley Altman, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be introduced to a series of radiology case studies via an interactive team game approach designed to encourage 'active' consumption of educational content. 2) Use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) Receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

ABSTRACT

The extremely popular audience participation educational experience, Diagnosis Live!, is an expert-moderated session featuring a series of interactive case studies that will challenge radiologists' diagnostic skills and knowledge. The session features a lively, fast-paced game format: participants will be automatically assigned to teams who will then use their personal mobile devices to test their knowledge in a fast-paced session that will be both educational and entertaining. After the session, attendees will receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance.

SPSI21

Special Interest Session: Quantitative Imaging Applications in Screening, Treatment Selection, and Treatment Assessment - The Need for Standardization in the Era of Personalized Medicine

Monday, Nov. 26 4:30PM - 6:00PM Room: S504AB

BQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Edward F. Jackson, PhD, Madison, WI (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Appreciate the opportunities and advantages of quantitative imaging biomarkers in clincal research and clinical practice, particularly in the era of precision medicine.

ABSTRACT

Quantitative imaging should undoubtedly be an enabler of the practice of precision medicine. Applications include patient screening, optimal treatment selection, and treatment assessment (both short term for potential adaptive therapy and long term for surveillance). To fully achieve the goal of enabling precision medicine, however, quantitative imaging measurands must be standardized at each step in the imaging and data analysis chain. This is the primary goal of the RSNA Quantitative Imaging Biomarkers Alliance (QIBA®), which has as its mission to 'improve the value and practicality of quantitative imaging biomarkers by reducing variability across devices, sites, patients, and time'. This session will highlight initiatives of QIBA and other quantitative imaging efforts, such as the NCI Quantitative Imaging Network (QIN), that seek to translate quantitative imaging measures from academic centers of excellence to clinical trial applications to patient care in the era of precision medicine.

Sub-Events

SPSI21A Quantitative Imaging Applications in Lung Cancer Screening

Participants
James L. Mulshine, MD, Chicago, IL (*Presenter*) Nothing to Disclose

SPSI21B Quantitative Imaging Applications for Therapy Selection

Participants
David A. Mankoff, MD, PhD, Philadelphia, PA (*Presenter*) Speaker, Koninklijke Philips NV; Consultant, General Electric Company; Advisory Board, RefleXion Medical Inc; Consultant, Blue Earth Diagnostics Ltd; Research Funded, Siemens AG; Advisory Board, ImaginAb, Inc; Spouse, Owner, Trevarx

For information about this presentation, contact:

david.mankoff@uphs.upenn.edu

LEARNING OBJECTIVES

1) List clinical and biologic questions molecular imaging can address relelvant to drug treatment selection. 2) List current applications of molecular imaging to therapy guidance. 3) Describe future applications and ongoing trials applying molecular imaging as a quantitative biomarker to guide targeted treatments.

ABSTRACT

This talk will review quantitatvie molecular imaging as a cancer imaigng biomarker to guide therpaeutic decision making and evaluate the efficacy of treatment, focusing largeyl on current and emerging PET methods.

Honored Educators

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SPSI21C Quantitative Imaging Applications for Treatment Assessment and Adaptive Therapy

Participants
Clifton D. Fuller, MD,PhD, Houston, TX (*Presenter*) Research Consultant, Elekta AB; Research Grant, Elekta AB; Speaker, Elekta AB

SPSI21D Quantitative Imaging Applications - The Importance of Study Design

Participants

Nancy A. Obuchowski, PhD, Cleveland, OH (*Presenter*) Research Consultant, Siemens AG; Research Consultant, QT Ultrasound Labs; Research Consultant, Elucid Bioimaging Inc; Research Consultant, FUJIFILM Holdings Corporation

LEARNING OBJECTIVES

1) Understand the effects of ignoring quantitative imaging biomarker (QIB) measurement error on clinical trials. 2) Recognize how the known technical performance of a QIB can be used to improve clinical trial study design.

ABSTRACT

Quantitative imaging biomarkers (QIBs) have increasingly become part of clinical trials both to qualify the QIB (e.g. as integrated biomarkers to assess association with patient outcome) and utilize the QIB (e.g. as integral biomarkers to determine study eligibility and monitor therapy effects). The measurement error associated with QIBs is often overlooked in trial design planning, yet it affects study power and how the QIB measurements should be interpreted. We examine the impact of typical QIB measurement error on a variety of study designs and provide recommendations for how to use the known technical performance of a QIB for improving study planning.

URL

Bio: https://my.clevelandclinic.org/staff/25-nancy-obuchowski#research-publications

SPSI22

Special Interest Session: Imaging Cognition 2018: Addiction

Monday, Nov. 26 4:30PM - 6:00PM Room: E353C

MR NR NM OT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
David B. Hackney, MD, Boston, MA (*Moderator*) Nothing to Disclose
Jody L. Tanabe, MD, Aurora, CO (*Moderator*) Nothing to Disclose

Sub-Events

SPSI22A Addiction in America 2018

Participants
Diana M. Martinez, MD, New York, NY (*Presenter*) Nothing to Disclose

SPSI22B PET as a Tool in Investigating Addiction

Participants
Diana M. Martinez, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dm437@cumc.columbia.edu

LEARNING OBJECTIVES

1) Learn the basis of PET neurochemical imaging. 2) Learn the association between dopamine signaling and drug seeking behavior. 3) Understand the correlation between striatal dopamine signaling and treatment response. 4) Understand the status of dopamine imaging across different types of addictions. 5) Understand the theory behind addiction as a habitual behavior and its imaging correlates.

ABSTRACT

The involvement of dopamine in addiction has its origins in studies investigating reward and reinforced behavior. Much of this research has been explored in the human brain using Positron Emission Tomography (PET) imaging of striatal dopamine transmission. These studies show that addiction is associated with a decrease in dopamine D2/3 receptors and a decrease in pre-synaptic dopamine release, and that this decrease occurs across different types of addiction, including cocaine, alcohol, and heroin dependence. However, these imaging studies also show that, in cocaine abuse, blunted dopamine transmission is predictive of cocaine seeking behavior. Low D2/3 receptor binding and low dopamine release are associated with the choice to self-administer cocaine over alternative reinforcers, which can be viewed as a failure to shift between competing rewards. It is striking that addiction to different substances of abuse are accompanied by the same alteration in neurobiology, independent of their primary impact on the dopaminergic system. Moreover, similar alterations of the dopaminergic transmission and D2-like receptor system have been described in psychiatric diseases other than addiction. Although these psychiatric disorders differ in their phenomenology, they share a common deficit in reward-related behavior, particularly with respect to impulsivity and motivation. This presentation will describe the animal and human studies that link alterations in dopamine transmission and the D2 receptors with impulsive and motivated behavior. The hypothesis that these alterations in dopamine transmission represent the neurobiological underpinnings that facilitate impulsivity and undermine motivation, rather than the only the consequences of addiction itself, will be discussed.

SPSI22C fMRI in Addiction

Participants
Jody L. Tanabe, MD, Aurora, CO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the neural circuit associated with cravings in addictions. 2) Name 3 interventions shown to modulate craving and the "craving circuit.' 3) Identify 3 metrics that would be needed to implement an fMRI craving marker into addiction management.

SPSI22D MRS in Craving with a Focus on Alcoholism

Participants
John D. Port, MD, PhD, Rochester, MN (*Presenter*) Research Consultant, Biomedical Systems; Research Consultant, Neuronetics

LEARNING OBJECTIVES

1) Describe the theoretical reward circuitry of the human brain. 2) Explain how the reward circuitry homeostasis is altered in the setting of addiction/alcoholism. 3) Discuss current MR spectroscopy findings in alcoholism/craving.

ABSTRACT

The human brain has a complex reward system that impacts much of human behavior. Over the last 60 years, numerous brain

The human brain has a complex reward system that impacts much of human behavior. Over the last 60 years, numerous brain regions have been identified in humans and other animals that together explain the different aspects of behavior and reward. The cortico-basal ganglia-thalamo-cortical loop is perhaps the best known model of the human reward system, but many other areas participate in reward. Addiction is the process whereby a drug (alcohol, cocaine, etc) alters the homeostasis of the reward system in a predictable way, thus creating addictive behaviors that are difficult to manage and reverse. This talk will first introduce the current best model of the human reward system, with examples of its normal operation. Next, I will discuss the process of addition, focusing on how reward system homeostasis is disrupted in addiction, using alcoholism as an example. Finally, I will review the MR spectroscopic studies of alcoholism from the perspective of this altered reward system homeostasis, exploring the metabolic abnormalities in craving.

SPSI22E Panel Discussion

Participants
David B. Hackney, MD, Boston, MA (*Moderator*) Nothing to Disclose
Jody L. Tanabe, MD, Aurora, CO (*Moderator*) Nothing to Disclose

SPSI23

Special Interest Session: High-value MRI: Updates from the February 2018 ISMRM-RSNA Co-provided Workshop

Monday, Nov. 26 4:30PM - 6:00PM Room: E450B

GU HP MR NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants

Clare M. Tempany-Afdhal, MD, Boston, MA (*Moderator*) Research Grant, InSightec Ltd; Research Grant, Gilead Sciences, Inc; Advisory Board, Profound Medical Inc; Spouse, Employee, Spring Bank Pharmaceuticals, Inc; Spouse, Director, Trio Healthcare; Spouse, Consultant, Gilead Sciences, Inc; Spouse, Consultant, Merck & Co, Inc; Spouse, Consultant, Echosens SA; Spouse, Consultant, Shinogi; Spouse, Consultant, Ligand Pharmaceuticals, Inc; Spouse, Stock options, Spring Bank Pharmaceuticals, Inc; Spouse, Stock options, Allurion; Spouse, Stock options, Trio Healthcare; ;

For information about this presentation, contact:

ctempany@bwh.harvard.edu

LEARNING OBJECTIVES

To inform on a path to value with clinical MRI and MR guided interventions in Prostate cancer

Sub-Events

SPSI23A High-value MRI: Paths Forward from the ISMRM-RSNA Workshop

Participants
James G. Pipe, PhD, Rochester, MN (*Presenter*) Research Grant, Koninklijke Philips NV

For information about this presentation, contact:

pipe.james@mayo.edu

LEARNING OBJECTIVES

1) To learn how to increase the value in their own practice or research. 2) To understand the breadth of activity in value-oriented development in imaging.

ABSTRACT

In February 2018, RSNA and ISMRM co-provided a workshop on High Value MRI. The overarching themes presented at this workshop will be reviewed, illustrating several areas of activities, for researchers and practitioners in clinically focused MRI, that can be both achievable and impactful in increasing the Value of MRI moving forward.

SPSI23B Demonstrating Value of Neuro MR through Comparative Effectiveness Research

Participants
Yoshimi Anzai, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

yoshimi.anzai@hsc.utah.edu

LEARNING OBJECTIVES

1) To learn how to measure the downstream effect of neuro MR imaging to patients' management. 2) To demonstrate the impact of the neuro MR imaging on the downstream cost.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Yoshimi Anzai, MD - 2014 Honored Educator

SPSI23C Demonstrating High-value Prostate Cancer Diagnosis with MR from Protocol Development and PI-RADS to Cost-effectiveness

Participants
Clare M. Tempany-Afdhal, MD, Boston, MA (*Presenter*) Research Grant, InSightec Ltd; Research Grant, Gilead Sciences, Inc; Advisory Board, Profound Medical Inc; Spouse, Employee, Spring Bank Pharmaceuticals, Inc; Spouse, Director, Trio Healthcare; Spouse, Consultant, Gilead Sciences, Inc; Spouse, Consultant, Merck & Co, Inc; Spouse, Consultant, Echosens SA; Spouse,

Consultant, Shinogi; Spouse, Consultant, Ligand Pharmaceuticals, Inc; Spouse, Stock options, Spring Bank Pharmaceuticals, Inc; Spouse, Stock options, Allurion; Spouse, Stock options, Trio Healthcare; ;

LEARNING OBJECTIVES

1) To review the current state of the art of prostate cancer diagnostics. 2) To understand the added- value of mpMRI for detection, diagnosis and biopsy sampling. 3) To review the results of current cost-effectiveness studies.

ABSTRACT

Technological advances in 5 areas-MR techniques, clinical innovations, interventional MRI, new prostate biopsy approaches and cost effectiveness studies- will be reviewed to provide background understanding of the science and added value of MRI behind current innovations in prostate cancer diagnosis.

URL

www.ncigt.org

SPSI23D High-value MRI: Hope for Busy Radiology Departments Around the World

Participants
Bhavya Rehani, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bhavya.rehani@ucsf.edu

LEARNING OBJECTIVES

1) Discuss High Value MRI and Implications for Busy Radiology Departments Worldwide.

SPSI24

Special Interest Session: Demystifying Machine Learning and Artificial Intelligence for the Radiologist

Monday, Nov. 26 4:30PM - 6:00PM Room: E451A

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Safwan Halabi, MD, Stanford, CA (*Moderator*) Nothing to Disclose
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Practical introduction to machine learning and artificial intelligence including allaying fears of joblessness among radiologists while providing potential scenarios of what being a radiologist in the era of artificial intelligence might entail. 2) Describe cutting-edge examples of research and clinical applications of AI and machine learning in imaging, using the High Impact Clinical Trials (HICT) format of research presentation followed by a topic discussant. 3) Discuss the future applications of machine learning and artificial intelligence.

ABSTRACT

The application of machine learning and artificial intelligence in medicine, and especially radiology, has caught the attention of physicians, researchers and the global tech industry. While some radiologists worry their jobs will be taken over by software, others are optimistic that this technology will make image interpretation faster, more accurate and pertinent. Coupling the increasing amounts of data radiologists have to interpret with decreasing reimbursement, artificial intelligence software has the potential to reinvent the entire radiology practice from exam ordering to diagnosis. What distinguishes this special interest session is the combination that addresses the current concerns of radiologists, presents leading edge research and provides insight into the impact of current technology on future practice.

Sub-Events

SPSI24A The Lowdown: Introduction to Machine Learning and Artificial Intelligence (Or Machines Will Not Take Our Jobs)

Participants
Bradley J. Erickson, MD, PhD, Rochester, MN (*Presenter*) Stockholder, OneMedNet Corporation; Stockholder, VoiceIt Technologies, LLC; Stockholder, FlowSigma;

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSI24B The Reality: Current Application of Machine Learning and Artificial Intelligence in Clinical Radiology and Research

Participants
Jayashree Kalpathy-Cramer, MS, PhD, Charlestown, MA (*Presenter*) Consultant, Infotech Software Solution
Kristen W. Yeom, MD, Palo Alto, CA (*Presenter*) Nothing to Disclose
Bhavik N. Patel, MD,MBA, Stanford, CA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

View learning objectives under main course title.

SPSI24C The Fantasy: Future Applications of Machine Learning and Artificial Intelligence in Radiology and Radiogenomics

Participants
Bradley J. Erickson, MD, PhD, Rochester, MN (*Presenter*) Stockholder, OneMedNet Corporation; Stockholder, VoiceIt Technologies, LLC; Stockholder, FlowSigma;

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bje@mayo.edu

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSI24D Q & A

SPSI25

Special Interest Session: Academy for Radiology and Biomedical Imaging Research Imaging Shark Tank Session

Monday, Nov. 26 4:30PM - 6:00PM Room: S502AB

OT RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

LEARNING OBJECTIVES

The Academy's Imaging Shark Tank session primary goal is to educate imaging investigators about how best to present translational research and technology development ideas to industry and alternate non-governmental funding sources. This session will present a panel of experts in IP, venture capital and industry, who will hear from lucky investigators pitch their idea to the audience and in turn receive feedback from both the panel and audience. A truly interactive and fun session!

Sub-Events

SPSI25A Creating a Form for Venture Funding Pitches

Participants
Renee L. Cruea, Washington, DC (*Presenter*) Nothing to Disclose
Ronald L. Arenson, MD, San Francisco, CA (*Presenter*) Scientific Advisory Board, Imagion Biosystems

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSI25B The Pitch Teams

Participants
Jesse L. Courtier, MD, San Francisco, CA (*Presenter*) Founder, HoloSurg3D, Inc; Consultant, HoloSurg3D, Inc
Benjamin A. Laguna, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Sandip Biswal, MD, Stanford, CA (*Presenter*) Research Grant, General Electric Company;
Michelle James, MD, Sacramento, CA (*Presenter*) Nothing to Disclose
Srini Tridandapani, MD,PhD, Decatur, GA (*Presenter*) Co-founder, CameRad Technologies, LLC; Spouse, Co-founder, CameRad Technologies, LLC;

SPSI25C Shark Tank Panel

Participants
Scott A. Penner, JD, San Diego, CA (*Presenter*) Nothing to Disclose
Jacob A. Stolk, PhD,MBA, Waukesha, WI (*Presenter*) Employee, General Electric Company
Ronald L. Arenson, MD, San Francisco, CA (*Presenter*) Scientific Advisory Board, Imagion Biosystems
Sean Kendall, Chicago, IL (*Presenter*) Investor, Healthcare & Biotech Companies

SPSI25D Discussion

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
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November 25–30 | McCormick Place, Chicago

SPSI26

Special Interest Session: High Impact Clinical Trials

Monday, Nov. 26 4:30PM - 6:00PM Room: N229

OT RS

CME credit is not available for this session.
ARRT Category A Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Udo Hoffmann, MD, Boston, MA (*Moderator*) Institutional Research Grant, Kowa Company, Ltd; Institutional Research Grant, Abbott Laboratories; Institutional Research Grant, HeartFlow, Inc; Institutional Research Grant, AstraZeneca PLC

Sub-Events

SPSI26A Efficacy and Safety of Transdermal, Sublingual, and Oral Nitroglycerin Administration for Coronary CT Angiography: Results of a Prospective Randomized Trial

Participants
Dominik Fleischmann, MD, Stanford, CA (*Presenter*) Research Grant, Siemens AG
Jan-Erik Scholtz, MD, Boston, MA (*Presenter*) Nothing to Disclose
Vinit Baliyan, MBBS, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Sandeep S. Hedgire, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Nathaniel D. Mercaldo, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Theodore T. Pierce, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Gabriela Spilberg, MD, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose
Katherine Stockton, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Travis L. Redel, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Frederick R. McNulty Jr, RT, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Russel J. Roberts, PharmD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Udo Hoffmann, MD, Boston, MA (*Abstract Co-Author*) Institutional Research Grant, Kowa Company, Ltd; Institutional Research Grant, Abbott Laboratories; Institutional Research Grant, HeartFlow, Inc; Institutional Research Grant, AstraZeneca PLC
Brian B. Ghoshhajra, MD, Waban, MA (*Abstract Co-Author*) Research Grant, Siemens Healthcare USA;

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PURPOSE

Nitroglycerin increases vessel diameter and is used prior to coronary CT angiography (CTA) to improve coronary artery assessment. Our aim was to compare oral, sublingual and transdermal nitroglycerin administration for coronary vasodilation and safety.

METHOD AND MATERIALS

This prospective, single center, randomized controlled study included 198 subjects who were scheduled for elective coronary CTA and randomized to one of three NTG (0.8 mg) delivery methods: patch (transdermal, n=66), tablet (sublingual, n=66) or spray (oral, n=66). NTG was given after non-contrast acquisition and 5 minutes (sublingual, oral) or at least 45 minutes (transdermal) before CTA. We compared diameters measured in short axis before and after NTG at 7 pre-defined locations in proximal, mid and distal coronary artery segments by using mixed-effect linear regression model. We assessed vital parameter before and after NTG administration and side effects of drug administration.

RESULTS

The studied population had a mean age of 58.1±12.6 years, 91/198 [46.0%] were females, and an average BMI of 28.7±5.6 kg/m2. On average, coronary diameters in CTA were 115.2% (95% CI: 114.0-116.4), 115.0% (113.8-116.1) and 116.3% (115.1-117.5) of baseline in tablets, spray and patches, respectively, without statistically significant differences (p>=0.20; Figure, left). Regardless of NTG delivery route, NTG had highest vasodilation effect in distal coronary segments (125.6, 124.2-126.9) compared to proximal (111.7, 110.8-112.5) and mid coronary segments (116.4, 115.5-117.2) (Figure, right). 30 (15.2%) patients reported transient headache (tablet, n=12; spray=4; patch=14; p=0.03 [spray vs patch, p=0.02]) with a median intensity of 3 on a 10-point scale (0=no headache, 10=worst headache) (interquartile range: 2-5; tablet=3[3-6], spray=2[2-5], patch=3[2-5], p=0.02 [Tablet vs Patch, p=0.004). Heart rate increased on average by 4.3±11.0 bpm without significant difference between drug delivery routes (p=0.56). Systolic blood pressure decreased significantly more in tablets (13.6±13.0 mmHg) vs. patches (7.0±17.8 mmHg, p=0.008).

CONCLUSION

NTG can be administered safely oral, sublingual or transdermal with similar vasodilatory effect on coronary arteries prior to coronary CTA.

CLINICAL RELEVANCE/APPLICATION

Transdermal nitroglycerin administration by patch prior to coronary CTA can be seen as a safe alternative to tablets and spray with similar vasodilatory effect on coronary arteries.

FIGURE

http://abstract.rsna.org/uploads/2018/18014875/18014875_vyt2.jpg

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Udo Hoffmann, MD - 2015 Honored Educator

SPSI26B Optoacoustic Imaging (OA) is Helpful in Predicting Breast Cancer Molecular Subtypes

Participants
Linda Moy, MD, New York, NY (*Presenter*) Nothing to Disclose
Basak E. Dogan, MD, Dallas, TX (*Presenter*) Nothing to Disclose
Gisela D. Menezes, San Antonio, TX (*Abstract Co-Author*) Researcher, UTHSCSA; Medical Director, Seno Medical Instruments, Inc
Erin I. Neuschler, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Seno Medical Instruments, Inc; Speaker, Northwest Imaging Forums, Inc; ; ;
Reni S. Butler, MD, Madison, CT (*Abstract Co-Author*) Nothing to Disclose
A. Thomas Stavros, MD, San Antonio, TX (*Abstract Co-Author*) Advisor, Devicor Medical Products, Inc Advisor, General Electric Company Advisor, SonoCine, Inc Owner, Ikonopedia, LLC Medical Director, Seno Medical Instruments, Inc
Philip T. Lavin, PhD, Framingham, MA (*Abstract Co-Author*) Research Consultant, Seno Medical Instruments, Inc
Roger Aitchison, Longmont, CO (*Abstract Co-Author*) Nothing to Disclose
Pamela M. Otto, MD, San Antonio, TX (*Abstract Co-Author*) Consultant, Seno Medical Instruments, Inc Investigator, Seno Medical Instruments, Inc Speaker, World Class CME
F. L. Tucker, MD, Wirtza, VA (*Abstract Co-Author*) Nothing to Disclose
Stephen Grobmyer, MD, Cleveland, OH (*Abstract Co-Author*) Travel support, Seno Medical Instruments, Inc Research support, Mitaka USA, Inc Research support, Provista Diagnostics, Inc

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PURPOSE

To investigate the potential role of functional optoacoustic imaging-derived hemoglobin de-oxygenation and angiogenesis feature scoring combined with conventional gray-scale US (OA/US) in non-invasively diagnosing breast cancer molecular subtypes.

METHOD AND MATERIALS

In a IRB approved, 16-center multi-institutional study, 2105 women with a suspicious breast mass underwent pre-biopsy OA/US using Imagio™ breast imaging system between 12/2012-09/2015. Lesions revealing invasive breast cancer at needle biopsy were retrospectively reviewed. Seven blinded readers scored the internal (OAINT) and external (OAEXT) OA/US features of identified cancers. The ratio of total internal to total external OA/US feature scores (RInt/Ext) was derived. Tumor hormone receptor (ER and PR), and HER-2neu status, and available ki-67(%) labeling index were derived from pathology specimens. Analysis of individual OA/US feature scores and tumor molecular subtypes of Luminal A (LumA), Luminal B (LumB), Triple-negative (TRN) and HER2 amplified (HER2+) was performed using ANOVA.

RESULTS

Of 653 invasive cancers, 537 (82.2%) were ER+, 111 (17%) ER-negative, while in 5(0.8%) ER was missing. ER+ cancers had significantly higher OAEXT ($p=0.0004$), with lower OAINT ($p<0.05$), and RInt/Ext ($p<0.0001$) compared to ER-negative ones. Of 532 patients with available pathologic molecular subtype, 186(35.0%) were LumA, 244(45.9%) LumB, 79(14.8%) TRN and 23(4.3%) were HER2+. OAEXT was lower in TRN compared to LumA ($p<0.0001$), whereas OAINT were lower in LumA compared to TRN($p=0.031$). The mean RInt/Ext was significantly higher in TRN (1.7, SD ± 0.7) compared to LumB (1.3, SD ±0.5) and LuminalA (1.2, SD ± 0.5) subtypes ($p<0.0001$), but not significantly different from HER2 (1.5, SD ±0.6). RInt/Ext helped distinguish LumA vs LumB ($p=0.044$), LumA vs HER2+ ($p=0.0286$), LumA vs TNBC ($p<0.0001$), LumB vs TNBC ($p<0.0001$) while LumB vs HER2+ was not significant ($p=0.1866$). HER2+vs TNBC ($p=0.1597$) did not reach statistical significance.

CONCLUSION

Functional OA/US features can help non-invasively distinguish breast cancer molecular subtypes, showing promise as a clinical prognostic tool that can facilitate management decisions.

CLINICAL RELEVANCE/APPLICATION

OA/US imaging phenotypes can help serve as molecular surrogates that contribute to the diagnosis and prognosis of breast cancer.

SPSI26C Safety and Tolerability of High-Specific-Activity I-131 MIBG (AZEDRA®) in Patients with Iobenguane Scan Positive Cancers: A Pooled Analysis Across AZEDRA Clinical Studies

Participants
Richard L. Wahl, MD, Saint Louis, MO (*Presenter*) Research Consultant, Nihon Medi-Physics Co, Ltd; Contract, WhiteRabbit.AI Inc
Miguel Pampaloni, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Daniel Pryma, MD, Philadelphia, PA (*Abstract Co-Author*) Research Grant, Siemens AG; Research Grant, 511 Pharma; Research Grant, Progenics Pharmaceuticals, Inc; Research Consultant, Progenics Pharmaceuticals, Inc; Research Consultant, 511 Pharma; Research Consultant, Actinium Pharmaceuticals, Inc; Research Consultant, Nordic Nanovector ASA
Bennett B. Chin, MD, Durham, NC (*Abstract Co-Author*) Scientific Advisory Board, Progenics Pharmaceuticals, Inc
Richard B. Noto, MD, Providence, RI (*Abstract Co-Author*) Consultant, Progenics Pharmaceuticals, Inc;
Joseph S. Dillon, Iowa City, IA (*Abstract Co-Author*) Research Grant, Progenics Pharmaceuticals, Inc; Research Grant, Lexicon Pharmaceuticals, Inc
Stephanie M. Perkins, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Lilja B. Solnes, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

Lale Kostakoglu, MD, MPH, New York, NY (*Abstract Co-Author*) Research Consultant, F. Hoffmann-La Roche Ltd
Aldo N. Serafini, MD, Miami, FL (*Abstract Co-Author*) Research Consultant, Progenics Pharmaceuticals, Inc
Katherine K. Matthay, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Jessica Jensen, New York, NY (*Abstract Co-Author*) Employee, Progenics Pharmaceuticals, Inc
Tess Lin, New York, NY (*Abstract Co-Author*) Employee, Progenics Pharmaceuticals, Inc
Stuart Apfel, New York, NY (*Abstract Co-Author*) Consultant, Progenics Pharmaceuticals, Inc
Theresa White, New York, NY (*Abstract Co-Author*) Employee, Progenics Pharmaceuticals, Inc
Nancy Stambler, Tarrytown, NY (*Abstract Co-Author*) Employee, Progenics Pharmaceuticals, Inc
Vincent DiPippo, New York, NY (*Abstract Co-Author*) Employee, Progenics Pharmaceuticals, Inc
Syed M. Mahmood, MD, New York, NY (*Abstract Co-Author*) Employee, Progenics Pharmaceuticals, Inc
Vivien Wong, New York, NY (*Abstract Co-Author*) Employee, Progenics Pharmaceuticals, Inc
Camilo Jimenez, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Sohail Chaudhry, MD,PhD, Dallas, TX (*Presenter*) Consultant, Progenics Pharmaceuticals, Inc.

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PURPOSE

There is an unmet medical need for the treatment of iobenguane scan positive cancers, and especially in patients with advanced pheochromocytoma/paraganglioma (PPGL). High-specific-activity I- 131 meta-iodobenzylguanidine (HSA I-131 MIBG, AZEDRA®) is the first and only radioactive therapeutic agent approved for the treatment of adult and pediatric patients 12 years and older with iobenguane scan positive, unresectable, locally advanced or metastatic PPGL who require systemic anticancer therapy. Conventional I-131 meta-iodobenzylguanidine (MIBG) therapy has been associated with hematological toxicity in nearly all treated subjects, and up to a 15% incidence of severe acute hypertension including hypertensive crises and tachycardia during or immediately after the infusion. The purpose of this pooled analysis is to characterize the safety and tolerability of HSA I-131 MIBG.

METHOD AND MATERIALS

Data from four HSA I-131 MIBG open-label, Phase I and phase II studies (NCT00339131; NCT00458952; NCT00874614; NCT00659984) were pooled for safety analysis with a data cutoff of March 10, 2017. A literature review was conducted on the safety of conventional I-131 MIBG. Demographic and baseline characteristics will be presented with descriptive statistics for continuous variables, and frequencies/percentages for categorical variables. Adverse event (AE) data will be described by disease indication, age, gender, race, treatment with prior conventional I-131 MIBG, number of HSA I-131 MIBG doses, vital signs, electrocardiogram (ECG), laboratory values, reasons for treatment or study discontinuation, and long-term AEs.

RESULTS

The pooled safety population included 118 patients (age range: 3-76 years) who received any dose of HSA I-131 MIBG. Few AEs showed a clear association with age. The incidence of most AEs was similar regardless of gender or race. The incidence of AEs was comparatively higher after the second therapeutic dose; however, the incidences of most serious AEs (SAEs) were similar after each therapeutic dose. No clinically significant trend was seen in ECG changes from baseline. 21 patients (18%) experienced hypertensive events of which treatment-related hypertension/increased blood pressure was reported in 7 (5.9%) patients and treatment-related tachycardia was reported in 6 (5.1%) subjects. Within 48 hours of therapeutic dosing, only one possibly related mild increase in blood pressure was reported as an AE; other changes in blood pressure were not deemed clinically significant by the investigators in this time period. The most common reason for discontinuation was occurrence of an AE(s) (n=11, 9.3%), followed by receiving another anticancer therapy (n=8, 6.8%) and progressive disease (n=7, 5.9%). Thirty-four (28.8%) deaths were reported, two of which (myelodysplastic syndrome and acute myeloid leukemia) were related to late radiation toxicity attributed to HSA I-131 MIBG.

CONCLUSION

HSA I-131 MIBG was safe and well-tolerated across patients with iobenguane scan positive cancers. As with other similar radioactive therapeutic agents, HSA I-131 MIBG is associated with a predictable pattern of AEs. No serious treatment-related hypertensive events were observed suggesting that HSA I-131 MIBG would be less likely than conventional I-131 MIBG (with a 15% reported rate of severe hypertensive events) to cause acute or subacute severe hypertensive events. With proactive toxicity management, health care practitioners can ensure maximum treatment benefit and mitigate unnecessary treatment discontinuation.

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SPSI27

Special Interest Session: Integrated Diagnostics-Combining Genomics, Pathology and Radiology: The Future Now

Monday, Nov. 26 4:30PM - 6:00PM Room: N226

OT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Pablo R. Ros, MD,PhD, Cleveland, OH (*Presenter*) Nothing to Disclose
R. Nick Bryan, MD, PhD, Austin, TX (*Presenter*) Stockholder, Galileo CDS, Inc Officer, Galileo CDS, Inc
Jacob J. Visser, MD, PhD, Rotterdam, Netherlands (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To become familiar with the concept of Integrated Diagnosis, which combines Radiology, Pathology and Genomics into an innovative diagnostic tool. 2) To understand how the current computational revolution provides the technological basis for the cross-disciplinary implementation of Integrated Diagnosis. 3) To share the early experiences of established Integrated Diagnosis organizations in Academic Medical Centers and Medical Schools.

ABSTRACT

Making medicine more personalized and precise will entail increasing emphasis on, and precision in, diagnostics. Diagnoses however, depend on multiple components that include not only imaging, but also clinical observations, pathology, laboratory, and genomic tests. Biomarkers, including quantitative imaging markers and generic radiomics platforms in combination with deep learning algorithms contribute to the concept of data driven medicine allowing the optimal integration of information from different sources. To date, however, there is too little coordination between the medical specialties responsible for ordering and performing diagnostic tests, nor is there enough consideration as to the optimal order of tests. 'Integrated diagnostics': the convergence of imaging, pathology and laboratory tests with advanced information technology (IT) is the solution for bridging this gap. At Erasmus MC in Rotterdam, the organizational structures are optimal for the implementation of this concept: all diagnostic specialties are gathered in the division 'Diagnostics and Advice' and agreements with referring physicians are performed jointly. However, there is major resistance from the side of clinicians who rarely commit to acknowledged protocols. The potential of integrated diagnostics for disease prediction, diagnosis, and therapy monitoring and the barriers to its optimal implementation will be demonstrated in the specific case study at Erasmus MC.

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SPDL30

The RAD Files: The Truth is Out There (Case-based Competition)

Tuesday, Nov. 27 7:15AM - 8:15AM Room: E451B

ER MK

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Eric B. England, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
Carl C. Flink, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Be introduced to a series of radiology case studies via an interactive team game approach designed to encourage 'active' consumption of educational content. 2) Use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) Receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. *This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.*

SPSC30

Controversy Session: Prostate Cancer Imaging: Is the Endorectal Coil Necessary?

Tuesday, Nov. 27 7:15AM - 8:15AM Room: E350

GU MR OI

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants

Andrew B. Rosenkrantz, MD, New York, NY (*Moderator*) Nothing to Disclose
Aytekin Oto, MD, Chicago, IL (*Presenter*) Research Grant, Koninklijke Philips NV; Research Grant, Guerbet SA; Research Grant, Profound Medical Inc; Medical Advisory Board, Profound Medical Inc; Consultant, AbbVie Inc; ;
Baris Turkbey, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand pros and cons of using an endorectal coil for Prostate MRI. 2) To describe clinical scenarios in which it may be particularly beneficial to use a specific coil arrangements (endorectal or external pelvic). 3) To recognize practical aspects of optimizing image quality and overall workflow for both coil arrangements.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Aytekin Oto, MD - 2013 Honored EducatorAytekin Oto, MD - 2017 Honored Educator

SPSH30

Hot Topic Session: Management of DCIS and Minimal Risk Lesions

Tuesday, Nov. 27 7:15AM - 8:15AM Room: E450B

BR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Linda Moy, MD, New York, NY (*Moderator*) Nothing to Disclose

Sub-Events

SPSH30A LORIS Trial-Will it Address the Overtreatment of Low Grade DCIS?

Participants
Matthew G. Wallis, MD, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Matthew.wallis@addenbrookes.nhs.uk

LEARNING OBJECTIVES

1) To learn about the risk of overdiagnosis and overtreatment. 2) To become familiar with the risk of avoiding surgery. 3) To appreciate the prospective for the future.

ABSTRACT

Breast screening has led to an inexorable rise in the number of women living with a diagnosis of DCIS predominantly but not exclusively as a result of the detection of micro-calcification. It is clear from long term follow up that conventional treatment fails the 15 to 20% who develop invasive disease a few of whom then die from breast cancer. There is larger group that never progress with in their life time which means we have either cured them or just over treated them. Traditional pathology and genetics suggest that there is a low risk group that either never progress or if they do they develop 'low risk' invasive disease. I will describe the 4 international trials LORIS (The LOw RISk DCIS trial), LORD (LOw Risk DCIS) , COMET (Comparison of Operative versus Medical Endocrine Therapy for Low Risk DCIS) and LORETTA (Low Risk Tamoxifen Treatment And surveillance) . In particular commenting on their differences. Using LORIS as my main example I will discuss how we have attempted to resolve the hurdles of setting up a 'no treatment trial' and talk about some of the lessons learnt from successfully steering LORIS from feasibility to full trial. Anecdotally patient views have been more entrenched than those of surgeons

SPSH30B Pathologic Interpretation of Borderline Breast Lesions

Participants
Laura C. Collins, MD, Boston, MA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To have a greater level of understanding of the nuances of interpreting atypical ductal proliferations. 2) To have a greater level of understanding of the quantitative criteria for a diagnosis of low grade ductal carcinoma in situ. 3) Learners will have a greater level of understanding of the limitations of providing definitive diagnosis of some atypical ductal proliferations on core needle biopsy samples.

ABSTRACT

This presentation will cover the nuances of pathologic interpretation of borderline atypical ductal proliferations of the breast, particularly in the setting of core needle biopsy samples. Features that favor a diagnosis of atypical ductal hyperplasia versus low nuclear grade ductal carcinoma in situ will be discussed. Finally, the ramifications of definitive distinctions rendered on borderline lesions will be reviewed.

SPSH30C High Risk DCIS and What are We Prepared To Do About it

Participants
Brian J. Czerniecki, MD, PhD, Tampa, FL (*Presenter*) Advisory Board, ImmunoRestoration

LEARNING OBJECTIVES

1. Understand that there are subgroups of women with DCIS in whom there is an increased risk of subsequent breast cancer deaths and they include women under 40, African American females and those with hormone receptor negative breats cancer. 2. Disseminated cancer cells may seed even from very early DCIS lesions 3. Surgery and Radiation do not appear to reduce the risk of death from breast cancer in high risk groups

ABSTRACT

Controversy exists concerning whether all ductal carcinoma in situ (DCIS) lesions represent premalignant precursors destined to become invasive breast cancer (IBC). There is also evidence that cancer cells can disseminate very early during the process of tumorigenesis even prior to invasive breast cancer developing. There is a also evidence that certain groups of patients with DCIS have increased risk of mortality from DCIS and they include those diagnosed under 40, African American females and those that are hormone receptor negative. Local therapy with surgery and radiation does not decrease risk of mortality from DCIS. Many of these high risk lesions have expression of HER2 which is associated with both invasion and dissemintation of cancer cells (DCC). Targeting HER2 maybe benficial for eliminating both DCC and reducing risk of subsequent IBC. Dendritic cell (DC) vaccines administered in a neoadjuvant trials to patients with HER2 expressing DCIS has resulted in complete regression of disease in about 30% of DCIS patients. Vaccines drive anti-HER2 CD4 Th1 cells especially in sentinel nodes. Complete regression of DCIS is associated with diminshed breast cancer events. Combinations of other immune therapies with DC vaccines may result in greater numbers of complete responses. In summary, high grade and HER2 expressing DCIS in young women, African American females requires novel approaches to reduce mortlaity and subsequent breast cancer events.

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RCA31

Prostate MRI (Hands-on)

Tuesday, Nov. 27 8:00AM - 10:00AM Room: S401AB

GU MR

AMA PRA Category 1 Credits ™: 2.00
ARRT Category A+ Credits: 2.25

Participants
Jelle O. Barentsz, MD, PhD, Nijmegen, Netherlands (*Presenter*) Advisor, SPL Medical BV
Daniel J. Margolis, MD, Los Angeles, CA (*Presenter*) Consultant, Blue Earth Diagnostics Ltd
Roel D. Mus, MD, Groesbeek, Netherlands (*Presenter*) Nothing to Disclose
Joyce G. Bomers, Arnhem, Netherlands (*Presenter*) Nothing to Disclose
Jurgen J. Futterer, MD, PhD, Nijmegen, Netherlands (*Presenter*) Research Grant, Siemens AG
Rianne R. Engels, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Renske L. van Delft, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Michiel Sedelaar, MD, PhD, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Antonio C. Westphalen, MD, Mill Valley, CA (*Presenter*) Scientific Advisory Board, 3DBiopsy, Inc;
Geert M. Villeirs, MD, PhD, Ghent, Belgium (*Presenter*) Nothing to Disclose
Leonardo K. Bittencourt, MD, PhD, Rio De Janeiro, Brazil (*Presenter*) Nothing to Disclose
Vibeke B. Logager, MD, Herlev, Denmark (*Presenter*) Nothing to Disclose
Joseph J. Busch, MD, Chattanooga, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Understand the PI-RADS v2 category assessment to detect and localize significant cancer for both peripheral zone and transitional zone lesions. 2) Recognize benign pathology like inflammation and BPH and to differentiate these from significant prostate cancers.

ABSTRACT

In this Hands-on Workshop, the participants will able to review up to 47 multi-parametric MRI cases with various prostatic pathology using a dedicated workstation. Focus will be on the overall assessment of PI-RADS v2 category, which enables them to score the probability of the presence of a significant cancer in patients with elevated PSA and/or clinical suspicion. All cases are from daily non-academic practice, and have various levels of difficulty. The cases include: easy and difficult significant peripheral-transition- and central zone cancers, inflammation, BPH, and the most common pitfalls. Internationally renowned teachers will guide the participants during their PI-RADS v2 scoring. The coursebook can be found at: http://bit.ly/rsna2018 Please note: To guarentee the best learning experience we can only allow 100 people in the room (2 per computer). It will be first come first serve.

Active Handout:Renske Lian van Delft

http://abstract.rsna.org/uploads/2018/16002000/Workshop RSNA 2018 Coursebook small RCA.pdf

MSAS31

Radiology Safety: Effective Strategies in Patient Care (Sponsored by the Associated Sciences Consortium) (Interactive Session)

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S105AB

MR SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Kendra Huber, RT, BS, Castle Rock, CO (*Moderator*) Nothing to Disclose
JoAnn Balderos-Mason, PhD,RT, Chicago, IL (*Moderator*) Nothing to Disclose

Sub-Events

MSAS31A Radiation Safety and Protection in Diagnostic Imaging

Participants
Steffen Sammet, MD,PhD, Chicago, IL (*Presenter*) Research Grant, Koninklijke Philips NV

For information about this presentation, contact:

ssammet@uchicago.edu

LEARNING OBJECTIVES

1) Radiation Units and Measurements. 2) Biological Effects of Ionizing Radiation. 3) Radiation Exposures in Diagnostic Radiology. 4) Principles of Radiation Protection and Radiation Safety.

ABSTRACT

Since the discovery of x-rays in 1895 by the German physicist Wilhelm Conrad Röntgen and the first reports of radiation injuries in 1896, radiation safety and protection of patients have been fundamental responsibilities in diagnostic imaging. The fast advancements in equipment that uses x-rays to form diagnostic images require radiation protection, dose monitoring and radiation safety strategies. This course will present and review the most current radiation safety and protection requirements in Diagnostic Radiology.

MSAS31B MRI Contrast and Protocol Optimization

Participants
Matt Rederer, BS, RT, Elgin, IL (*Presenter*) CEO, RITE Advantage, LLC

MSAS31C MRI Safety Made Complicated and Dangerous

Participants
Mark A. Smith, MS, ARRT, Columbus, OH (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mark.smith@nationwidechildrens.org

LEARNING OBJECTIVES

1) Identify MR safety concerns. 2) Recognize previous mistakes. 3) Identify proper MR safety policies and procedures. 4) Identify MR safety update on implants/devices. 5) Recognize strategies for successful MR safety practices.

ABSTRACT

MR technology and it's clinical applications have expanded rapidly in recent years. As a result, the safety of patients, family and staff is a primary concern, with MR safety awareness and training has become increasingly important. This presentation will review the essentials of MR safety that all personnell present in the MR environment should be familiar with.

Active Handout:Mark Aaron Smith

http://abstract.rsna.org/uploads/2018/18001114/RSNA 2018 MRI Safety handoutMSAS31C.pdf

MSCC31

Case-based Review of Nuclear Medicine: PET/CT Workshop-Head and Neck PET/CT (In Conjunction with SNMMI) (Interactive Session)

Tuesday, Nov. 27 8:30AM - 10:00AM Room: E450B

CT NR NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Samuel E. Almodovar-Reteguis, MD, Orlando, FL (*Director*) Nothing to Disclose
Katherine A. Zukotynski, MD, Ancaster, ON (*Director*) Nothing to Disclose
Katherine A. Zukotynski, MD, Ancaster, ON (*Moderator*) Nothing to Disclose

Sub-Events

MSCC31A Imaging of Dementia

Participants
Phillip Kuo, MD,PhD, Tucson, AZ (*Presenter*) Author, MD Training at Home; Research Grant, Astellas Group; Consultant, Endocyte, Inc; Consultant, General Electric Company; Education Grant, General Electric Company; Speakers Bureau, Eli Lilly and Company; Consultant, inviCRO, LLC; Consultant, Imaging Endpoints; Consultant, Progenics Pharmaceuticals, Inc

LEARNING OBJECTIVES

1) Discuss appropriate use criteria for PET in the work-up of dementia. 2) Review imaging signs of amyloid deposition and pitfalls of image interpretation. 3) Illustrate a systematic approach to interpretation of PET imaging in dementia.

MSCC31B Head and Neck PET/CT

Participants
Rathan M. Subramaniam, MD,PhD, Dallas, TX (*Presenter*) Consultant, Blue Earth Diagnostics Ltd; Speaker, Blue Earth Diagnostics Ltd

For information about this presentation, contact:

rathan.subramaniam@utsouthwestern.edu

LEARNING OBJECTIVES

1) To review the best clinical practices of head and neck PET/CT in oncologic imaging. 2) To review the common sites of tumor location in head and neck and patterns of tumor spread. 3) To review pitfalls of head and neck PET/CT interpretations.

ABSTRACT

This talk will review the best clinical practices of head and neck PET/CT in oncology, patterns of tumor spread and common and unusual intepretation pitfalls.

MSES31

Essentials of Chest Imaging

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S100AB

CH CT OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

MSES31A CT of Pleural Diseases

Participants
Travis S. Henry, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Differentiate the common causes of unilateral and bilateral pleural effusions. 2) Prioritize a differential diagnosis of unilateral pleural effusions on CT based on relevant imaging findings. 3) Produce a differential of at least 3 causes of pleural masses.

Active Handout:Travis S. Henry

http://abstract.rsna.org/uploads/2018/18000942/CT of Pleural Disease Handout MSES31A.pdf

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MSES31B Lung Cancer Staging 8th Edition

Participants
Jeremy J. Erasmus, MD, Houston, TX (*Presenter*) Nothing to Disclose

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MSES31C ACR Lung RADS / Lung Cancer Screening

Participants
Ella A. Kazerooni, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

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MSES31D 2017 Fleishner Society Criteria for Pulmonary Nodules

Participants
Geoffrey D. Rubin, MD, Durham, NC (*Presenter*) Consultant, Fovia, Inc; Consultant, HeartFlow, Inc; Consultant, General Electric Company;

LEARNING OBJECTIVES

1) To apply the 2017 Fleischner Society Guidelines for the assessment and management of incidentally detected pulmonary nodules in clinical practice.

ABSTRACT

The Fleischner Society Guidelines for management of solid nodules were published in 2005, and separate guidelines for subsolid nodules were issued in 2013. Since then, new information has become available; therefore, the guidelines have been revised to reflect current thinking on nodule management. The revised guidelines incorporate several substantive changes that reflect current thinking on the management of small nodules. The minimum threshold size for routine follow-up has been increased, and recommended follow-up intervals are now given as a range rather than as a precise time period to give radiologists, clinicians, and patients greater discretion to accommodate individual risk factors and preferences. The guidelines for solid and subsolid nodules have been combined in one simplified table, and specific recommendations have been included for multiple nodules. These guidelines represent the consensus of the Fleischner Society, and as such, they incorporate the opinions of a multidisciplinary international

group of thoracic radiologists, pulmonologists, surgeons, pathologists, and other specialists. Changes from the previous guidelines issued by the Fleischner Society are based on new data and accumulated experience. MacMahon H, Naidich DP, Goo JM, et al. Guidelines for Management of Incidental Pulmonary Nodules Detected on CT Images: From the Fleischner Society 2017. Radiology. 2017;:161659.

MSQI31

Quality Improvement Symposium: Value in Imaging 1: Value in Radiology

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S402AB

AI SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jonathan B. Kruskal, MD, PhD, Boston, MA (*Moderator*) Author, Wolters Kluwer nv

LEARNING OBJECTIVES

1) To define the concept and definition of value relative to clinical radiology practice. 2) To describe how value can be measured. 3) To define strategies for improving delivery of value.

Additional Information

RSNA will award Quality Essentials Certificates of Completion to RSNA 2018 attendees who successfully participate. Participants who achieve a score of 80% or higher on the SAM test questions will be eligible to receive the certificates.

Sub-Events

MSQI31A What is Value in Radiology?

Participants
Jonathan B. Kruskal, MD, PhD, Boston, MA (*Presenter*) Author, Wolters Kluwer nv

For information about this presentation, contact:

jkruskal@bidmc.harvard.edu

LEARNING OBJECTIVES

1) To define the concept and definition of value relative to clinical radiology practice. 2) To describe how value can be measured. 3) To define strategies for improving delivery of value.

Honored Educators

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MSQI31B The Patient Perspective on Radiology Value

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (*Presenter*) Royalties, Osler Institute

For information about this presentation, contact:

tessa.cook@uphs.upenn.edu

LEARNING OBJECTIVES

1) Discuss what patients value most in their encounters with a radiology practice. 2) Describe challenges patients face in navigating their care in radiology. 3) Understand innovations in care design that could address challenges patients face in radiology.

MSQI31C How Machine Learning will Optimize our Value

Participants
Curtis P. Langlotz, MD,PhD, Menlo Park, CA (*Presenter*) Advisory Board, Nuance Communications, Inc; Shareholder, whiterabbit.ai; Advisory Board, whiterabbit.ai; Shareholder, Nines.ai; Consultant, Nines.ai; Shareholder, TowerView Health; Research Grant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, Alphabet Inc;

LEARNING OBJECTIVES

1) Review the clinical constraints and needs that radiologists face. 2) Critique the role of computer aided detection in radiology. 3) Understand the role of artificial intelligence across the image life cycle, including detection. 4) Discuss how artificial intelligence will change the practice of radiology.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

MSRO31

BOOST: Gastrointestinal-Oncology Anatomy (Interactive Session)

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S103AB

GI OI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

Zhen J. Wang, MD, Hillsborough, CA (*Presenter*) Stockholder, Nextrast, Inc
Mary U. Feng, MD, San Francisco, CA (*Presenter*) Self: Consultant, Varian, Inc and RefleXion Medical Inc; Spouse (Felix Feng, MD), Advisory Boards Dendreon, Janssen, Bayer, Sanofi, Ferring, EMD Serono, Medivation/Astellas, Blue Earth Diagnostics, Progenics; Spouse, honorarium Clovis
Edward Y. Kim, MD, Seattle, WA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

Jane.Wang@ucsf.edu

Mary.feng@ucsf.edu

LEARNING OBJECTIVES

1) Describe relevant liver anatomy and key imaging features of liver tumors. 2) Describe new techniques for imaging liver tumors and monitoring treatment response.

MSRO35

BOOST: Lung-Oncology Anatomy (Interactive Session)

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S103CD

CH OI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Subba R. Digumarthy, MD, Boston, MA (*Presenter*) Nothing to Disclose
Amita Sharma, MBBS, Boston, MA (*Presenter*) Nothing to Disclose
Melin J. Khandekar, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

sdigumarthy@mgh.harvard.edu

LEARNING OBJECTIVES

1) Explain the different techniques and approaches for radiation therapy delivery. 2) Identify the anatomy relevant for thoracic oncology treatment planning. 3) Define targets and organs at risk for thoracic radiation therapy.

Honored Educators

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RC301

Pulmonary Vascular Imaging

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S104B

CH CT MR VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Sub-Events

RC301A Imaging of Acute Pulmonary Embolism

Participants
Ioannis Vlahos, MRCP,FRCR, London, United Kingdom (*Presenter*) Research Consultant, Siemens AG Research Consultant, General Electric Company

LEARNING OBJECTIVES

1) Overview current imaging strategies and key facts in acute pulmonary embolism imaging. 2) Provide an update on current issues and challenges in acute pulmonary embolism imaging.

Honored Educators

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RC301B Imaging of Chronic Pulmonary Embolism and Pulmonary Hypertension

Participants
Carole J. Dennie, MD, Ottawa, ON (*Presenter*) Speaker, Bayer AG; Spouse, Consultant, Abbott Laboratories

For information about this presentation, contact:

cdennie@toh.ca

LEARNING OBJECTIVES

1) Review the classification of pulmonary hypertension. 2) List CT and MRI features of PH. 3) Describe imaging characteristics of chronic pulmonary embolism.

RC301C Imaging of Pulmonary Arteriovenous Malformations

Participants
Kristopher W. Cummings, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Cummings.Kristopher@mayo.edu

LEARNING OBJECTIVES

1) Explain the role MDCT plays in the evaluation of suspected hereditary hemorrhagic telangiectasia. 2) List the most important information provided by MDCT for management of pulmonary arteriovenous malformations.

RC301D Pulmonary MRA: Practical Applications

Participants
Christopher J. Francois, MD, Madison, WI (*Presenter*) Departmental research support, General Electric Company;

For information about this presentation, contact:

cfrancois@uwhealth.org

LEARNING OBJECTIVES

1) Identify roles for magnetic resonance angiography (MRA) in imaging patients with pulmonary artery disease, particularly on the use of MRA in pulmonary embolism. 2) Describe techniques and protocols for robust, clinical pulmonary MRA. 3) Summarize the evidence supporting the use of pulmonary MRA for pulmonary embolism.

ABSTRACT

1) Pulmonary MRA is appropriate for imaging patients suspected of having pulmonary embolism who have contra-indications to CTA, particularly those in whom avoiding iodinated contrast (due to allergy or decreased renal function) or minimizing radiation exposure

(younger patients) would be beneficial. 2) Current, commercially available MRA sequences that take advantage of newer parallel imaging techniques help ensure consistent pulmonary MRA in a clinical setting. 3) Following multi-center studies (using older MRA techniques and protocols) in the last decade that indicated that pulmonary MRA may not be accurate enough for routine clinical use, more recent studies suggest that pulmonary MRA is effect in identifying clinically significant pulmonary embolism.

Active Handout:Christopher Jean-Pierre Francois

http://abstract.rsna.org/uploads/2018/17000303/RSNA2018_PulmonaryMRA RC301Dpdf.pdf

RC302

What's New from the ABR?

Tuesday, Nov. 27 8:30AM - 10:00AM Room: N230B

ED

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Valerie P. Jackson, MD, Tucson, AZ (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the need for professional self-regulation. 2) Understand the importance of public trust for physicians. 3) Describe ABR's Online Longitudinal Assessment (OLA) program. 4) Discuss advantages of ABR OLA. 5) Describe ABR finances.

Sub-Events

RC302A Board Certification: Where Professional Self-Regulation Meets the Public Trust

Participants
Brent J. Wagner, MD, West Reading, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the importance of professional self-regulation as it relates to the practice of the various disciplines within radiology. 2) Discuss the role of certification as it relates to expectations of patients and the public.

RC302B Online Longitudinal Assessment is Almost Here! What Will It Mean for You?

Participants
Vincent P. Mathews, MD, Hartland, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe ABR's Online Longitudinal Assessment program. 2) Discuss advantages of ABR OLA compared to traditional MOC examinations.

RC302C Things You Always Wanted to Know About ABR Finances

Participants
Robert M. Barr, MD, Charlotte, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the basic finances of the ABR as well as the oversight process. 2) To gain insight into the philosophy of the executive team with regard to ABR spending. 3) To learn how your fees are used to administer and improve the board certification process.

RC303

Cardiac Series: Emerging Cardiovascular MR and CT Imaging Techniques

Tuesday, Nov. 27 8:30AM - 12:00PM Room: E350

CA BQ CT MR

AMA PRA Category 1 Credits ™: 3.00
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants

Hildo J. Lamb, MD, PhD, Leiden, Netherlands (*Moderator*) Nothing to Disclose
Gautham P. Reddy, MD, Seattle, WA (*Moderator*) Researcher, Koninklijke Philips NV;
Karen G. Ordovas, MD, San Francisco, CA (*Moderator*) Advisor, Arterys Inc
Albert Hsiao, MD,PhD, La Jolla, CA (*Moderator*) Founder, Arterys, Inc; Consultant, Arterys, Inc; Consultant, Bayer AG; Research Grant, General Electric Company;
Karin E. Dill, MD, Worcester, MA (*Moderator*) Nothing to Disclose

Sub-Events

RC303-01 Spectral Detector CT

Tuesday, Nov. 27 8:30AM - 8:55AM Room: E350

Participants
Suhny Abbara, MD, Dallas, TX (*Presenter*) Royalties, Reed Elsevier; Institutional research agreement, Koninklijke Philips NV; Institutional research agreement, Siemens AG

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RC303-02 Spectral Detector Computed Tomography Enabled Contrast Media Reduction for TAVR Planning CT: Evaluation in 60 Patients

Tuesday, Nov. 27 8:55AM - 9:05AM Room: E350

Participants
Nils Grosse Hokamp, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Rahul B. Thomas, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Amit Gupta, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Omer Alabar, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Leslie Ciancibello, RT, Cleveland , OH (*Abstract Co-Author*) Consultant, Cassling Group Consultant, Siemens AG
Armando Cavallo, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Sanjay Rajagopalan, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Robert C. Gilkeson, MD, Cleveland, OH (*Abstract Co-Author*) Research Consultant, Riverain Technologies, LLC; Research support, Koninklijke Philips NV; Research support, Siemens AG; Research support, General Electric Company

PURPOSE

Computed tomography is imaging method of choice for procedural planning in patients prior to transcatheter aortic valve replacement (TAVR). The patients eligible for TAVR constitute an elderly population which frequently have an impaired kidney function. We aimed to evaluate if TAVR imaging with reduced contrast media is enabled by spectral detector computed tomography (SDCT).

METHOD AND MATERIALS

60 patients (31 female, mean age 81.6±10.3) were included in this retrospective, IRB-approved and HIPPA-compliant study. The imaging protocol comprised a prospective-ECG gated study of the entire chest (Th) immediately followed by a retrospective, ECG-gated covering the heart (Car) and a non-gated study of the abdomen and pelvis (Abd). For both, Th/Car and Abd, 25 ml of iodinated contrast media (c=350 mg/ml ioversol) was administered through an antecubital vein followed by a 40 ml saline flush. 25 ml constitutes a reduction by 50% as compared to the institutional standard. Th/Car/Abd images were reconstructed in axial plane with a slice thicknesses of 2/0.9/2 mm as conventional images (CI) and virtual monoenergetic images of 40-200 keV (VMI). Objective image evaluation was performed based on regions of interest placed in the aortic bulb, the descending aorta and the external iliac arteries. Further, one cardiologist and one radiologist evaluated the studies with respect to their utility for TAVR planning. Pre- and post-proecedural serum creatinine was collected. Data was assessed statistically using ANOVA with Dunnet's post-hoc or Wilcoxon test.

RESULTS

VMI 40keV resulted in a significant improvement in image contrast as compared to CI, this accounts for all, e.g. in the aortic bulb

VMI_40keV resulted in a significant improvement in image contrast as compared to CI, this accounts for all, e.g. in the aortic bulb and the external iliac arteries 215.9±81.3 HU/604.9±274.4 HU and 205.3±74.6 HU/583.3±241.5 HU (p<=0.05). Out of all studies, 2 studies were not diagnostic due to missed contrast bolus. All other studies provided sufficient image quality for TAVR evaluation. No patient showed adverse renal effects.

CONCLUSION

Pre-TAVR examinations can be carried out using SDCT using the described protocol. Moreover, SDCT enables a reduction of contrast media by 50% possibly limiting adverse renal effects.

CLINICAL RELEVANCE/APPLICATION

In patients with impaired kidney function, examination on SDCT should be considered for TAVR planning as it enables contrast dose reduction by 50%.

RC303-03 Myocardial Rest Perfusion CTA Improves Stenosis Quantification in Regions of Artefact from Calcified Plaque and Motion: Dual Energy CTA Compared With Catheter Coronary Angiography

Tuesday, Nov. 27 9:05AM - 9:15AM Room: E350

Awards
Student Travel Stipend Award

Participants
Prashanth Reddy, MBBS,MD, Bangalore, India (*Presenter*) Nothing to Disclose
Bharath B. Das, MD, MBBS, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose
Srikanth Sola, MD, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose
Bhavana Nagabhushana Reddy, MBBS, MD, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose
Sankar Neelakantan, MD , Bangalore, India (*Abstract Co-Author*) Nothing to Disclose
Sanjaya Viswamitra, MD, Bengaluru, India (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

prashanth.d@sssihms.org.in

PURPOSE

To assess the utility of resting CT dual energy myocardial perfusion in improving the diagnostic performance of CT coronary angiography in assessment of coronary artery stenosis in areas of artefact due to calcified plaque and motion: direct comparison with catheter coronary angiography.

METHOD AND MATERIALS

1347 CT coronary angiograms were performed in our institute from January 2104 to December 2017, out of with 32 cases with dual energy CT angiography(DE-CTA) and catheter coronary angiography performed within a span on 2 weeks from each other were included in this study. DE-CTA was performed using a 64 detector row CT scanner with fast KvP switching and ECG gating in the prospective mode. High calcium score in these patients prompted the use of DE-CTA. Iodine-water material decomposition images in the short axis plane using minimum intensity projections of 5 mm thickness, were reviewed for the presence of resting perfusion defects. Diagnostic accuracy was assessed by comparison with CAG. Coronary segments with indeterminate stenosis due to blooming artefact from heavily calcified plaque or motion artefact were reclassified as significant stenosis if there was a perfusion defect in the corresponding myocardial segment. Significant coronary stenosis was defined as a > 50% stenosis on CAG. Sensitivity, specificity, positive predictive value and negative predictive value of DE-CTA alone and DE-CTA combine with perfusion assessment for the detection of significant stenosis were calculated.

RESULTS

DE-CTA combined with perfusion assessment for the detection of significant stenosis showed improvement over DE-CTA alone. mean age of 58 ± 7. The calcium scores ranged from 40 to 344 AU.The sensitivity, specificity, positive predictive value and negative predictive value increased from 81% to 85%, 87% to 94%, 63% to 79% and 95% to 96%, respectively. The area under the receiver operating characteristic curve for detecting CAD also increased from 0.84 to 0.89 (p=0.02).

CONCLUSION

Dual energy CT with rapid KvP switching showed a high sensitivity and negative predictive value of the detection of significant coronary stenoses. There was improvement in diagnostic performance when both CTCA and perfusion assessment were used for stenosis evaluation.

CLINICAL RELEVANCE/APPLICATION

Myocardial rest perfusion CT has additional value is assessment of coronary stenoses in vessels with heavily calcified plaque and motion artefacts.

RC303-04 Quantifying Regional Myocardial Function-Strain, Torsion and Twist

Tuesday, Nov. 27 9:15AM - 9:40AM Room: E350

Participants
Bernd J. Wintersperger, MD, Toronto, ON (*Presenter*) Speaker, Siemens AG; Research support, Siemens AG; Institutional research agreement, Siemens AG; Speaker, Bayer AG

For information about this presentation, contact:

bernd.wintersperger@uhn.ca

LEARNING OBJECTIVES

1) Describe the principle architecture of the LV related to cardiac function. 2) Describe the principles of regional myocardial function assessment. 3) Compare different imaging approaches for quantification of regional myocardial function. 4) Identify

possible applications of regional function analysis in clinical cardiac imaging.

ABSTRACT

A complex joint effort of the entire heart muscle facilitates normal ventricular output. While the evaluation of cardiac volumes and global function aims at assessment of the gross ventricular status, measures of regional myocardial function provide a more detailed analysis of myocardial function at tissue level.Parameters of regional myocardial function generally describe the relationship between force and resulting deformation of finite elements. Furthermore, such regional parameters are used to describe these relationships along various directions of the cardiac axis and coordinate system. The complex composition of myocardial layers including the change of fiber orientation with location may also allow more insight into the effect of pathologies on function.Different modalities (Echo, MRI, CT) have been proposed for the assessment of such parameters. While in MRI regional parameters have predominately been used for research purposes, the development of speckle-tracking echocardiography (STE) and its evaluation has pushed towards clinical applications of regional myocardial functional parameters. In MRI, the recent push towards analysis of strain based on standard cine SSFP techniques enables further analysis without impact on scanning workflow; and with the use of modern post-processing semi-automated/automated approaches appear feasible. At this stage, normal ranges and the test-retest variability of the different algorithms are under evaluation.The clinical use of such techniques may allow for earlier identification of subclinical pathology and as such may trigger therapy decisions at earlier time points.Standardization of approaches and definition of normal ranges may be required for different techniques; preferably black box approaches should be avoided.

Active Handout:Bernd J. Wintersperger

http://abstract.rsna.org/uploads/2018/16001381/WinterspergerRSNA2018 RC303-04.pdf

RC303-05 Standardization for FT-CMR Strain Analysis: The Long Road to an Imaging Biomarker

Tuesday, Nov. 27 9:40AM - 9:50AM Room: E350

Participants
Moritz Halfmann, Mainz, Germany (*Presenter*) Nothing to Disclose
Sebastian Benz, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Andre Lollert, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Christoph Dueber, MD, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Karl F. Kreitner, MD, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Tilman S. Emrich, MD, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

While post-processing feature tracking cardiac magnetic resonance (FT-CMR) imaging is rapidly evolving, the literature available still remains scarce. This is especially striking for the right ventricle (RV), where only 9 out of the 17 publications recently compiled in a meta-analysis by Vo et al. included the RV. In order to establish imaging biomarkers however, it is essential to have a broad dataset to analyze and then standardize for various influencing factors.

METHOD AND MATERIALS

CMR was performed on 62 carefully selected healthy volunteers at 3T (Magnetom Skyra®, Siemens Healthineers). Eligible for inclusion were adults without any cardiac disease history from 20 to 80 years old who were then stratified in 3 age groups with uniform distribution of men and woman. A semi-automatic tissue tracking software (CVI42 Circle®) then subsequently tracked the myocardial movement enabling us to calculate strain parameters, standardize for age and sex using ANOVA and establish reference values for the right ventricle.

RESULTS

The following mean normal values for the RV were found: global radial strain 13.47% (+- 6.46), global circumferential strain -7.61% (+- 3.92) and median global longitudinal strain -24.35% (+- 5.22). RV strains values were significantly different between old and young individuals ($p<0.05$), while sex had a smaller impact. Interestingly, all global left ventricular strains showed statistically significant differences with regard to sex (all $p<0.05$) but not with regard to age.

CONCLUSION

Parts of our results contrast those of recently published studies. These differences might be explained by the use of different software, number of slices used for tracking and measured strain parameters. This stresses the urgent need of further standardization before we can effectively employ FT-CMR in clinical routine.

CLINICAL RELEVANCE/APPLICATION

FT-CMR derived imaging biomarkers hold a great potential to increase the diagnostic accuracy for myocardial pathologies while simultaneously reducing the need for more invasive diagnostic measures.

RC303-06 Strain Analysis Using Feature Tracking Cardiac Magnetic Resonance (FT-CMR) In Assessment of Myocardial Viability in Chronic Ischemic Patients

Tuesday, Nov. 27 9:50AM - 10:00AM Room: E350

Awards
Student Travel Stipend Award

Participants
Sara W. Tantawy, MBBCh, Aswan, Egypt (*Presenter*) Nothing to Disclose
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PURPOSE

To determine the strength of peak circumferential and radial strain analysis by FT-CMR using routinely acquired cine images in differentiating between viable and non-viable myocardium in chronic ischemic patients.

METHOD AND MATERIALS

CMR exams were performed on a 1.5T machine to assess viability in 30 patients with chronic ischemia, 26 males and 4 females, with a mean age of 55 (range=33-85 years). Mean ejection fraction was 40±12%. Short axis standard steady-state in free-precession(SSFP) cine images were used in peak circumferential and radial strain quantification, and results were compared with regional wall motion and visually evaluated late gadolinium enhancement (LGE) scar transmurality. A total of 480 segments for ischemic patients were analyzed. 135 segments were hypokinetic, 78 were akinetic and only 1 segment was dyskinetic. 76 segments were non-viable and 404 segments were viable based on LGE. CMR exams of a control group of 10 healthy volunteers with a mean age of 38±11 were used. 160 normal myocardial segments were analyzed.

RESULTS

Peak global circumferential strain was statistically significantly impaired in ischemic patients compared to controls(-13.29 ±8.98 vs. -19.63 ±7.08),P< 0.0001. Similarly, peak global radial strain was statistically significantly impaired in ischemic patients compared to controls(21.88 ±17.96 vs. 30.90 ±18.59),P<0.0001. Segmental circumferential strain was statistically significantly impaired in non-viable segments compared to viable segments(-8.21 ±9.32 vs. -14.26 ±8.64),P<0.0001. Segmental radial strain was statistically significantly impaired in non-viable segments compared to viable segments(14.68 ±13.59 vs. 23.24 ±18.49),P<0.0001. A cut-off point of circumferential strain of -8 was attained (below which the segment is considered as non-viable) with sensitivity 58 %, specificity 84%, NPV 90%, PPV 44% and diagnostic accuracy 79%. A cut-off point of radial strain of 14 was attained (below which the segment is considered as non-viable) with sensitivity 55%, specificity 73%, NPV 90%, PPV 28% and diagnostic accuracy 70%.

CONCLUSION

FT-CMR is a time-efficient post processing tool than can reliably aid in differentiating viable and non-viable myocardium with no need for additional sequence acquisition or contrast administration.

CLINICAL RELEVANCE/APPLICATION

FT-CMR can robustly predict prognosis by viability assessment and is recommended in routine CMR exams before percutaneous intervention.

RC303-07 Valvular Flow Quantification with Phase Contrast Imaging (2D, 4D)

Tuesday, Nov. 27 10:20AM - 10:45AM Room: E350

Participants
Michael Markl, PhD, Chicago, IL (*Presenter*) Institutional research support, Siemens AG; Consultant, Circle Cardiovascular Imaging Inc;

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LEARNING OBJECTIVES

1) Understand principles and techniques for cardiovascular flow quantification using 2D phase contrast MRI and 4D flow MRI. 2) Describe advantages of 4D flow MRI for the comprehensive assessment of valvular flow characteristics. 3) Identify possible applications of 2D and 4D flow MRI in clinical cardiovascular imaging.

RC303-08 4D Flow in vitro Evaluation of Aortic Valve Replacements Reveals Physiologic Hemodynamics Distal to Mechanical Valves in Contrast to Biological Valves

Tuesday, Nov. 27 10:45AM - 10:55AM Room: E350

Participants
Thekla Helene Oechtering, MD, Luebeck, Germany (*Presenter*) Nothing to Disclose
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PURPOSE

To evaluate hemodynamics distal to mechanical and biological aortic valves in vitro by 4d flow MRI.

METHOD AND MATERIALS

Five aortic valve prostheses of identical diameter [mechanical valves, MV: trileaflet valve (prototype), On-X (CryoLife); biological

valves, BV: Perimount Magna Ease (Carpentier-Edwards), Trifecta valve (Abbott), Tribio (protoype); all 21mm] were placed in a flexible silicone aortic phantom (Elastrat, Switzerland). Scans were conducted at 3T with and without valves under pulsatile flow conditions (60 bpm with home-built piston pump) in a pressure-controlled model using Gadolinium-doped blood mimicking fluid (36.6% glycerin solution). Three levels of cardiac output (CO) were tested to simulate ascending flow conditions (CO-1, CO-2, CO-3). Time-resolved velocity information of every voxel was measured and analyzed using GTFlow (GyroTools, CH). Hemodynamic parameters and presence of secondary flow patterns were evaluated.

RESULTS

There was a pronounced central ejection jet in the aortic bulb distal to biological valves at all COs with higher peak velocities compared to mechanical ones (e.g. CO-2 Bulb: MV 138±12cm/s; Tribio+Perimount: 198±15cm/s; Trifecta: 159cm/s), indicating a relative stenosis of BV compared to MV with the same diameter. All valves were regurgitant with an average retrograde volume of 10±3ml. While mechanical valves resulted in near-physiological aortic flow patterns with pronounced sinus vortices, there was marked formation of secondary helices and vortices in the ascending aorta distal to biological valves at all CO-levels altering commonly observed primary flow patterns.

CONCLUSION

Biological valves result in increased flow velocities in the aortic bulb and ascending aorta as compared to mechanical valves. The valve leaflets of the Trifecta valve are attached at the outside of the commissures in contrast to other BV. Apparently, this results in a lesser degree of relative stenosis with peak velocities between those of MV and BV. In addition, biological valves also caused secondary flow patterns in contrast to mechanical valves that revealed near-to-normal hemodymamics. These results are in line with previous turbulent kinetic energy measurements and CFD simulations.

CLINICAL RELEVANCE/APPLICATION

Aortic flow patterns distal to mechanical valves more closely mirror physiology which may translate in alterations in kinetic energy or wall shear forces and thus influence patients' long-term health.

RC303-09 4D Flow MRI Evaluation of a New Technique of Valve-Sparing Aortic Root Replacement (VSARR)

Tuesday, Nov. 27 10:55AM - 11:05AM Room: E350

Participants
Valentina Silvestri, Lille, France (*Presenter*) Nothing to Disclose
Edouard Gabiano, Lille, France (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

The aim of this study was to evaluate hemodynamics and blood flow patterns by 4D flow MRI after a modified VSARR in comparison with the standard David procedure. The new technique is conceived to ease the operative procedure, avoid prosthesis and annular deformation and facilitate coronary reimplantation.

METHOD AND MATERIALS

27 patient (23 males; mean age= 59.5 ±13.14) including 13 patients after David procedure (group 1) and 14 patients after the modified one (group 2) underwent 4D flow evaluation with a 1.5 T MRI system (Siemens MAGNETOM Aera, Siemens Healthineers, Erlangen, Germany). Four-dimensional flow CMR data were acquired using a sagittal oblique volume covering the thoracic aorta. Data were transferred to an onsite computer equipped with a commercially available software CAAS (Pie Medical Imaging, Maastricht, The Netherlands). Average interval from surgery was 8.7 ±1.7 years. Analysis included (a) wall shear stress (WSS) measurements performed at different levels of the thoracic aorta (neo-sinuses, sinotubular junction, ascending aorta and proximal arch), (b) qualitative assessment of flow pattern (laminar, helical or turbulent) and (c) flow eccentricity using a 3-point scale.

RESULTS

No significant differences were found between the two groups in terms of: (a) WSS (neo-sinuses: 1183 mPa ±610 vs 1418 ±664, p=0.35; sinotubular jonction: 1577 ±519 vs 1864 ±673, p=0.23; ascending aorta: 1464 ±598 vs 1697 ±430, p=0.25; arch: 835 ±401 vs 898 ±214, p=0.62) and (b) flow pattern mainly rated as turbulent in both groups (p=0.12). A higher overall degree of flow eccentricity was observed in group2 mainly rated as moderate (6/14, 43%) without significant difference with group1 (6/13, 46% rated as central; p=0.34).

CONCLUSION

4D flow MRI demonstrates similar haemodynamics and blood flow patterns with the simplified David procedure compared with the classical one.

CLINICAL RELEVANCE/APPLICATION

MRI 4D flow allows a detailed analysis of post-surgical hemodynamic profile of the thoracic aorta.

RC303-10 Multiparametric Myocardial MR Mapping (T1, T2 and T2*)

Tuesday, Nov. 27 11:05AM - 11:30AM Room: E350

Participants

Kate Hanneman, MD, FRCPC, Toronto, ON (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Describe the basic techniques of myocardial MR mapping. 2) Explain the role of myocardial MR mapping. 3) Identify findings of common diseases on T1, T2, and T2* maps.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Kate Hanneman, MD, FRCPC - 2017 Honored EducatorKate Hanneman, MD, FRCPC - 2018 Honored Educator

RC303-11 Comparison of Different Cardiovascular Magnetic Resonance Sequences for Native, Stress and Post-Contrast Myocardial T1 Mapping: Preliminary Results

Tuesday, Nov. 27 11:30AM - 11:40AM Room: E350

Participants
Hui Zhou, MD, Changsha, China (*Presenter*) Nothing to Disclose
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Faraz Pathan, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Luca Arcari, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
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Moritz H. Albrecht, MD, Frankfurt am Main, Germany (*Abstract Co-Author*) Speaker, Siemens AG
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To compare the native, stress and post-contrast T1 values obtained from different sequences for T1 mapping of the myocardium.

METHOD AND MATERIALS

We compared three T1 mapping sequences (FFM, MPI and LONG/SHORT) of 211 consecutive populations (patients and healthy volunteers) using conservative septal technique as the standardized approach. We calculated ventricular septum and related blood T1 in vivo through subsequent parametric mapping. We also analyzed the T1 differences of these sequences in native, stress and post-contrast conditions.

RESULTS

T1 values differed significantly depending on the sequence, with MPI providing consistently higher mean values than FFM (1310±62 ms vs. 1150±63 ms in native condition, 1327±63 ± 28 ms vs. 1153±61 ms in stress condition and 604±65 ms vs. 588±64 ms in post-contrast condition, mid-ventricular, respectively; $p < 0.001$), LONG providing higher and SHORT providing lower mean values than FFM (1075±109 ms vs. 1042±80 ms in native condition, 519±77 ms vs. 535±68 ms in post-contrast condition, mid-ventricular, respectively; $p < 0.001$) . T1 values also differed significantly depending on the stress, with stress FFM and MPI providing higher mean values than the native (1147±69 ms vs. 1135±63 ms, 1327±63 ms vs. 1302±57 ms, mid-ventricular, respectively; $p < 0.001$). On Passing-Bablok regression analysis, MPI is significantly correlated with FFM in native, stress and post-contrast (r=0.501, 0.450, 0.871, respectively; $p < 0.001$). FFM is significantly correlated with LONG, SHORT in mid-ventricular segment (r=0.805, 0.966, respectively; $p < 0.001$). On Bland-Altman analysis, the mean difference (95% limits of agreement) between MPI and FFM in native, stress and post-contrast is 160.1ms(48.8ms-271.4), 173.8ms(46.1ms-301.6ms), 16.8ms(42.4ms-75.9ms), respectively. The mean difference (95% limits of agreement) between FFM and LONG, SHORT in mid-ventricular segment is 32.3ms(-79.3ms-144.0), -17.2ms(-58.3ms-23.9ms), respectively.

CONCLUSION

FFM and MPI showed good agreement with MPI values are much higher than FFM. FFM and LONG/SHORT showed good agreement with LONG values are higher than FFM and SHORT values are lower than FFM. Stress increase the T1 values of myocardium in FFM and MPI.

CLINICAL RELEVANCE/APPLICATION

T1 values differed significantly depending on the sequence and therefore it is necessary to respectively establish the T1 normal reference range according to different sequences.

RC303-12 Native T1 Value and Extracellular Volume of Infarct Myocardium for Predicting Adverse Left Ventricular Remodeling

Tuesday, Nov. 27 11:40AM - 11:50AM Room: E350

Participants
Mengxi Yang, MS, Chengdu, China (*Presenter*) Nothing to Disclose
Zhigang Yang, MD, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose
Ying-Kun Guo, MD, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

In T1-mapping techniques, native T1 value and extracellular volume (ECV) of infarct myocardium are applied to assess the severity of injury and predict functional recovery in patients with acute myocardial infarction (MI). We sought to investigate whether native T1infarct value and ECVinfarct is affected by microvascular obstruction (MVO) and have predict value for adverse left ventricular (LV) remodeling post-MI.

METHOD AND MATERIALS

54 MI patients underwent acute and 3-month 3T CMR, including cine, T1-mapping and late gadolinium enhancement (LGE). Infarct zone was determined by LGE image and then transposed to native T1-mapping and ECV mapping images for native T1infarct value and ECVinfarct measurement. The visible hypo-intensity core within infarct zone was eliminated when MVO presented.

RESULTS

Among 54 patients, 36 (66.67%) had MVO in acute phase and 20 (37.04%) developed adverse LV remodeling in chronic phase. There wasn't significant difference in T1infarct value between patients with and without MVO (1474.7 ± 63.5ms vs. 1495.4 ± 98.0ms, P = 0.352), while ECVinfarct is higher in patients with MVO than those without (58.66 ± 8.71% vs. 49.64 ± 8.82%, P = 0.001). T1infarct value merely had the correlation with the 3-month change of end-diastolic LV volume (rMVO absent = 0.483, P = 0.042) and predicted LV remodeling in patients without MVO (rMVO absent = 0.659, P = 0.003); ECVinfarct had the correlation with the change of end-diastolic LV volume (rall patients = 0.564, P < 0.001) and predicted LV remodeling in all patients (rMVO absent = 0.626, P = 0.005; rMVO present = 0.686, P < 0.001; rall patients = 0.622, P < 0.001). In multivariable logistic analysis, ECVinfarct was also associated with LV remodeling (ß= 0.312, P = 0.007).

CONCLUSION

In infarct myocardium, native T1 value might be influenced by MVO but ECV isn't. T1infarct value predicts LV remodeling in MVO absent MI and ECVinfarct predicts LV remodeling in all MI.

CLINICAL RELEVANCE/APPLICATION

The combination of native T1 value and ECV in infarct myocardium has the potential to predict adverse LV remodeling post-MI and select high-risk patients who need more aggressive treatments.

RC303-13 Artificial Intelligence Machine Learning-based Prediction of Hematocrit Values from Native MRI Myocardial T1-maps to Avoid Blood Sampling for Extracellular Volume Fraction Analysis

Tuesday, Nov. 27 11:50AM - 12:00PM Room: E350

Participants
Akos Varga-Szemes, MD, PhD, Charleston, SC (*Abstract Co-Author*) Research Grant, Siemens AG
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U. Joseph Schoepf, MD, Charleston, SC (*Abstract Co-Author*) Research Grant, Astellas Group; Research Grant, Bayer AG; Research Grant, Siemens AG; Research support, Bayer AG; Consultant, Guerbet SA; Consultant, General Electric Company; Consultant, HeartFlow, Inc; Consultant, Bayer AG; Consultant, Siemens AG; ; ;
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PURPOSE

To evaluate a machine learning (ML) algorithm developed in-house to estimate blood hematocrit levels (Hct) from native MRI myocardial T1-maps in order to avoid blood sampling prior to cardiac MRI studies involving extracellular volume fraction (ECV) analysis.

METHOD AND MATERIALS

A total of 51 consecutive patients (age 56±13y) selected from a prospective study who underwent cardiac MRI (Avanto, Siemens, Erlangen, Germany) at 1.5T were included. MRI protocol consisted of native (MOLLI scheme 5(3)3) and post-contrast (15-min post-Gd, scheme 4(1)3(1)2) T1-maps of the myocardium. Native blood R1 (1/T1) values were measured in the left ventricle for Hct estimation. A linear regression (LR) analysis was applied to model the relationship between the image-derived data and laboratory Hct values. For the ML approach, 31 additional features based on patient demographics, clinical history, and imaging parameters were extracted and used to train a linear Support Vector Machine employing k-fold cross validation. ECV values were calculated based on each Hct and compared by the Friedman-test. Derived Hct values were compared using linear regression and the Friedman-test.

RESULTS

Average native blood T1 and R1 measurements were 1654±142ms and 0.60±0.04s-1, respectively. Hct derived from native T1-maps by the LR and ML algorithms were 38.7±3.3% and 39.1±3.6%, respectively, and did not show statistical difference when compared to laboratory Hct values (38.7±4.8; P=0.446). The LR approach provided the following model for Hct calculation: Hct[%]=89.8×R1[native,blood] -19.0]. The LR model-based Hct demonstrated a weaker relationship with laboratory Hct values (r=0.70; P<0.001). The ML model showed a moderate relationship to blood-sampled Hct values (r=0.78; P<0.001). Analysis of the residuals demonstrated an increase in accuracy for the ML approach compared to the LR model (RMSE 3.07 vs. 3.47). ECV values derived from LR, ML, and lab techniques were in good agreement (38.1±16.9, 37.9±16.8, and 37.9±17.0%, respectively; P=0.475).

CONCLUSION

The ML-based algorithm provides accurate Hct estimation and reliable myocardial ECV calculation, highlighting its potential in clinical

workflows to generate ECV without the need for same-day laboratory Hct measurement.

CLINICAL RELEVANCE/APPLICATION

This study demonstrates the benefit of a ML strategy to eliminate the need for blood sampling prior to cardiac MRIs involving myocardial ECV measurement.

RC304

Musculoskeletal Series: Ultrasound

Tuesday, Nov. 27 8:30AM - 12:00PM Room: E450A

MK US

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Viviane Khoury, MD, Philadelphia, PA (*Moderator*) Nothing to Disclose
Linda Probyn, MD, Toronto, ON (*Moderator*) Nothing to Disclose
Jon A. Jacobson, MD, Ann Arbor, MI (*Moderator*) Research Consultant, BioClinica, Inc; Advisory Board, General Electric Company; Advisory Board, Koninklijke Philips NV; Royalties, Reed Elsevier
Marnix T. van Holsbeeck, MD, Detroit, MI (*Moderator*) Minor stockholder, Koninklijke Philips NV; Minor stockholder, General Electric Company; Stockholder, MedEd3D; Grant, Siemens AG; Grant, General Electric Company;

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LEARNING OBJECTIVES

Moderator

ABSTRACT

Moderator

Sub-Events

RC304-01 Shoulder Ultrasound (Demonstration)

Tuesday, Nov. 27 8:30AM - 9:05AM Room: E450A

Participants
Viviane Khoury, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Describe the ultrasound anatomy of shoulder structures evaluated in a routine shoulder examination. 2) Learn the standardized approach used in the evaluation of the shoulder with US. 3) Demonstrate the scanning technique for the dynamic examination of common shoulder lesions. 4) Outline how to position patients optimally for the evaluation of the shoulder respecting ergonomics.

RC304-02 The Use of Dynamic Ultrasound in the Diagnosis and Follow-up of Patients with Clinically Suspected Slipping Rib Syndrome

Tuesday, Nov. 27 9:05AM - 9:15AM Room: E450A

Participants
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Kevin Wong, DO, East Lansing, MI (*Abstract Co-Author*) Nothing to Disclose
Lisa McMahon, MD, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
Monique Riemann, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Slipping Rib Syndrome (SRS) is a condition that affects adolescents and young adults. Dynamic Ultrasound imaging has a potential and likely significant role; however, limited data exists describing the protocol and techniques available. It is our intent to describe the development of an effective and reproducible protocol for dynamic imaging in patients with SRS.

METHOD AND MATERIALS

Retrospective review was performed of suspected SRS patients presenting to the Radiology or Surgery department from March to

December 2017. 29 patients were evaluated. Focused history was taken, and imaging was performed at the site of pain. Images of the bilateral 6th-11th ribs were obtained at rest and with dynamic maneuvers. Dynamic maneuvers included Valsalva, crunch, focal rib push/compression, and any provocative movement that elicited pain per the patient. Imaging was correlated with medical/surgical records generated by the pediatric surgeon specializing in treatment of slipping ribs. Group comparisons were conducted using the Wilcoxon rank sum and Fisher's exact test. Sensitivity and specificity were provided with the 95% confidence interval (CI) based on the binomial distribution and exact confidence limits.

RESULTS

21 of 29 patients had a clinical diagnosis of SRS, with an average age of 17 years. 4 patients were scanned twice for a total of 33 scans. 21 patients were female, while 8 were male. 66% (19/29) were athletes, with average BMI of 22.7. Dynamic ultrasound correctly detected SRS in 92% (23/25) of cases and correctly excluded SRS in 100% (8/8) of cases. The push maneuver demonstrated the highest sensitivity (87% (0.62,0.98)) followed by morphology (76% (0.55,0.91)) and then crunch maneuver (73% (0.50,0.89)). Valsalva was the least sensitive (10% (0.01,0.32)). Both false negative examinations did not utilize dynamic crunch or push maneuvers.

CONCLUSION

Dynamic Ultrasound imaging of the ribs, particularly with utilization of crunch and push maneuvers, is an effective and reproducible tool for the diagnosis of SRS. Valsalva has a limited role for the detection of slipping rib given low sensitivity. Ultrasound has the ability to give the surgeon morphological data and information on additional ribs that are at risk, thereby assisting in surgical planning.

CLINICAL RELEVANCE/APPLICATION

Dynamic Ultrasound is a valuble tool in the diagnosis and surgical planning of an uncommon and likely underrecognized entity; Slipping Rib Syndrome.

RC304-03 Supraspinatus Muscle Shear Wave Elastography (SWE): Detection of Biomechanical Differences with Varying Tendon Quality Prior to Gray-scale Morphologic Changes

Tuesday, Nov. 27 9:15AM - 9:25AM Room: E450A

Awards
Student Travel Stipend Award

Participants
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James S. Babb, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Ronald S. Adler, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study was to determine whether SWE can detect biomechanical changes in the supraspinatus muscle that occur with increasing supraspinatus tendon abnormality prior to morphologic gray-scale changes.

METHOD AND MATERIALS

An IRB approved, HIPAA compliant mixed retrospective/prospective study of shoulder ultrasounds from 2013-2018 was performed. Images were acquired by a single radiologist with 26 years musculoskeletal ultrasound experience on a Siemens Acuson S3000 with Virtual Touch™ IQ in longitudinal orientation to the supraspinatus muscle with shear wave velocity (SWV) point quantification. Tendon and muscle were graded in order of increasing tendinosis/tear (e.g. tendon grade 1=normal tendon or mild tendinosis without tear to grade 4=full-thickness tear) and increasing fatty infiltration (0-3 scale). Mixed model analysis of variance, analysis of covariance, and Spearman rank correlation were used for statistical analysis.

RESULTS

The cohort consisted of 79 patients (mean age 54±15 years-old; 47% male, 53% female) with 100 ultrasounds. There was no statistically significant age or sex dependence for supraspinatus muscle SWV (p=0.886, 0.119, respectively). There was no significant correlation between muscle SWV and muscle or tendon grade (p=0.744, 0.377, respectively). In patients with morphologically normal muscle on gray-scale ultrasound, there were significant differences in muscle SWV when comparing tendon grade 3 with grades 1, 2, and 4 (p=0.018, 0.025, 0.014, respectively), even when adjusting for gender and age (p=0.044, 0.028, 0.018, respectively). Pairwise comparison of tendon grades other than those mentioned did not achieve statistical significance (p>0.05).

CONCLUSION

SWE can detect biomechanical differences within the supraspinatus muscle that are not morphologically evident on gray-scale ultrasound. Specifically, supraspinatus partial tears with at least moderate tendinosis may correspond to biomechanically distinct muscle properties compared to both lower grades of tendon abnormality and full-thickness tears.

CLINICAL RELEVANCE/APPLICATION

SWE may be a novel tool to quantitatively evaluate muscle quality in the setting of rotator cuff disease. Further research is needed to determine whether this may aid prognosis for repair outcomes.

RC304-04 Prevalence of Pseudoerosions of the Hand and Wrist: Ultrasound Findings in 100 Asymptomatic Volunteers

Tuesday, Nov. 27 9:25AM - 9:35AM Room: E450A

Awards
Student Travel Stipend Award

Participants

Anna L. Falkowski, MD, Basel, Switzerland (*Presenter*) Nothing to Disclose
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Vivek Kalia, MD, MPH, New York, NY (*Abstract Co-Author*) Nothing to Disclose
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Girish Gandikota, MBBS , Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Ralf G. Thiele, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Identification of cortical erosions with ultrasound is an important finding that can indicate inflammatory arthritis. While cortical depressions have been described in several metacarpal heads that may potentially simulate an erosion, we have noted similar "pseudoerosions" more frequently than prior descriptions, and with more extensive involvement of the wrist. Thus, our purpose is to evaluate the frequency and location of these pseudoerosions in asymptomatic volunteers.

METHOD AND MATERIALS

After IRB approval and obtaining informed consent,100 subjects without hand or wrist symptoms were examined bilaterally with ultrasound. Dorsal metacarpal heads, lunate, triquetrum, and distal ulna were examined. Cortical depressions were characterized with regard to location (central, marginal, both), morphology (irregularity, ring-down artifact), and dimensions (length and depth) by two fellow-trained musculoskeletal radiologists in consensus.

RESULTS

Study group consisted of 52 male and 48 female subjects with mean age of 47 ± 16 years. Metacarpal (MC) heads showed a central pseudoerosion in various frequencies (MC1: 21.5%; MC2: 92%; MC3: 85.5%; MC4: 59.5%; MC5: 81%). Only one marginal erosion was present at a MC5 and a marginal plus central at a MC2. Pseudoerosions were present at the lunate (82%), triquetrum (84%), and distal ulna (20%), and were multiple (lunate: 40%; triquetrum: 27%, ulna 5%). Ring-down artifact (30.25 - 49.7%) was present more than cortical irregularity (12.6 - 27.9%) of the pseudoerosions. Mean pseudoerosion length and depth of MC was 3 mm (range: 0.6 - 9 mm) and 0.7 mm (range: 0.2 - 8), respectively. Wrist dimensions for pseudoerosions varied slightly for the lunate (length: 2.1; depth: 0.8), triquetrum (length: 1.7; depth: 1.0), and ulna (length: 1.7; depth: 1.1) with a range of 0.3 - 6 mm in length, and 0.3 - 5 mm in depth.

CONCLUSION

Central pseudoerosions are a typical finding of metacarpal heads, lunate, triquetrum, and distal ulna in asymptomatic patients and should not be misinterpreted as inflammatory arthritis.

CLINICAL RELEVANCE/APPLICATION

Knowledge of erosion mimickers and their characteristics will enable the differentiation between a physiologic finding and a true inflammatory bone defect.

Honored Educators

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RC304-05 Wrist Ultrasound (Demonstration)

Tuesday, Nov. 27 9:35AM - 10:10AM Room: E450A

Participants
Linda Probyn, MD, Toronto, ON (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Describe an approach to ultrasound examination of the wrist including dynamic imaging. 2) Identify potential pitfalls. 3) Review important anatomy of the wrist including tendons, ligaments, nerves and common sites of pathology.

RC304-06 Hip Ultrasound (Demonstration)

Tuesday, Nov. 27 10:20AM - 10:55AM Room: E450A

Participants
Jon A. Jacobson, MD, Ann Arbor, MI (*Presenter*) Research Consultant, BioClinica, Inc; Advisory Board, General Electric Company; Advisory Board, Koninklijke Philips NV; Royalties, Reed Elsevier

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LEARNING OBJECTIVES

1) Be able to list the components of an ultrasound scanning protocol to evaluate the hip. 2) Recognize normal hip anatomy as seen with ultrasound. 3) Understand ultrasound scanning pitfalls.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying

educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Jon A. Jacobson, MD - 2012 Honored EducatorJon A. Jacobson, MD - 2017 Honored Educator

RC304-07 Ultrasound Guided Targeted High Volume Injection (HVI) of the Rotator Cuff Interval versus Supervised Physical therapy for Primary Adhesive Capsulitis of Shoulder: A Randomized Control Study

Tuesday, Nov. 27 10:55AM - 11:05AM Room: E450A

Participants
Joban Babhulkar, MBBS,DMRD, Pune, India (*Presenter*) Nothing to Disclose
Vishal Walasangikar, MD,MBBS, Pune, India (*Abstract Co-Author*) Nothing to Disclose
Vishnu R. Unnithan, MBBS,DO, Pune, India (*Abstract Co-Author*) Nothing to Disclose
Ashish Babhulkar, MBBS,DO, Pune, India (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

High volume injection (HVI) is a promising treatment option for severe adhesive capsulitis, for faster rehabilitation. We present a single center, single blinded, matched parallel randomized control trial (RCT) comparing ultrasound-guided HVI through rotator cuff interval followed by supervised physical therapy, versus supervised physical therapy alone for severe primary adhesive capsulitis of shoulder joint.

METHOD AND MATERIALS

40 patients were randomized in to two groups: Group-A (n=20) underwent supervised physiotherapy in addition to HVI, and Group-B (n=20) underwent supervised physiotherapy in isolation. A blinded researcher carried out assessments at 0,3 & 6 months. The primary outcome measure was shoulder range of motion (ROM), especially external rotation. In addition UCLA score, VAS score, cuff strength, failure rates and return to pre-disease activity levels were assessed.

RESULTS

Group-A fared better in all parameters at 2 weeks and 3 months, but by 6 months the outcome results of both the groups were similar. In Group-A, the external rotation improved significantly from 4.50 (-300 to 200) at baseline to 43.250 (150 to 800; $P<0.05$) at 3 months and 51.250 (150 to 850) at 6 months; which were 6.250 (-200 to 250), 36.750 (150 to 600) and 47.50 (150 to800) respectively in Group-B. Group-A had statistically significant improvement in UCLA score ($p<0.05$) compared to Group-B at 3 months, but which were almost similar by 6 months. In both the groups, all the outcome measures improved significantly from baseline to 6 months ($p<0.05$).

CONCLUSION

In conclusion, HVI is distinct from hydrodilation and patients who underwent HVI had rapid pain relief with earlier regaining of movements and earlier returning to their pre-disease activity levels.

CLINICAL RELEVANCE/APPLICATION

HVI is distinct from Hydrodilataion in which the former targets the basic pathological component in adhesive capsulitis, namely Coroco-Humeral Ligament, unlike causing diffuse capsular breakage like the later procedure. HVI is a relatively simple, cost effective and safer procedure producing superior outcomes, if given as an adjunct to physical therapy.

RC304-08 Diagnostic Performance of High-Resolution Ultrasound in the Evaluation of Intrinsic and Extrinsic Ligaments of the Wrist in Patients with Previous Trauma or Carpal Instability

Tuesday, Nov. 27 11:05AM - 11:15AM Room: E450A

Participants
Salvatore Gitto, MD, Milan, Italy (*Presenter*) Nothing to Disclose
Domenico Albano, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Carmelo Messina, MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Angelo Corazza, MD, Genova, Italy (*Abstract Co-Author*) Nothing to Disclose
Santi Rapisarda, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Luca Maria Sconfienza, MD, PhD, Milano, Italy (*Abstract Co-Author*) Travel support, Bracco Group; Travel support, Esaote SpA; Travel support, ABIOGEN PHARMA SpA; Speakers Bureau, Fidia Pharma Group SpA

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PURPOSE

To investigate the role of ultrasound (US) in the evaluation of intrinsic and extrinsic ligaments of the wrist having magnetic resonance arthrography (MRA) as reference standard.

METHOD AND MATERIALS

This IRB-approved prospective study included 19 patients (12 men, 7 women; mean age 44 ± 19 SD years) referred for MRA of the wrist and having history of a previous trauma or carpal instability. All patients provided informed consent. US examination was performed just before MRA by a musculoskeletal radiologist using a commercially available US system equipped with a 14-6 MHz linear transducer. The intrinsic interosseus and midcarpal, collateral, and extrinsic ligaments were evaluated on both the dorsal and volar sides of the wrist. Ligament thickness was measured and tears were detected. After a delay of 2-3 months aimed at minimizing the recall of specific cases, the same radiologist re-assessed ligament thickness and integrity on the MRA images that

were previously obtained with a 1.5 T unit. Ligament detection rate between US and MRA was calculated using the Chi-square test. Ligament thickness reproducibility between US and MRA was assessed using the Bland-Altman method.

RESULTS

On the dorsal side, US detected more ligaments (108/114, 94.7%) than MRA (96/114, 84.2%; P=0.016), while on the volar side the difference was not significant (149/171, 87.1% vs. 156/171, 91.2%, respectively; P=0.296). Among detectable ligaments, thickness reproducibility ranged between 44% (COR=0.9, bias=-0.8, P<0.001) of the volar ulnocapitate ligament and 71% (COR=0.05, bias=-0.1, P<0.001) of the volar scaphotriquetral ligament. Diagnostic performance of US for ligaments where a tear was found was 100% sensitivity, 100% specificity, 100% VPP, 100% VPN, 100% accuracy for the volar and dorsal scapholunate ligaments, and the ulnar collateral ligament; it was 100%, 94%, 50%, 100%, 94%, respectively, for the volar ulnolunate ligament.

CONCLUSION

US has similar diagnostic performance to MRA in the assessment of intrinsic and extrinsic carpal ligaments and ligamentous tears. Future studies focused on a larger cohort of patients are warranted.

CLINICAL RELEVANCE/APPLICATION

High-resolution US seems to be a valuable and promising technique for the assessment of intrinsic and extrinsic carpal ligaments and ligamentous tears.

RC304-09 Short and Long Term Outcomes of Ultrasound Guided Percutaneous Tenotomy for Lateral Epicondylitis

Tuesday, Nov. 27 11:15AM - 11:25AM Room: E450A

Participants
Faysal Altahawi, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Brittani Demarest, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Michael C. Forney, MD, Cleveland, OH (*Presenter*) Nothing to Disclose

PURPOSE

In this study, we evaluate long and short-term outcomes of ultrasound guided percutaneous tenotomy of the common extensor origin in the elbow for patients with lateral epicondylitis.

METHOD AND MATERIALS

Institutional review board approval was obtained. 44 consecutive patients that had received ultrasound-guided percutaneous tenotomy of the common extensor origin for lateral epicondylitis were retrospectively identified. All included cases were performed by a single operator using the Tenex Health TXTM system. The patients were surveyed and asked to retrospectively evaluate their symptoms before the procedure, 2 weeks after the procedure, 3 to 6 months after the procedure, and 1 year after the procedure using the Disabilities of the Arm, Shoulder and Hand Score (QuickDASH) survey as well as the Oxford Elbow Score (OES) survey. Scores were compared using paired two-tailed students T-test.

RESULTS

QuickDASH survey scores were significantly improved for symptoms 3-6 months and 1 year after ultrasound guided percutaneous tenotomy as compared to symptoms before intervention (P=0.023 and P=0.008, respectively), but were not significantly changed for symptoms 2 weeks after the procedure (P=0.903). Oxford Elbow Score survey similarly demonstrated improved scores in the pain, elbow function, and social-psychological domain sub-scales as compared to pre-procedural scores for symptoms 3-6 months after the procedure (P=0.023, P=0.009, and P=0.008, respectively) and 1 year after the procedure (P=0.008, P<0.001, and P=0.038, respectively), but were not significantly changed for symptoms 2 weeks after procedure (P=0.903, P=0.718, and P=0.387, respectively).

CONCLUSION

When retrospectively surveyed, patients that receive ultrasound guided percutaneous tenotomy using the Tenex Health TXTM system for lateral epicondylitis feel their symptoms are significantly better 3-6 months and 1 year after the procedure, and that symptoms are not significantly better or worse 2 weeks after the procedure.

CLINICAL RELEVANCE/APPLICATION

Ultrasound guided percutaneous tenotomy for lateral epicondylitis is effective and may provide an alternative to surgical tenotomy.

RC304-10 Ankle Ultrasound (Demonstration)

Tuesday, Nov. 27 11:25AM - 12:00PM Room: E450A

Participants
Marnix T. van Holsbeeck, MD, Detroit, MI (*Presenter*) Minor stockholder, Koninklijke Philips NV; Minor stockholder, General Electric Company; Stockholder, MedEd3D; Grant, Siemens AG; Grant, General Electric Company;

LEARNING OBJECTIVES

1) Describe an approach to ultrasound examination of the ankle using a four quadrant approach and including dynamic imaging. 2) Identify potential pitfalls of scanning that mimic disease. 3) Review important anatomy of the ankle including retinacula, tendons, ligaments, nerves and common sites of pathology.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
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RC305

Neuroradiology Series: Artificial Intelligence in Neuroradiology

Tuesday, Nov. 27 8:30AM - 12:00PM Room: S406B

AI IN NR

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

Participants
Greg Zaharchuk, MD, PhD, Stanford, CA (*Moderator*) Research Grant, General Electric Company; Stockholder, Subtle Medical;
Christopher P. Hess, MD, PhD, Mill Valley, CA (*Moderator*) Nothing to Disclose

Sub-Events

RC305-01 AI: An Introduction for Neuroradiologists

Tuesday, Nov. 27 8:30AM - 9:00AM Room: S406B

Participants
Yvonne W. Lui, MD, New York, NY (*Presenter*) Research collaboration, Siemens AG; Advisor, Bold Brain Ventures

LEARNING OBJECTIVES

1) Introduce basic concepts, ideas, and terminology of machine learning. 2) Review array of machine learning applications in neuroimaging.

RC305-02 Residual Extraction Approach in the Deep Learning With 3D Convolutional Ladder Network for Differential Diagnosis of Idiopathic Normal Pressure Hydrocephalus and Alzheimer's Disease

Tuesday, Nov. 27 9:00AM - 9:10AM Room: S406B

Participants
Ryusuke Irie, MD, Tokyo, Japan (*Presenter*) Nothing to Disclose
Yujiro Otsuka, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Koji Kamagata, Tyuuouku, Japan (*Abstract Co-Author*) Nothing to Disclose
Michimasa Suzuki, MD, Minato-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Akihiko Wada, MD, Izumo, Japan (*Abstract Co-Author*) Nothing to Disclose
Masaaki Hori, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Tomoko Maekawa, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
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Christina Andica, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
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Yumiko Motoi, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Shigeki Aoki, MD, PhD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Idiopathic normal pressure hydrocephalus (iNPH) and Alzheimer's disease (AD) are geriatric diseases and common as causes of dementia. As a treatment approach is quite different, it is important to diagnose iNPH and AD correctly. The purpose of this study was to differentiate iNPH and AD by deep learning method.

METHOD AND MATERIALS

Twenty-three patients with iNPH (11 male and 12 female: mean age 74.6 years) and 23 patients with AD (11 male and 12 female: mean age 75.0 years) were included in this study. Diagnosis of iNPH was made according to the criteria of probable iNPH proposed by the Japanese Clinical Guidelines for Idiopathic Normal Pressure Hydrocephalus, and that of AD was made according to the criteria of probable AD by the National Institute of Neurologic and Communicative Disorders and Stroke/Alzheimer's Disease and Related Disorders Association. All patients underwent brain MRI with 3 T unit and we used only whole-brain three dimensional (3D) T1-weighted images in this study. We designed fully-automated, end-to-end 3D deep learning model to differentiate iNPH and AD. The model consists of residual extraction part followed by neural network classifier. In the residual extraction part, we build 3D convolutional ladder network to reconstruct 3D volume to be extracted from original 3D volume. The residual volume is then fed again into the encoder to obtain residual feature map. The feature map is used as an input of subsequent neural network classifier. We evaluated an accuracy of our model in differentiation of iNPH and AD by leave-one-out cross-validation. We also evaluated validity of the result by visualizing important area in the original input image with Gradient-weighted Class Activation Mapping.

RESULTS

Twenty out of 23 cases in iNPH and 20 out of 23 cases in AD were correctly diagnosed (predictive value was 87.0%). The area under the receiver operating characteristic curve was 0.91. The time taken for diagnosis was about 1 to 2 seconds per case.

CONCLUSION

Residual extraction approach in the deep learning method was useful for the differential diagnosis of iNPH and AD.

CLINICAL RELEVANCE/APPLICATION

Deep learning with residual extraction approach can help radiologists in the diagnosis of dementia which is difficult to be differentiated clinically.

RC305-03 Automated Classification of Alzheimer's Disease by Interregional Correlation Matrix in Structural MR Images

Tuesday, Nov. 27 9:10AM - 9:20AM Room: S406B

Participants
Xiangzhu Zeng, MD, Beijing, China (*Presenter*) Nothing to Disclose
Huishu Yuan, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Yan Liu, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Ling Wang, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose
Zheng Wang, MS, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Based on compartmental sparse feature selection method, interregional correlation matrix of structural magnetic resonance data was built for identification of Alzheimer's disease (AD) from the healthy and compared with voxel-based volume of gray matter (GM) method.

METHOD AND MATERIALS

198 AD (AD group) cases and 148 healthy control (HC group) cases were investigated (table 1). For all cases, High-resolution 3D T1WI images were acquired on a SIEMENS Trio 3T scanner or a GE 750 3T scanner. 148 AD and 100 HC cases were in training set and 50 AD and 50 HC for testing. Sparse principal component analysis (SPCA) method was used to extract sparse principal components (SPCs) for 32 ROIs of the cerebrum according to AAL template and feature parameter value Yi of SPCs was obtained for each ROI. Then interregional correlation matrix of Yi of 32 ROIs is built and 16 distinct ROIs are selected according to analyzing the interregional correlation coefficients between Hippocampus and other ROIs. Yi of SPCs and the volume of GM of 17 distinct ROIs as variables in support vector machine (SVM) classifier (Figure 1).

RESULTS

1. Interregional correlation matrix of Yi of 32 ROIs is built and 16 distinct ROIs (Amygdala, parahippocampal gyrus, caudate, anterior cingulum, middle cingulum, posterior cingulum, superior orbital frontal lobe, inferior orbital frontal lobe, middle orbital frontal lobe, medial orbital frontal lobe, fusiform gyrus, insula, putamen, thalamus, middle temporal pole and superior temporal pole) with high correlation with Hippocampus were selected ($r>0.3$, $p< 0.05$) (Figure 2). 2. Yi and the volume of GM of 17 ROIs (above 16 ROIs and Hippocampus) used as feature variable of SVM, The classification accuracy for Yi and the volume of GM is 0.84 and 0.82 respectively. 3. There is a strong correlation between Yi of hippocampus and volume of it ($r=0.963$, $p<0.001$). Yi has much higher correlation with MMSE score ($r=0.586$, $p<0.001$) than volume ($r=0.393$, $p<0.001$) (Table 2).

CONCLUSION

Our results revealed high classification accuracy for AD diagnosis by using SPCA method combined with interregional correlation matrix of structural MR data. The feature parameter value Yi of our method is more accurate than volume of GM to quantify cerebral atrophy of AD.

CLINICAL RELEVANCE/APPLICATION

The method of SPCA combined with interregional correlation matrix is an effective computer-aided diagnosis method to help clinician to identify AD.

RC305-04 Comparison of Machine Learning Models for Prediction of Alzheimer's Disease (AD)

Tuesday, Nov. 27 9:20AM - 9:30AM Room: S406B

Participants
Qingchen Diao, Shenzhen, China (*Abstract Co-Author*) Nothing to Disclose
Silun Wang, MD, PhD, Shenzhen, China (*Presenter*) Nothing to Disclose
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PURPOSE

Alzheimer's disease (AD) is a type of neurodegenerative disease that is the most common form of dementia. The purpose of this study is to compare investigate the diagnostic accuracy of machine learning methods for predicting AD via structural information of brain.

METHOD AND MATERIALS

T1-weighted 3D MPRAGE images were collected from the Alzheimer's Disease Neuroimaging Initiative (ADNI). We recruited 88 AD patients and 142 normal controls (mean age 71.7 ± 5.9 vs 71.4 ± 4.8, $p>0.05$). The raw data was firstly processed by FreeSurfer to generate the subcortical segmentation, cortical parcellation and segmentation of hippocampus. We then trained three types of machine learning algorithms, namely support vector machine (SVM), random forest (RF) and naive bayes, on the 80% of dataset and evaluated accuracy, sensitivity, positive predictive value (PPV), specificity and negative predictive value (NPV) on the rest of dataset. Grid search associated with cross validation is used to get the best hyper-parameter (including kernels of SVM) of each algorithm.

RESULTS

For each patient, 163 brain structural data were generated including 70 cortex thickness, 68 brain volume, 10 volume of ventricle, 15 subsegment of hippocampus for each raw MRI images. In terms of classify AD patients, RF has best diagnostic accuracy of 95.7%, sensitivity of 83.3%, PPV of 100%, specificity of 100% and NPV of 94.4%. However, SVM (accuracy 84.8%, sensitivity 58.3%, precision 77.8%, PPV 94.1%, NPV 86.5%) and naive bayes (accuracy 82.6%, sensitivity 58.3%, PPV 70.0%, specificity 91.2%, NPV 86.1%) show worse performances. We further found that entorhinal cortical thickness, hippocampal tail volume and molecular layer of hippocamus, especially in left brain, are top-3 important features, which have largest Gini importance and mean decrease impurity (0.1038, 0.0514, 0.0457 respectively).

CONCLUSION

Random forestRF has better diagnostic performance compared to SVM and naive bayes. RF shows highly precision and specificity and thus is appropriate for screening testing use in population study. In addition, machine learning identifies that thinner of entorhinal cortical thickness and smaller of hippocampal tail play a key role in AD patients.

CLINICAL RELEVANCE/APPLICATION

Machine learning based on FreeSurfer-processed MRI images may accuraty predict AD,

RC305-05 Radiomics Based on Multi-Contrasts MRI Allows Precisely Differentiate Glioma Subtypes and Predict Tumor Proliferative Behaviors

Tuesday, Nov. 27 9:30AM - 9:40AM Room: S406B

Participants
Changliang Su, Wuhan, China (*Presenter*) Nothing to Disclose
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Ju Zhang, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To explore the feasibility of radiomics based on anatomical, diffusion- and perfusion-weighted MRI in differentiating gliomas subtypes and predicting tumor proliferation.

METHOD AND MATERIALS

220 pathology confirmed gliomas and ten contrasts were included in the retrospective analysis. After registed to T2FLAIR images and resampled to 1 mm3 isotropically, 431 radiomics features were extracted from each included contrast maps in semi-automatic defined tumor volume. For single contrast and the combination of all contrast maps, partial correlation analysis revealed correlations between radiomics features and pathological biomarkers, and multivariate models were built to identify the best predictive models with adjusted 0.632+ bootstrap AUC.

RESULTS

In univariate analysis, both non-wavelet and wavelet radiomics features correlated significant with tumor grades and Ki-67. The max R was 0.557 (p=2.04E-14) in T1C for tumor grades, and 0.395 (p=2.33E-07) in ADC for Ki-67. In multi-variate analysis, the combination of all contrast radiomics features had the highest AUCs in both differentiating glioma subtypes and predicting proliferation, when compared with single contrast images. For low/high-grade gliomas, the best AUC was 0.911. In differentiating subtypes gliomas, the best AUC was 0.896 in grade II-III, 0.997 for grade II-IV, and 0.881 in grading III-IV. In reflecting levels of proliferation, multi-contrasts features leaded to an AUC of 0.936.

CONCLUSION

Multi-contrasts Radiomics supplys complementary information on both geometric characters and molecular biological traits, which correlated significantly with tumor grades and proliferation. Combined all contrasts radiomics models might precisely predict glioma biological behaviors, which may attribute to pre-surgical personal diagnosis.

CLINICAL RELEVANCE/APPLICATION

The precisely predicting tumor subtypes and proliferation levels based multi-contrasts MRI radiomics allows accurate evlation of pre-surgical gliomas, which may facillate the development of precise medicine, even in those patients from poor areas, who suffer from expensive cost on genetic detections.

RC305-06 Accelerating and Standardizing Stroke Patient Triaging with Deep Learning

Tuesday, Nov. 27 9:40AM - 10:10AM Room: S406B

Participants
Kim Mouridsen, Aarhus, Denmark (*Presenter*) Shareholder and Officer, Cercare Medical

LEARNING OBJECTIVES

1) Describe how deep learning may be applied to predict most likely tissue outcome in acute ischemic stroke. 2) Compare different approaches to prediction of outcome with machine learning. 3) Explain basic considerations in constructing and training deep learning models.

RC305-07 Data Preparation, Segmentation, and Deployment for Neuroradiology AI Applications

Tuesday, Nov. 27 10:20AM - 10:50AM Room: S406B

Participants
Michael Muelly, MD, Mountain View, CA (*Presenter*) Employee, Google LLC; Partner, ClariPACS LLC

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LEARNING OBJECTIVES

1) Recognize the impact of data and label quality on machine learning models. 2) Understand the components involved in end to end development of machine learning models for clinical applications.

RC305-08 Whole-Tumor Texture and Morphology Analyses of Conventional and Diffusion Tensor Imaging For Determination of Grades and Histological Subtypes in Meningiomas Using Machine Learning

Tuesday, Nov. 27 10:50AM - 11:00AM Room: S406B

Participants
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PURPOSE

To evaluate the role of texture and morphology analyses of postcontrast T1-weighted images, apparent diffusion coefficient (ADC) and fractional anisotropy (FA) maps bases on the entire tumor volume, in differentiation of grades and histological subtypes of meningiomas.

METHOD AND MATERIALS

Eighty-five patients with pathologically diagnosed meningiomas (low grade [benign], 61; high-grade [atypical and anaplastic], 24), who underwent postcontrast T1-weighted and diffusion tensor imaging, were included in the discovery set. The postcontrast-T1 weighted image, ADC and the fractional anisotropy maps were analyzed to derive volume-based data of the entire tumor. Texture and morphology analyses were correlated with the meningioma grades and histological subtypes. Support vector machines were trained to build classification models for the determination of meningioma grade. We tested the model in a temporal external validation set (37 patients; low-grade,27; high-grade,10).

RESULTS

Various texture and morphology parameters differed significantly according to meningioma grades. The best classification system for the prediction of meningioma grades had a maximum area under the curve of 0.905 and 0.878 in the discovery and validation sets, respectively. Various texture parameters differed significantly between fibroblastic and non-fibroblastic subtypes.

CONCLUSION

Whole-tumor texture and morphology features of postcontrast T1-weighted images, ADC and fractional anisotropy maps are useful for differentiating meningioma grades.

CLINICAL RELEVANCE/APPLICATION

Texture and morphology features of postcontrast T1-weighted images, ADC and fractional anisotropy maps may aid in preoperative grading of meningiomas, which influences treatment planning.

RC305-09 The Added Prognostic Value of Radiological Phenotypes to Clinical Features in IDH-Wild Type Lower Grade Gliomas Using Machine Learning

Tuesday, Nov. 27 11:00AM - 11:10AM Room: S406B

Awards
Student Travel Stipend Award

Participants
Chae Jung Park, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Kyunghwa Han, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung Soo Ahn, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yoon Seong Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Spouse, Stockholder, Medi Whale
Sohi Bae, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung-Koo Lee, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the additional prognostic value of MR imaging phenotypes to clinical features using machine learning in patients with IDH-wild type lower grade gliomas

METHOD AND MATERIALS

Preoperative MRIs of 112 patients with histopathologically confirmed IDH-wild type grade II or III gliomas were retrospectively

Preoperative MRIs of 112 patients with histopathologically confirmed IDH-wild type grade II or III gliomas were retrospectively analyzed according to the Visually Accessible Rembrandt Images (VASARI) features set. A radiologic risk score (RRS) for overall survival (OS) and progression free survival (PFS) was produced by selected features and their regression coefficients from Elastic net regression model with 100 times of repeated cross validation. Multivariable Cox analysis was performed including age, Karnofsky Performance score (KPS), grade, extent of resection and RRS. The added predictive value of RRS was calculated by comparing C-indices between multivariable Cox models with and without RRS. The difference of C-indices was validated by bootstrap with 1,000 times of resampling.

RESULTS

Elastic net Cox regression model revealed 15 different MR imaging phenotypes that were significantly associated with OS and PFS, respectively. According to multivariable Cox analysis, RRS obtained from these imaging phenotypes was an independent predictor for both OS (HR 3.322, $p < 0.001$) and PFS (HR 2.605, $p < 0.001$). The model with RRS showed better performance in predicting survival than that without RRS (C-index for OS: 0.722 vs. 0.806, C-index for PFS: 0.706 vs. 0.773). The differences of C-indices in two models were statistically significant after bootstrap testing.

CONCLUSION

RRS derived from MRI features was independent predictors for survival in patients with IDH-wild type lower grade gliomas. Addition of RRS to prognosis prediction model significantly improved performance.

CLINICAL RELEVANCE/APPLICATION

IDH-wild type lower grade gliomas are known to be similar to glioblastoma in terms of genetic alterations and prognostically heterogeneous. Radiological phenotypes may have added prognostic value in patients with IDH-wild type lower grade gliomas.

RC305-10 Magnetic Resonance Textural Analysis on Contrast Enhanced 3D-SPACE Images in Assessment of Consistency of Pituitary Macroadenoma

Tuesday, Nov. 27 11:10AM - 11:20AM Room: S406B

Participants
Wenting Rui, Shanghai, China (*Presenter*) Nothing to Disclose
Yue Wu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Zengyi Ma, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
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Junhai Zhang, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To explore the value of magnetic resonance textural analysis (MRTA) in assessing consistency of pituitary macroadenoma (PMA) based on contrast enhanced 3D-SPACE images.

METHOD AND MATERIALS

Fifty-three patients with PMA that underwent contrast enhanced 3D-SPACE scanning by 3.0T MRI and endoscopic trans-sphenoidal surgery were included in the present study. Consistency levels of PMA were evaluated intraoperatively by two neurosurgeons. Each resection specimen was stained with H&E and anti-collagen IV. MRTA was conducted and texture features were calculated by Omni Kinetics software. An unpaired t-test was used to analyze the differences of texture features between relative soft and hard PMAs. Receiver operating characteristic curves by individual and combined features were used to calculate the diagnostic accuracy of MRTA in predicting consistency.

RESULTS

First-order energy and second-order correlation negatively correlated with hard PMAs, while first-order entropy and second-order variance, sum variance, and sum entropy positively correlated with tumor stiffness. All showed significant differences between soft and medium consistency PMAs ($P<0.05$). Diagnostic accuracy of combined negative features could achieve an area under the curve (AUC) of 0.819, sensitivity of 88.9%, specificity of 61.5%, positive predictive value (PPV) of 70.6%, negative predictive value (NPV) of 84.2% and positive features could achieve an AUC of 0.836, sensitivity of 85.2%, specificity of 69.2%, PPV of 74.2%, NPV of 81.8% ($P<0.001$).

CONCLUSION

MRTA using contrast enhanced 3D-SPACE images is helpful for assessing PMA consistency preoperatively and noninvasively.

CLINICAL RELEVANCE/APPLICATION

Consistency level of PMA determines surgery approach and resection rates. MRTA based on contrast enhanced 3D-SPACE images may help assess consistency of PMAs preoperatively and noninvasively, which can guide the appropriate surgery approach to increase resection rates and reduce long-term recurrence.

RC305-11 Real-World Performance of Deep-Learning-based Automated Detection System for Intracranial Hemorrhage

Tuesday, Nov. 27 11:20AM - 11:30AM Room: S406B

Participants
Hyunkwang Lee, Boston, MA (*Presenter*) Nothing to Disclose
Sehyo Yune, MD,MPH, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Stuart R. Pomerantz, MD, Boston, MA (*Abstract Co-Author*) Research Grant, General Electric Company
Mohammad Mansouri, MD, MPH, Framingham, MA (*Abstract Co-Author*) Nothing to Disclose
Ramon G. Gonzalez, MD, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

Michael H. Lev, MD, Boston, MA (*Abstract Co-Author*) Consultant, General Electric Company; Institutional research support, General Electric Company; Stockholder, General Electric Company; Consultant, MedyMatch Technology, Ltd; Consultant, Takeda Pharmaceutical Company Limited; Consultant, D-Pharm Ltd
Synho Do, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Most of currently published deep learning studies in medical image analysis report their performance using carefully selected data. To use such tools in the clinical practice, however, it is critical to know how they work with the real-world data. Here, we evaluated the applicability of our ICH detection system in the clinical setting by comparing the model performance on the real-world cases to the performance on the selected dataset.

METHOD AND MATERIALS

We previously trained and validated the deep learning system for ICH detection using a total of 904 cases of 5mm, non-contrast head CT scans - 625 cases with ICH and 279 cases without ICH. Six board-certified neuroradiologists annotated all 2D axial slices according to the presence of ICH based on consensus. For evaluating the model, we retrieved an additional, non-overlapping set of 200 cases - 100 with ICH and 100 without ICH - with exclusion of cases with any history of brain surgery, intracranial tumor, intracranial device placement, skull fracture, or cerebral infarct. For performance evaluation in the real-world setting, all non-contrast head CT scans acquired at a single emergency department for three months from September to November 2017 were obtained. Collected were 2,606 consecutive cases including 163 cases with ICH.

RESULTS

Area under the receiver operating curve (AUC) was 0.993 for detecting the presence of ICH on the 200 selected cases with sensitivity of 98.0%, specificity of 95.0%, and negative predictive value of 97.9%. The same model achieved AUC of 0.834 on the real-world cases with sensitivity of 87.1%, specificity of 58.3%, and negative predictive value of 98.5% at the high sensitivity operating point.

CONCLUSION

The deep-learning-based ICH detection model achieved lower sensitivity and specificity when tested on real-world data compared to when tested on the selected data that excluded potentially confusing cases. However, the negative predictive values were similar in the two test datasets.

CLINICAL RELEVANCE/APPLICATION

The performance of deep-learning based systems should be evaluated on the real-world data before being used in the clinical practice to assist clinicians in interpreting the automated output.

RC305-12 The Present and Future of Deep Learning in Neuroradiology: What Can We Do Now and What We Will Be Able to Accomplish

Tuesday, Nov. 27 11:30AM - 12:00PM Room: S406B

Participants
Peter Chang, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

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RC306

Best Head & Neck Cases of 2018: The Experts Share Their Most Interesting and Educational Neck, Sinonasal, and Temporal Bone Cases

Tuesday, Nov. 27 8:30AM - 10:00AM Room: E451B

HN NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

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LEARNING OBJECTIVES

1) Challenge one's head and neck imaging interpretation skills by viewing a series of cases that have not been previously presented. 2) Consider appropriate differential diagnoses. 3) Evalueat imaging protocols and techniques to insure use of optimized protocols at one's home institution. 4) Improve knowledge of common sinonasal conditions relevant to clinical practice. 5) Recommend the most appropriate imaging technique for evaluation of inflammatory and neoplastic sinonasal lesions. 6) Identity additional findings such as adenopathy, perineural spread, and second primary lesions. 7) Review standard MR and CT imaging protocols of the temporal bone to include optimizing studies for the detection of particular pathologies. 8) Highlight critical anatomic relationships within the middle and inner ear that are useful in the detection and identification of common and uncommon diseases affecting the temporal bone. 9) Improve the diagnostic acumen of the radiologist interpreting imaging studies of the temporal bone.

Sub-Events

RC306A Best Neck Cases of 2018

Participants
Nancy J. Fischbein, MD, Stanford, CA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Challenge one's head and neck imaging interpretation skills by viewing a series of cases that have not been previously presented. 2) Consider appropriate differential diagnoses. 3) Evalueat imaging protocols and techniques to insure use of optimized protocols at one's home institution.

RC306B Best Sinonasal Cases of 2018

Participants
Michelle A. Michel, MD, Milwaukee, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Improve knowledge of common sinonasal conditions relevant to clinical practice. 2) Recommend the most appropriate imaging technique for evaluation of inflammatory and neoplastic sinonasal lesions. 3) Identity additional findings such as adenopathy, perineural spread, and second primary lesions.

RC306C Best Temporal Bone Cases of 2018

Participants
John I. Lane, MD, Rochester, MN (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Review standard MR and CT imaging protocols of the temporal bone to include optimizing studies for the detection of particular pathologies. 2) Highlight critical anatomic relationships within the middle and inner ear that are useful in the detection and identification of common and uncommon diseases affecting the temporal bone. 3) Improve the diagnostic acumen of the radiologist interpreting imaging studies of the temporal bone.

RC307

Genitourinary Series: Prostate MRI in the PI-RADS Era: Detection, Diagnosis and MRI Guided/Targeted Interventions

Tuesday, Nov. 27 8:30AM - 12:00PM Room: E353B

GU BQ MR

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Clare M. Tempany-Afdhal, MD, Boston, MA (*Moderator*) Research Grant, InSightec Ltd; Research Grant, Gilead Sciences, Inc; Advisory Board, Profound Medical Inc; Spouse, Employee, Spring Bank Pharmaceuticals, Inc; Spouse, Director, Trio Healthcare; Spouse, Consultant, Gilead Sciences, Inc; Spouse, Consultant, Merck & Co, Inc; Spouse, Consultant, Echosens SA; Spouse, Consultant, Shinogi; Spouse, Consultant, Ligand Pharmaceuticals, Inc; Spouse, Stock options, Spring Bank Pharmaceuticals, Inc; Spouse, Stock options, Allurion; Spouse, Stock options, Trio Healthcare; ;

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LEARNING OBJECTIVES

1) The role of prostate MRI in urological practice will be reviewed and discussed. 2) Current issues in Prostate cancer care MpMRI Interpretation and Reporting using PI-RADS v2 MR assessment and reporting will be reviewed and attendee will learn how to apply PI-RADS v2. 3) To understand the complementary nature of MR based-quantitative metrics. 4) Prostate biopsy: when to biopsy and how. Cognitive, fusion and In bore biopsy approaches will be outlined. 5) Impact of PI-RADS on outcomes of prostate biopsy and treatment. Meta-analytic and other reviews of population studies will be presented. 6) Updates on MR interventions including focal therapy will be discussed.

Sub-Events

RC307-01 mpMRI in Clinical Practice: Changes in Urology Practice Patterns in US

Tuesday, Nov. 27 8:30AM - 8:50AM Room: E353B

Participants
Srinivas Vourganti, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC307-02 Update on Prostate Cancer Care and Role of Imaging

Tuesday, Nov. 27 8:50AM - 9:10AM Room: E353B

Participants
Clare M. Tempany-Afdhal, MD, Boston, MA (*Presenter*) Research Grant, InSightec Ltd; Research Grant, Gilead Sciences, Inc; Advisory Board, Profound Medical Inc; Spouse, Employee, Spring Bank Pharmaceuticals, Inc; Spouse, Director, Trio Healthcare; Spouse, Consultant, Gilead Sciences, Inc; Spouse, Consultant, Merck & Co, Inc; Spouse, Consultant, Echosens SA; Spouse, Consultant, Shinogi; Spouse, Consultant, Ligand Pharmaceuticals, Inc; Spouse, Stock options, Spring Bank Pharmaceuticals, Inc; Spouse, Stock options, Allurion; Spouse, Stock options, Trio Healthcare; ;

LEARNING OBJECTIVES

View learning objectives under main course title.

RC307-03 Practice Patterns and Challenges of Performing and Interpreting Prostate MRI: A Survey by the Society of Abdominal Radiology (SAR) Prostate Disease Focus Panel

Tuesday, Nov. 27 9:10AM - 9:20AM Room: E353B

Participants
Silvia D. Chang, MD, Vancouver, BC (*Presenter*) Nothing to Disclose
Sadhna Verma, MD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Baris Turkbey, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Daniel J. Margolis, MD, Los Angeles, CA (*Abstract Co-Author*) Consultant, Blue Earth Diagnostics Ltd

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PURPOSE

To report on the practice patterns and challenges of performing and interpreting prostate MRI.

METHOD AND MATERIALS

After ethics approval an electronic survey was emailed to SAR members.

RESULTS

The response rate was 15% (212/1446). Majority were academic abdominal radiologists (65%) with 1-5 (52%), 6-10 (20%), 11-20 (15%) or >20 (19%) years of experience reporting prostate(p)MRI.Those not yet interpreting pMRI (8%) preferred workshop (56%), web-based (35%) or other formats (9%) for training. Number of pMRI exams reported per week were: 0-5 (43%), 6-10 (38%), 11-20 (12%), 21-30 (5%), > 30 (2%) and imaged at 3T (58%), 1.5T (20%) or either (21%). Most exams were performed without an endorectal (ER) coil (83%). Highest b-values varied from 800-5000, with 1400 (26%) and 1500 (30%) the most common. Most acquire DCE with temporal resolution of < 10s (79%). Majority of these pMRIs were used for fusion biopsies (71%), performed by urologists (74%), radiologists (18%) or both (8%). PIRADSv2 was used by 86% of the respondents and template reporting in 75%. Sixty-four percent of respondents did not have wait lists. Sixty-three percent staff tumor boards and 46% perform quality assurance. Challenges to performing and interpreting pMRI were scored on a 1-5 Likert scale: 1 = easy, 2=somewhat easy, 3=neutral, 4=somewhat difficult and 5 = very difficult. The median score were 2 or 3 for patient prep such as emptying bladder/rectum, using enema or anti-spasmotic agent. Image acquisition and reporting factors (access to 3T, using b values > 1400, temporal resolution of < 10s, reporting with PIRADSv2) were scored 1-2, whereas performing spectroscopy or using an ER coil scored 4. Acquiring patient history (PSA, medications, past treatment) scored 2. Quality factors (time to report, training/maintaining skills, funding, quality control) scored 3. Additional challenges include: acquiring image quality, having sufficient cases for maintaining skills and interobserver variability of PIRADS scores.

CONCLUSION

The majority of academic radiologists perform prostate MRI at 3T without an ER coil and interpret them using PIRADSv2. Challenges include obtaining image quality, acquiring feedback and interobserver variability of PIRADS scores.

CLINICAL RELEVANCE/APPLICATION

A knowledge of the practice patterns and challenges to performing and interpretting prostate MRI will enable us to design educational programs and guide improvements for the next version of PIRADS.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Sadhna Verma, MD - 2013 Honored Educator

RC307-04 Serial mpMRI Reporting in Men on Active Surveillance For Prostate Cancer: Initial Experience Using the PRECISE Recommendations

Tuesday, Nov. 27 9:20AM - 9:30AM Room: E353B

Participants
Francesco Giganti, MD, London, United Kingdom (*Presenter*) Nothing to Disclose
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Giovanni Barchetti, MD, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Stefano Cipollari, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Caroline M. Moore, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The PRECISE recommendations were developed to facilitate robust data collection and assess the natural history of mpMRI findings in men on active surveillance (AS) for prostate cancer (PCa). We report our initial validation of these guidelines in terms of radiological monitoring and imaging reclassification.

METHOD AND MATERIALS

Seventy-three patients with previously diagnosed Gleason 3 + 3 PCa were included in our AS program, with antwo mpMRI scans at baseline and after 1 year. Inclusion criteria were : PSA density < 0.15 and PSA > 2 ng/ml. Exclusion criteria were: PSA > 10/25 ng /ml and any previous treatment for PCa. We used the PRECISE case report form and reported according to PI-RADS v2 guidelines. The following parameters were assessed: changes on PI-RADS score, change in lesion size and features of the index lesion and the likelihood of extra-prostatic extension. When radiological progression was suspected, a TRUS-MRI fusion targeted biopsy was performed. Patients with stable imaging findings continued the regular imaging follow-up.

RESULTS

Mean follow-up was 24 months . Baseline PRDADs score was 1-2 in xx3 men, 3 in xx40 men and 4 or 5 in xx30 man. Sixty out of 73 men (82%) had stable imaging findings with no change in PI-RADS score. Six out of 73 men (8%) had a decrease in PI-RADS score. Seven out of 73 (10%) men showed an increase in PI-RADS score and underwent targeted biopsy, which confirmed a higher Gleason score (3+4 or 4+3) in 6/7 cases (86%).

CONCLUSION

The PRECISE case report form is an appropriate method for the standardization of serial imaging evaluations in men on AS. Data analysis and collection according to the PRECISE recommendations allows to identify men with imaging progression and direct them to repeat targeted biopsy.

CLINICAL RELEVANCE/APPLICATION

Multiparametric MRI of the prostate can be a valuable adjunct tool for the management of patients on active surveillance.

RC307-05 Targeted Biopsy Validation of Magnetic Resonance Fingerprinting-Relaxometry and Apparent Diffusion Coefficient Mapping for Differentiation of Cancer from Non-Cancerous Lesions in Prostate

Tuesday, Nov. 27 9:30AM - 9:40AM Room: E353B

Awards
Trainee Research Prize - Fellow

Participants
Ananya Panda, MD,MBBS, Rochester, MN (*Presenter*) Support, Siemens AG
Wei-Ching Lo, PhD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
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Mark D. Schluchter, PhD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Mark A. Griswold, PhD, Cleveland, OH (*Abstract Co-Author*) Research support, Siemens AG Royalties, Siemens AG Royalties, General Electric Company Royalties, Bruker Corporation Contract, Siemens AG
Lee E. Ponsky, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Vikas Gulani, MD, PhD, Cleveland, OH (*Abstract Co-Author*) Research support, Siemens AG; Licensed Technology, Siemens Healthineers - both myself and my spouse. MR Fingerprinting, on which we are both inventors, has been licensed by Siemens.

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PURPOSE

To provide targeted biopsy validation of quantitative exam comprising of MRF-relaxometry & ADC mapping for distinguishing prostate cancer from non-cancerous lesions and cancer grades

METHOD AND MATERIALS

In IRB approved study,122 patients underwent MRF,clinical prostate MRI(high resolution T2w & DWI) & targeted biopsy(cognitive targeting:76 patients,in-gantry targeting:46 patients).A MRF-FISP acquisition was used to cover whole prostate.ADC mapping was performed using b-values 50-1400sec/mm2.Based on clinical reads by body radiologists,another radiologist blinded to pathology diagnosis drew ROIs on targeted lesions and contralateral normal peripheral zone(NPZ) & transition zone(NTZ) on T2 MRF maps.Both T1 & T2 relaxation times were obtained simultaneously from ROIs drawn on T2 map.ROIs were replicated on ADC maps in same locations.Mean T1,T2 &ADC were compared & logistic regression analysis was used to evaluate MRF & ADC in differentiating cancer grades,prostatitis and biopsy-proven benign lesions

RESULTS

Mean T1,T2 & ADC in PZ & TZ prostate cancer were lower than NPZ & NTZ and together produced best separation(AUC=0.989 for PZ; 0.983 for TZ).Mean T2 & ADC values in low-grade PZ cancer were higher than intermediate/high-grade PZ cancer.Combination of T2+ADC had higher discriminatory ability(AUC=0.898) compared to T2(AUC=0.801) and ADC(AUC=0.827) for cancer grades.Mean T2 & ADC values in PZ cancer were lower than prostatitis.T2 was significant predictor for cancer over prostatitis(p=0.019) while ADC was barely significant(p=0.049).For separation of PZ cancer from biopsy-proven benign tissue,T1+ADC had higher discriminatory ability(AUC=0.861) compared to ADC(AUC=0.840).In TZ,mean T1,T2 & ADC in TZ cancer were lower than prostatitis.Multiparametric combinations had higher diagnostic performance(AUCs: T1+T2:0.849, T1+ADC:0.878, T2+ADC:0.854) than ADC(AUC=0.842) for differentiating TZ cancer from prostatitis and from both prostatitis and biopsy-proven benign tissue(AUCs: T1+ADC 0.886,T1+T2+ADC:0.892,AUC ADC=0.861)

CONCLUSION

Based on targeted biopsy validation of MRF and ADC mapping,both T1 & T2 mapping added utility to ADC for improved characterization of suspicious lesions seen on T2w images & DWI

CLINICAL RELEVANCE/APPLICATION

MRF relaxometry added utility to ADC mapping. Quantitative evaluation may decrease subjectivity of T2w images & improve non-invasive characterization of indeterminate lesions in mpMRI of prostate.

RC307-06 Improvement of Prostate Cancer Detection: Combining Computer-aided Diagnostic System and TRUS-MRI Targeted Biopsy

Tuesday, Nov. 27 9:40AM - 9:50AM Room: E353B

Participants
Stefano Cipollari, Rome, Italy (*Presenter*) Nothing to Disclose
Valeria Panebianco, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Riccardo Campa, MD, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Giovanni Barchetti, MD, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Maurizio Del Monte, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the role of multiparametric MRI (mpMRI) combined with a CAD system (WATSON Elementary) to increase the detection rate of prostate cancer (PCa) and to validate it using TRUS-MRI fusion targeted biopsy as a reference test for pathology.

METHOD AND MATERIALS

We included patients with high clinical suspicion of prostate cancer (total PSA >4 ng/mL, or >2.5 ng/mL in patients with family history, and/or a positive DRE) and with no previous prostate biopsy positive for PCa. A total of 167 patients, aged 47-79 years, with a mean PSA value of 7,62 ng/ml (IQR 2.45-18.6), underwent diagnostic 3T mpMRI. Images were evaluated using PIRADSv2

(radiologist evaluation) and Watson Elementary CAD system (CAD Evaluation). Patients with a PIRADS score > 3, and patients with PIRADS score equal to 3 and with a PSA density >= 0.15 were directed to biopsy of the CAD targets. When a CAD target overlapped with a radiologic one, biopsy was performed in the overlapping area, defined as Target-in-Target (TiT). Sixty-three patients underwent TRUS-MRI fusion biopsy, for a total of 212 sampled targets, including radiologist-selected targets, CAD-selected targets and TiTs. MRI data were compared to biopsy pathology reports and to whole-mount pathology slides (when radical prostatectomy was performed). Receiver Operating Characteristics (ROC) curves were computed for both the radiologist evaluation and the CAD analysis.

RESULTS

Radiologist evaluation achieved better diagnostic performance compared to CAD system (AUC vs AUC) for a cancer detection rate of 35.8% and 68.6%, respectively. The highest detection rate was 81.81% obtained when biopsying TiT lesions. Overall cancer detection rate was 60.37%.

CONCLUSION

Radiologist Evaluation was more accurate than CAD in the diagnosis of prostate cancer. CAD system proved useful in identifying the neoplastic area within radiologist detected lesions (Target-in-Target). Accordingly, CAD may represent a valuable tool in identifying biopsy targets to improve cancer detection rates, although it's not advisable its use as an independent tool for the selection of biopsy targets.

CLINICAL RELEVANCE/APPLICATION

The use of CAD in conjunction with radiologist evaluation increases the accuracy of TRUS/MRI biopsy when selecting Target-in-Target lesions.

RC307-07 Standard and New Quantitative MR Techniques - Added Value to PI-RADS

Tuesday, Nov. 27 9:50AM - 10:10AM Room: E353B

Participants
Andrew B. Rosenkrantz, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC307-08 Overview and Current Impact of PI-RADS v2 in Clinical Practice

Tuesday, Nov. 27 10:20AM - 10:40AM Room: E353B

Participants
Katarzyna J. Macura, MD,PhD, Baltimore, MD (*Presenter*) Author with royalties, Reed Elsevier; Research Grant, Profound Medical Inc; Research Grant, GlaxoSmithKline plc; Research Grant, Siemens AG

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LEARNING OBJECTIVES

View learning objectives under main course title.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Katarzyna J. Macura, MD, PhD - 2012 Honored EducatorKatarzyna J. Macura, MD, PhD - 2014 Honored Educator

RC307-09 MR Guided Prostate Biopsy - The Approaches and New Guidelines

Tuesday, Nov. 27 10:40AM - 11:00AM Room: E353B

Participants
Clare M. Allen, MBBCh, London, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC307-10 Defining a Learning Curve for PIRADS Version 2: A Change-Point Analysis of Cancer Detection Rates for Detected Lesions on Prostate MRI

Tuesday, Nov. 27 11:00AM - 11:10AM Room: E353B

Participants
Marcin Czarniecki, MD, Bethesda, MD (*Presenter*) Nothing to Disclose
Julie Y. An, MD, Akron, OH (*Abstract Co-Author*) Nothing to Disclose
Graham R. Hale, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Stephanie A. Harmon, PhD , Bethesda, MD (*Abstract Co-Author*) Research funded, NCI
Sherif Mehralivand, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
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Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, Siemens AG; Researcher, XAct Robotics; Researcher, NVIDIA Corporation;

Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; Royalties, Invivo Corporation; Royalties, Koninklijke Philips NV; ; ;
Peter Pinto, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Peter L. Choyke, MD, Rockville, MD (*Abstract Co-Author*) Nothing to Disclose
Joanna Shih, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To determine a change-point in cancer detection rate for PIRADS categories and to define a learning curve for PIRADSv2.

METHOD AND MATERIALS

This prospective single-center study included patients who underwent multi-parametric MRI followed by MR-guided transrectal ultrasound biopsy (FBx). All images were prospectively interpreted using PIRADSv2 by a radiologist with over 10 years of experience in reporting prostate MRI. Change-point analysis was used to find the optimal threshold in time for change in lesion-base cancer detection rate (CDR) in each PI-RADSv2 category. Changes in CDR were compared using permutation-based testing. Stratified change-point analysis was performed to account for clinical characteristics which were correlated with change in CDR.

RESULTS

Between May 14, 2015 and December 14, 2017, 658 patients (median age 65 years, PSA 6.66ng/ml) with 1375 detected lesions on mpMRI underwent FBx. There were 604 detected and FBx-confirmed PIRADS 4 lesions, which was the only category that demonstrated significant improvement in CDR after the optimal change point occurring at 275 days (CDR=16.9% vs 28.3%, p=0.033), corresponding to 251 MRI reads. Clinical characteristics except prostate volume were comparable before and after the change point (p=0.889, 0.481 and 0.431, and 0.045 for DRE positivity, PSA, ethnicity and prostate volume, respectively). In patients with above median prostate volume (55 ml), CDR was below 20% and did not show improvement over time (p=0.71). In prostate volume <=55 ml, CDR demonstrated a persistent upward shift after the optimal change point (CDR=22% vs 38%, p=0.054), and a borderline significant trend for the peripheral zone, irrespective of volume (CDR=17% vs. 28%, p=0.07).

CONCLUSION

An experienced reader's CDR of PIRADS 4 lesions improved following 251 mpMRI reads over 9 months, whereas CDR performance remained stable in other PIRADS categories.

CLINICAL RELEVANCE/APPLICATION

Current literature suggests relatively low cancer detection rate (CDR) for PIRADS category 4. For this category, CDR improves over time, with the optimal change point occurring at 275 days or 251 MRIs. The remaining PIRADS categories did not show any significant change over time.

RC307-11 Comprehensive Deep-Learning-Based Quantitative Prostate MRI Evaluation

Tuesday, Nov. 27 11:10AM - 11:20AM Room: E353B

Participants
Peter Chang, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Justin Glavis-Bloom, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Michelle Bardis, Orange, CA (*Presenter*) Nothing to Disclose
Michael Nguyentat, MD, Denver, CO (*Abstract Co-Author*) Nothing to Disclose
Alexander Ushinsky, MD, Orange, CA (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To evaluate a comprehensive deep learning based pipeline for prostate MRI evaluation including prostate segmentation as well as nodule detection, segmentation and PI-RADS scoring.

METHOD AND MATERIALS

After IRB approval, an institutional database was queried to identify patients with prostate MRI obtained between September 2014 and December 2016. For each patient, co-registered T2W and ADC series were used to manually generate segmentations masks for prostate and any detected nodules. For each nodule, composite as well as T2W/ADC subcomponent PI-RADS scores were assessed by a board-certified abdominal radiologist. A 3D/2D fully convolutional neural network (CNN) based on U-net architecture was used to perform prostate segmentation. Subsequently, a 3D/2D mask R-CNN architecture based on a feature pyramid backbone was used to identify potential bounding-box abnormalities, perform nodule segmentation and assess PI-RADS score (Figure 1A-D). Rather than a simple 5-score classification problem, quantitative PI-RADS evaluation was implemented by explicitly engineering the network to regress along dimensions of PI-RADS criteria (Figure 1E-F). For all experiments, five-fold cross-validation was performed.

RESULTS

A total of 303 nodules from 217 patients were included in this study. Prostate segmentation Dice score was 0.891 (0.832-0.917). AUC for nodule detection was 0.788; by varying detection thresholds sensitivity/PPV could range from 0.935/0.535 to 0.602/0.870. For detected nodules, segmentation Dice score was 0.762 (0.719-0.803). Weighted Cohen's kappa for PI-RADS scoring agreement was 0.63, 0.71, 0.51 for composite, T2W, and ADC subcomponents, respectively.

CONCLUSION

A comprehensive deep learning based pipeline is presented as a clinically feasible tool for end-to-end prostate MRI evaluation, including prostate/nodule segmentation (volume calculation) as well as quantitative PI-RADS scoring. By explicitly engineering the network to learn the components of PI-RADS criteria, the algorithm provides visual feedback into the interpretation process (Figure 1E-F). Overall, accuracy of PI-RADS scoring is comparable to reported human-human inter-observer agreement.

CLINICAL RELEVANCE/APPLICATION

A comprehensive deep learning pipeline may significantly improve speed, accuracy, reproducibility and objectivity of MR evaluation of prostate cancer, the second most common malignancy in men.

RC307-12 Men Avoiding Prostate Biopsy by Using Multiparametric MRI: A Retrospective Analysis of PI-RADS Scored in 4259 Patients

Tuesday, Nov. 27 11:20AM - 11:30AM Room: E353B

Participants
Wulphert Venderink, MD, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
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Christina A. Hulsbergen-Van De Kaa, MD, PhD, Nijmegen, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Christiaan G. Overduin, MSc, Nijmegen, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Jurgen J. Futterer, MD, PhD, Nijmegen, Netherlands (*Abstract Co-Author*) Research Grant, Siemens AG

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PURPOSE

As a consequence of the limitations of systematic transrectal ultrasound (TRUS) biopsy, multiparametric (mp)MRI is increasingly being used in the diagnostic work up of patients suspected of having prostate cancer. The aim of our study was to determine which proportion of patients avoided biopsy because of negative mpMRI findings in our clinical routine.

METHOD AND MATERIALS

Patients having mpMRI of the prostate in our institution were retrospectively included between January 2012 and December 2017. We included patients suspected to have prostate cancer with either a history of negative TRUS biopsy or those who were biopsy naïve. Lesions were classified according to Prostate Imaging Reporting and Data System (PI-RADS) by one of our eight radiologists, with varying degree of experience. Primary outome was the proportion of patients with a negative mpMRI, defined as an index lesion classified PI-RADS < 3. Descriptive statistics were used. Hystopathologic follow up until 26 March 2018 was collected by searching the Dutch Public Pathology Database.

RESULTS

A total of 4259 men were included. The median age was 64 years (interquartile range [IQR], 60-70) and median PSA was 8.5 ng/ml (IQR, 6.0-13.0). Patients had a history of prior negative TRUS biopsy in 47.9% (2039/4259) and were biopsy naïve in 52.1% (2220/4259). In 53.6% (2281/4259) an index lesion was classified PI-RADS < 3. Deciding not to biopsy lesions classified PI-RADS 3 with a PSA density below 0.15 ng/ml/ml would result in an additional 5.8% (total proportion 59.4%) of patients avoiding biosy. In 0.4% (9/2281) of the patients with a negative mpMRI, csPCa (Gleason >= 3+4) was detected after a median period of 29 months (IQR, 16-49).

CONCLUSION

More than half of patients having mpMRI of the prostate avoided biopsy because of negative findings on mpMRI.

CLINICAL RELEVANCE/APPLICATION

In a daily clinical setting, approximately half of patients suspected of having prostate cancer may considered to avoid biopsy because of a negative prostate mpMRI.

RC307-13 MRI-Guided Transurethral Ultrasound Ablation (TULSA) in Patients with Localized Prostate Cancer

Tuesday, Nov. 27 11:30AM - 11:40AM Room: E353B

Participants
David Bonekamp, MD, PhD, Heidelberg, Germany (*Presenter*) Speaker, Profound Medical Inc
Steven S. Raman, MD, Santa Monica, CA (*Abstract Co-Author*) Nothing to Disclose
Katarzyna J. Macura, MD,PhD, Baltimore, MD (*Abstract Co-Author*) Author with royalties, Reed Elsevier; Research Grant, Profound Medical Inc; Research Grant, GlaxoSmithKline plc; Research Grant, Siemens AG
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Aytekin Oto, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV; Research Grant, Guerbet SA; Research Grant, Profound Medical Inc; Medical Advisory Board, Profound Medical Inc; Consultant, AbbVie Inc; ;

PURPOSE

MRI-guided transurethral ultrasound ablation (TULSA) uses MRI thermometry to control conformal ultrasound ablation of prostate tissue with a transurethral device. We report 3 year (yr) Phase I outcomes and early results from the TULSA-PRO Ablation Clinical Trial (TACT) Pivotal study.

METHOD AND MATERIALS

Phase I addressed safety and ablation precision in 30 patients (pts) at 3 sites, aged >=65, <=cT2a, PSA<=10 ng/ml, Gleason score (GS) <=3+4. To assess delayed necrosis a 3-mm 55°C margin spared 1-3 mm of peri-capsular prostate tissue. TACT enrolled 115 pts at 13 sites, aged 45-80 with biopsy-proven organ-confined PCa <=cT2b, PSA<=15 ng/ml, GS<=3+4. TULSA was delivered with intent of whole-gland ablation to the capsule by using a 2-mm 57°C reduced margin. Primary efficacy is %pts achieving PSA reduction >=75%. Secondary includes biopsy and PI-RADSv2 MRI at 12 months (mo). Safety endpoints are 12 mo AE and QoL.

RESULTS

Phase I AEs were minimal. Urinary incontinence (pads) was 0% at 12 mo, 20/21 potent maintained potency (IIEF Q2>=2). Median (IQR) PSA decreased 91% from 5.8 (3.8-8.0) ng/ml to nadir 0.5 (0.2-0.8) and 0.8 (0.4-1.6) at 3 yr. 12-mo MRI and biopsy showed 88% reduced prostate volume and 75% reduced cancer length, reflecting peri-capsular margin sparing. By 36 mo, 7/30 men (23%) had salvage therapy. TACT pre-treatment median (IQR) age was 64 (59-69), PSA 6.3 (5.0-8.3) ng/ml, with 39% GS6 and 61% GS7, 34% low- and 66% intermediate-risk (D'Amico). Baseline MRI detected PIRADSv2 >=3 and >=4 lesions in 82% and 66% of pts. Actual treatment time was 55 (41-70) min. Targeted prostate volumes ranged 15-88 cc, with spatial ablation precision of 0.1±1.4 mm, confirmed by contrast-enhanced MRI. There was no rectal injury and no Grade >=4 AE. Serious attributable AEs included 2 pts with urinary retention, 2 UTI, 1 epididymitis, 1 urine extravasation into abdomen, 1 ileus, and 1 DVT, all resolved. Median PSA reduction to-date is 94% (nadir 0.41 ng/ml). 95% (103/108) of pts met the endpoint of >=75% reduction.

CONCLUSION

The TACT Pivotal study of MRI-TULSA for whole-gland ablation in pts with localized PCa confirms safety and precision. PSA reduction >=75% was met in 95% of pts.

CLINICAL RELEVANCE/APPLICATION

Precise whole-gland ablation can be safely achieved using MRI-guided TULSA. It demonstrates potential as a minimally-invasive treatment for organ-confined prostate cancer. Data from the ongoing TACT study will further evaluate its safety and efficacy.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Katarzyna J. Macura, MD, PhD - 2012 Honored EducatorKatarzyna J. Macura, MD, PhD - 2014 Honored EducatorTemel Tirkes, MD - 2013 Honored EducatorTemel Tirkes, MD - 2014 Honored EducatorAytekin Oto, MD - 2013 Honored EducatorAytekin Oto, MD - 2017 Honored Educator

RC307-14 MR Guided Focal Therapy for Prostate Cancer: The Approaches and New Guidelines

Tuesday, Nov. 27 11:40AM - 12:00PM Room: E353B

Participants
Jurgen J. Futterer, MD, PhD, Nijmegen, Netherlands (*Presenter*) Research Grant, Siemens AG

LEARNING OBJECTIVES

View learning objectives under main course title.

RC308

Current Imaging of the Appendix

Tuesday, Nov. 27 8:30AM - 10:00AM Room: E353C

CT ER GI PD

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Douglas S. Katz, MD, Mineola, NY (*Moderator*) Nothing to Disclose

Sub-Events

RC308A Appendicitis in Children

Participants
Steven L. Blumer, MD, Wilmington, DE (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To review the prevalence as well as the clinical signs and symptoms of appendicitis in the pediatric population. 2) To discuss the role of various modalities in the imaging work-up of pediatric appendicitis including plain film, ultrasound, CT and MR. 3) To review the techniques of imaging pediatric appendicitis with ultrasound, CT and MR. 4) To illustrate the imaging findings of pediatric appendicitis on ultrasound, CT and MR. 5) To review potential mimickers of pediatric appendicitis. 6) To discuss potential complications of appendicitis in the pediatric population.

RC308B Appendicitis in Non-pregnant Adults

Participants
Michael N. Patlas, MD,FRCPC, Hamilton, ON (*Presenter*) Nothing to Disclose

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patlas@hhsc.ca

LEARNING OBJECTIVES

1) To discuss optimal use of different cross-sectional modalities for the diagnosis of acute appendicitis. 2) To illustrate common mistakes in interpretation. 3) To review potential mimics of acute appendicitis.

RC308C Uncommon and Atypical Appendiceal Disorders on CT

Participants
Douglas S. Katz, MD, Mineola, NY (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To review a series of uncommon and unusual/rare disorders of the appendix which may present as appendicitis clinically and on CT examinations. 2) To demonstrate examples of these entities from clinical practice, using CT. 3) To briefly review the current imaging and clinical literature on uncommon and unusual/rare disorders of the appendix. 4) To briefly explain the current management of these appendiceal disorders.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Douglas S. Katz, MD - 2013 Honored EducatorDouglas S. Katz, MD - 2015 Honored EducatorDouglas S. Katz, MD - 2018 Honored Educator

RC308D Appendicitis in Pregnancy

Participants
Vincent M. Mellnick, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Compare ultrasound and MRI for accuracy in the setting of suspected appendicitis in the pregnant patient. 2) Utilize MRI

protocols that consider the needs of the pregnant patient, including exam length, SAR, and multiplanar sequences. 3) Recognize the findings of acute appendicitis on MRI and understand the meaning of a nonvisualized appendix. 4) Identify common alternative diagnoses to appendicitis to direct management.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Vincent M. Mellnick, MD - 2016 Honored EducatorVincent M. Mellnick, MD - 2018 Honored Educator

RC309

Gastrointestinal Series: Advances in Abdominal CT (The In-Person Presentation is Supported by an Unrestricted Educational Grant from GE Healthcare, Life Sciences)

Tuesday, Nov. 27 8:30AM - 12:00PM Room: E451A

AI BQ CT GI

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants

Benjamin M. Yeh, MD, San Francisco, CA (*Moderator*) Research Grant, General Electric Company; Consultant, General Electric Company; Author with royalties, Oxford University Press; Shareholder, Nextrast, Inc; Research Grant, Koninklijike Philips NV; Research Grant, Guerbet SA; ;
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Meghan G. Lubner, MD, Madison, WI (*Moderator*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
George L. Shih, MD, MS, New York, NY (*Moderator*) Consultant, Image Safely, Inc; Stockholder, Image Safely, Inc; Consultant, MD.ai, Inc; Stockholder, MD.ai, Inc;
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LEARNING OBJECTIVES

1. Review topics around Machine Learning 2. Discuss applications of multi-energy CT 3. Review usage of oral contrast media and associated controversies 4. Discuss CT imaging biomarkers for oncologic and non oncologic applications 5. Review innovations in Health IT.

Sub-Events

RC309-01 Machine Learning

Tuesday, Nov. 27 8:30AM - 8:55AM Room: E451A

Participants
George L. Shih, MD, MS, New York, NY (*Presenter*) Consultant, Image Safely, Inc; Stockholder, Image Safely, Inc; Consultant, MD.ai, Inc; Stockholder, MD.ai, Inc;

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LEARNING OBJECTIVES

1) Basic concepts of machine learning and deep learning. 2) Exciting areas of abdominal machine learning research. 3) Future of abdominal AI.

RC309-02 Machine Learning-based Radiomics Improve Prediction of Metastatic Disease Progression in Patients with Colon Cancer

Tuesday, Nov. 27 8:55AM - 9:05AM Room: E451A

Participants
Dania Daye, MD, PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Azadeh Tabari, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Michael S. Gee, MD, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Intra-tumor heterogeneity is independently associated with worse patient prognosis in several cancer subtypes. This study investigates the role of quantitative tumor heterogeneity MRI features in predicting metastatic disease progression in patients with colon cancer.

METHOD AND MATERIALS

In this IRB-approved retrospective study, we identified 51 patients with stage 4 colon cancer who underwent MRI for liver

In this IRB-approved retrospective study, we identified 51 patients with stage 4 colon cancer who underwent MRI for liver metastasis evaluation. Standard clinical prognostic variables were collected. The largest hepatic lesion was identified on the portal venous phase T1-weighted post-contrast images and segmented. MR radiomic feature vectors were extracted from each lesion using 50 morphological and texture features. Six-month metastatic disease progression was assessed, with progression defined as appearance of new hematogeneous metastatic lesions. Univariate logistic regression analysis was used to assess the contribution of the features to disease progression prediction. A linear support vector machine (SVM) machine learning technique was applied to the imaging phenotype vector and to the clinical prognostic variables to predict disease progression. The classifiers were trained and tested using 10-fold cross validation. ROC analysis, area under the curve (AUC) and Delong's test were used to assess classification performance.

RESULTS

13 of 51 patients (26%) exhibited metastatic disease progression. Mean time to disease progression was 109±5.9 days. Tumor entropy, dissimilarity and GLCM standard deviation exhibited significant differences in mean values between patients exhibiting progression and those who did not (p=0.02, p=0.03 and p=0.03, respectively). Univariate regression revealed three features independently associated with metastatic disease progression: tumor promenance (p=0.03), homogeneity (p=0.03), and variance (p=0.02). An SVM model that incorporates imaging-based heterogeneity features resulted in improved model performance for disease progression prediction (AUC of 0.86), compared to the model that only included standard prognostic clinical variables (AUC=0.54) (p<0.001).

CONCLUSION

Quantitative tumor heterogeneity MRI features improve prediction of metastatic disease progression in patients with colon cancer.

CLINICAL RELEVANCE/APPLICATION

Machine learning-based tumor radiomics may improve disease progression prediction and may inform decisions regarding locoregional vs systemic therapy in patients with oligometastatic disease.

RC309-03 A Multiphase Convolutional Dense Network For Classification of Focal Liver Lesions on Dynamic Contrast-Enhanced CT

Tuesday, Nov. 27 9:05AM - 9:15AM Room: E451A

Participants
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Hui Liu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Meng Ye, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Wenqi Shi, Guangzhou, China (*Abstract Co-Author*) Author
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Dashan Gao, San Diego, CA (*Abstract Co-Author*) Author
Yunqiang Chen, San Diego, CA (*Abstract Co-Author*) Author
Sichi Kuang, Guangzhou, China (*Abstract Co-Author*) Author
Hanxi Zhang, Guangzhou, China (*Abstract Co-Author*) Author
Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, Gilead Sciences, Inc; Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Bayer AG; Research Grant, ACR Innovation; Research Grant, Koninklijke Philips NV; Research Grant, Celgene Corporation; Consultant, General Electric Company; Consultant, Bayer AG; Consultant, Boehringer Ingelheim GmbH; Consultant, AMRA AB; Consultant, Fulcrum Therapeutics; Consultant, IBM Corporation; Consultant, Exact Sciences Corporation; Advisory Board, AMRA AB; Advisory Board, Guerbet SA; Advisory Board, VirtualScopics, Inc; Speakers Bureau, General Electric Company; Author, Medscape, LLC; Author, Resoundant, Inc; Lab service agreement, Gilead Sciences, Inc; Lab service agreement, ICON plc; Lab service agreement, Intercept Pharmaceuticals, Inc; Lab service agreement, Shire plc; Lab service agreement, Enanta; Lab service agreement, Virtualscopics, Inc; Lab service agreement, Alexion Pharmaceuticals, Inc; Lab service agreement, Takeda Pharmaceutical Company Limited; Lab service agreement, sanofi-aventis Group; Lab service agreement, Johnson & Johnson; Lab service agreement, NuSirt Biopharma, Inc ; Contract, Epigenomics; Contract, Arterys Inc
Jin Wang, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To develop and assess an automated multiphase convolutional dense network (MP-CDN) to classify focal liver lesions (FLLs) of different pathological types on multiphase computed tomography (CT).

METHOD AND MATERIALS

Following ethics committee approval with waived informed consent requirement, 359 patients with a total of 517 FLLs scanned on a 320-row CT scanner using a multiphase (pre-contrast, arterial, portal venous, and delayed phases) protocol between 2012-2017 were retrospectively enrolled. FLLs were classified by contemporaneous histology as hepatocellular carcinoma (HCC, n=111), metastases (mets, n=112), benign FLL (i.e., hemangioma, focal nodular hyperplasia, adenoma; n=162), and hepatic abscess (n=132). A MP-CDN classifier with a sequential input of 4 CT contrast-enhanced phases was developed to automatically classify each FLL. 410 FLLs (88 HCCs, 89 mets, 128 benign FLLs, 105 abscesses) were used for training; 107 FLLs (23 HCCs, 23 mets, 34 benign FLLs, 27 abscesses) were used for testing. The performance of MP-CDN classification was assessed in the testing dataset: accuracy was calculated from the confusion matrix; the area under the receiver operating characteristic curve (AUC) was calculated from the softmax probability outputted from the last layer of the MP-CDN.

RESULTS

The mean classification accuracy in the testing dataset was 81.3% (87/107). The AUC for differentiating each lesion type from the other 3 lesion types was 0.92, 0.99, 0.88 and 0.96 for HCC, mets, benign FLLs, and hepatic abscess, respectively.

CONCLUSION

A MP-CDN accurately classified FLLs detected on multiphase CT over a 6-year period as HCC, mets, benign FLLs and hepatic abscess. If independently validated in a large, diverse cohort imaged with a variety of CT scanners and protocols, MP-CDN may be

a potential method to assist radiologists for differential diagnosis of malignant and benign FLLs.

CLINICAL RELEVANCE/APPLICATION

MP-CDN may be a potential method to assist radiologists for differential diagnosis of malignant and benign FLLs and to facilitate management decisions in clinical practice.

RC309-04 Development and Validation of a Deep Learning System for Staging Liver Fibrosis Using Contrast-Enhanced CT Images of the Liver

Tuesday, Nov. 27 9:15AM - 9:25AM Room: E451A

Participants
Jong Keon Jang, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
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Seung Soo Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yu Sub Sung, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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So Yeon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eunsil Yu, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To develop and validate a deep learning system (DLS) based on convolutional neural network for staging liver fibrosis using computed tomography (CT) images of the liver.

METHOD AND MATERIALS

A DLS for CT-based staging of liver fibrosis was created using a development dataset that included portal venous phase CT images for 7461 patients with pathologically confirmed liver fibrosis. The diagnostic performance of the DLS was evaluated in test datasets for 891 patients. The influence of patient characteristics and CT techniques on the accuracy of the DLS was evaluated by logistic regression analysis. In a subset of 421 patients, the diagnostic performance of the DLS was compared with that of the radiologist's assessment, aminotransferase-to-platelet ratio index (APRI), and fibrosis-4 index using the area under the receiver-operating characteristic curve (AUROC) and Obuchowski index.

RESULTS

DLS had a staging accuracy of 79.4% (707/891) and an AUROC of 0.96 (95% CI 0.95-0.97), 0.97 (CI 0.96-0.98), and 0.95 (CI 0.94-0.96) for diagnosing significant fibrosis (F2-4), advanced fibrosis (F3-4), and cirrhosis, respectively. In multivariate analysis, only pathologic fibrosis stage significantly affected the staging accuracy of the DLS ($P = .016$ and $P = .013$ for F1 and F2, respectively, compared with F4), while etiology and CT technique did not. The DLS (Obuchowski index 0.94) outperformed the radiologist's interpretation, APRI, and fibrosis-4 index (range of Obuchowski indices, 0.71-0.81, $P < .001$) for staging liver fibrosis.

CONCLUSION

The DLS allows accurate staging of liver fibrosis using CT images and appears to be a promising assessment tool.

CLINICAL RELEVANCE/APPLICATION

Considering its high diagnostic performance and robustness to CT imaging techniques, the CT-based deep learning system would be a useful clinical tool for assessing liver fibrosis using routine portal venous phase CT images of the liver.

RC309-05 New Applications of Multi-energy CT

Tuesday, Nov. 27 9:25AM - 9:50AM Room: E451A

Participants
Benjamin M. Yeh, MD, San Francisco, CA (*Presenter*) Research Grant, General Electric Company; Consultant, General Electric Company; Author with royalties, Oxford University Press; Shareholder, Nextrast, Inc; Research Grant, Koninklijike Philips NV; Research Grant, Guerbet SA; ;

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LEARNING OBJECTIVES

1) Review scenarios in which single-energy CT and other diagnostic imaging tests may be problematic. 2) Describe capabilities of multi-energy CT, including recent advances. 3) Discuss case scenarios where multi-energy CT improves diagnoses or clinical decision making. 4) Review potential pitfalls of multi-energy CT. 5) Describe future advances and applications of multi-energy CT.

RC309-06 Measuring Fat Fraction with Dual-Layer Spectral CT Material Attenuation Decomposition Plots: An Iodine-Independent Method for Imaging Hepatic Steatosis

Tuesday, Nov. 27 9:50AM - 10:00AM Room: E451A

Participants
Todd C. Soesbe, PhD, Dallas, TX (*Presenter*) Nothing to Disclose
Matthew A. Lewis, PhD, Dallas, TX (*Abstract Co-Author*) Research collaboration, CMR Naviscan Corporation; Research collaboration, QT Ultrasound, LLC
Lakshmi Ananthakrishnan, MD, Irving, TX (*Abstract Co-Author*) Nothing to Disclose

John R. Leyendecker, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Yin Xi, PhD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Takeshi Yokoo, MD, PhD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Robert E. Lenkinski, PhD, Dallas, TX (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV Research Consultant, Aspect Imaging

PURPOSE

To determine the accuracy and iodine-independence of fat fraction measurements obtained from dual-layer spectral CT material attenuation decomposition (MAD) plots. Accuracy was evaluated using an MRI verified phantom, while iodine-independence was evaluated in patients with contrast-enhanced multiphase CT.

METHOD AND MATERIALS

Spectral CT derived photoelectric effect and Compton scatter images were used to create a 2D histogram (MAD plot) that allowed for differentiation and segmentation of fat, liver, and iodine. MAD plot fat fraction accuracy was determined using an anthropomorphic phantom and four 50 mL vials containing different ratios of homogenized bovine liver and lard (0, 25, 50, and 100% fat by volume). The phantom was scanned on both a Philips Ingenia 3.0 T MRI and a Philips IQon dual-layer spectral CT (120 kVp and 140 kVp) with the MRI fat fraction measurements (mDIXON Quant) used as the reference standard. ROI data from the MRI and spectral CT fat fraction maps were compared to the known fat fraction. For proof of concept in vivo, MAD plot fat fraction accuracy between pre- and post-contrast spectral CT was determined in four patients with varying degrees steatosis. Non-contrast and contrast-enhanced MAD plot fat fraction maps were compared using three ROIs per image, placed in similar liver locations.

RESULTS

For the phantom data, Bland-Altman analysis showed the mean difference (mean+/-sigma) between the known and measured fat fraction percent was MRI = 1.61+/-1.23, 120kVp = 0.52+/-1.77, and 140kVp = 0.80+/-1.94. MAD plot fat fraction maps at 120 kVp and 140 kVp were comparable in accuracy to the MRI mDIXON quant fat fraction map. Bland-Altman analysis for the in vivo liver data showed that the mean difference between the pre- and post-contrast measured fat fraction percent was Venous = 0.21+/-1.57 and Delayed = -0.61+/-1.78. Therefore, the MAD plot fat fraction map was independent of iodine.

CONCLUSION

MAD plots are an accurate method for measuring fat fraction with dual-layer spectral CT ex vivo, with potential for in vivo contrast-enhanced CT. The MAD plot method is translatable to other types of dual-energy spectral CT systems and could potentially measure volumetric fat fraction.

CLINICAL RELEVANCE/APPLICATION

With this method any patient receiving an abdominal CT (with or without iodine) can have their liver fat fraction measured, which would help to detect early stage and asymptomatic fatty liver disease.

RC309-07 Can Quantitative Iodine Parameters on DECT Replace Perfusion CT Parameters in Colorectal Cancers?

Tuesday, Nov. 27 10:00AM - 10:10AM Room: E451A

Participants
Hyo-Jin Kang, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Se Hyung Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Seok Bae, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sun Kyung Jeon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joon Koo Han, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the correlation between iodine concentrations derived from dual-energy CT (DECT) and perfusion CT (PCT) parameters in patients with pathologically-proven colorectal cancers (CRC), and to evaluate their reproducibility and respective radiation exposures.

METHOD AND MATERIALS

Institutional review board approval and written informed consents were obtained for this study. Forty-one patients with CRCs who underwent same day DECT and PCT were prospectively enrolled. Three radiologists independently analyzed iodine concentration of the tumors and iodine ratios (ratio of lesion to aorta (IRa) or to infrarenal IVC (IRv)) from DECT as well as blood flow (BF), blood volume (BV), permeability (PMB), and mean transit time (MTT) from PCT. Pearson R and linear correlation, paired t-test and intraclass correlation coefficients (ICCs) were used.

RESULTS

Significant correlations were found between iodine parameters from DECT and PCT parameters: iodine concentration of tumors and BF (r=0.29,P=0.06), BV (r=0.32,P=0.04), PMB (r=0.34,P=0.03), and MTT (r=-0.38,P=0.02); iodine ratio (IRa) and MTT (r=-0.32,P=0.04); and iodine ratio (IRv) and BF (r=0.32,P=0.04) and PMB (r=0.44,P=<0.01). DECT showed better intra- and inter-observer agreements (ICC=0.98, 0.90 in iodine concentration; 0.98, 0.91 in IRa; and 0.91, 0.93 in IRv, respectively) than PCT (ICC=0.90, 0.78 in BF; 0.82, 0.76 in BV; 0.75, 0.75 in PMB; 0.64, 0.79 in MTT, respectively). As for radiation dosage, CTDIvol and DLP in DECT (10.48±1.84mGy and 519.7±116.7mGy·cm) were significantly lower than those of PCT (75.76mGy and 911mGy·cm) (P<0.01).

CONCLUSION

Iodine parameters from DECT are significantly correlated with PCT parameters, but have higher intra- and inter-observer agreements and lower radiation exposure.

CLINICAL RELEVANCE/APPLICATION

As iodine parameters derived from DECT are significantly correlated with perfusion parameters while allowing better intra- and inter-observer agreements and lower radiation exposure, DECT may be a good alternative to PCT in the assessment of the tumor

hemodynamics in patients with CRC.

RC309-08 Oral Contrast Media Controversies

Tuesday, Nov. 27 10:15AM - 10:40AM Room: E451A

Participants
Avinash R. Kambadakone, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Explain the indications and benefits of oral contrast media in abdomen/pelvis CT. 2) Understand the controversies in the role of oral contrast media in various clinical settings including ER, oncology and routine abdominal scans. 3) Optimize the use of oral contrast media to improve diagnosis.

RC309-09 Spectral Photon-Counting CT Multi-Phase Liver Imaging with Dual Contrast Agent

Tuesday, Nov. 27 10:40AM - 10:50AM Room: E451A

Participants
Salim Si-Mohamed, Lyon, France (*Presenter*) Nothing to Disclose
Valerie Tatard-Leitman, PhD, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
Daniela Pfeiffer, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Monica Sigovan, PhD, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
Daniel Bar-Ness, Bron, France (*Abstract Co-Author*) Nothing to Disclose
Loic Boussel, MD, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
Philippe C. Douek, MD, PhD, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
Peter B. Noel, PhD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

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PURPOSE

To demonstrate the feasibility of dual-contrast multiphase imaging of the liver using Spectral Photon-Counting CT via K-edge imaging.

METHOD AND MATERIALS

The experiments were performed on 3 rabbits following approval by the local ethics committee. We used a 5 energy bins prototype spectral photon-counting CT (Philips Healthcare, Haifa, Israel), tube voltage of 120 kVp, tube current of 100 mA. The iodine contrast agent (Iomeron, 400 mg/mL, 1.5 mL/kg, Bracco) was injected first, followed by the gadolinium contrast agent (gadoteridol, 0.5 M, 5 mL/kg, Bracco) 21 seconds later, and acquisitions were done 10 seconds after the second injection. This protocol allowed performing two different phases imaging of the liver, i.e. arterial (gadolinium) and portal (iodine). Conventional HU and quantitative material decomposition iodine and specific K-edge gadolinium images were obtained.

RESULTS

The gadolinium K-edge and iodine material decomposition images allowed the discrimination between the two contrast agents, which was not possible using the conventional CT images. Moreover, we observed a dual-phase imaging matching the expected pharmacokinetics of the two contrast media. The iodine injected enhanced the liver parenchyma while the gadolinium injected enhanced the arteries. These results were confirmed by measuring the attenuation values (HU) and the concentrations (mg/mL) of contrast agents in the aorta (conventional CT: 1130 ± 17.6 HU; gadolinium: 20.9 ± 1.2; iodine: 6.8 ± 0.4), hepatic arteries (conventional CT: 474.6 ± 44.3; gadolinium: 7.7 ± 0.8; iodine: 0.7 ± 0.4), portal vein (conventional CT: 233.6 ± 15.1; gadolinium: -0.1 ± 0.6; iodine: 2.5 ± 0.4) and liver parenchyma (conventional CT: 143.9 ± 11.2; gadolinium: - 0.6 ± 0.7; iodine: 3.6 ± 0.4).

CONCLUSION

Spectral Photon-Counting CT allows in vivo dual contrast qualitative and quantitative liver multi-phase imaging in a single acquisition. This finding pinpoints major clinical applications in multiphase imaging with no registration issues and with the additional value of reducing radiation dose to patients by decreasing the number of acquisitions.

CLINICAL RELEVANCE/APPLICATION

Spectral Photon-Counting CT allows the qualitative discrimination between two contrast agents injected sequentially in the liver, enabling to reduce radiation dose to patients by combining liver arterial and portal phases into a single acquisition.

RC309-10 Machine Learning Based Quality Assurance for CT Arterial Phase Timing to Ensure Robust Measurement of Tumor Density in Hepatocellular Carcinoma Patients

Tuesday, Nov. 27 10:50AM - 11:00AM Room: E451A

Awards
Trainee Research Prize - Fellow

Participants
Laurent Dercle, MD, New York, NY (*Presenter*) Nothing to Disclose
Jingchen Ma, NYC, NY (*Abstract Co-Author*) Nothing to Disclose
Fatima-Zohra Mokrane, MD, Toulouse, France (*Abstract Co-Author*) Nothing to Disclose
Ai-ping Chen, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose
Deling Wang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

Lin Lu, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Lawrence H. Schwartz, MD, New York, NY (*Abstract Co-Author*) Committee member, Celgene Corporation Committee member, Novartis AG Committee member, ICON plc Committee member, BioClinica, Inc
Chuanmiao Xie I, MD,PhD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Binsheng Zhao, DSc, New York, NY (*Abstract Co-Author*) License agreement, Varian Medical Systems, Inc; Royalties, Varian Medical Systems, Inc; License agreement, Keosys SAS; License agreement, Hinacom Software and Technology, Ltd;

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PURPOSE

Several treatment response criteria shifted towards categorizing response as a decrease in tumor size and/or density. We aimed to increase the reproducibility of the measurement of tumor density at the arterial phase in Hepatocellular carcinoma (HCC) by developing and validating a semi-Automatic arterial-timing Classification Algorithm based on the analysis of the pharmacokinetiC distribution of the Iodinated contrast Agent a Single timepoint (ACACIAS).

METHOD AND MATERIALS

Using dynamic CT-images of 69 HCC pts, we trained (48 pts, 1930 timepoints) and validated (21 pts, 837 timepoints) ACACIAS to categorize arterial-timing into five phases according to the time to arterial peak: early (E0) < -15s < pre-peak (Pre1) < -5s < peak (P2) < +5s < post-peak (Post3) < +15s < late (L4). The random forest algorithm built the model based on the average density in predefined ROIs. Using an independent testing set, we delineated and calculated the average density of biopsy-proven HCC in 90 pts with cirrhotic liver at three phases: non-contrast enhanced 'NCP', arterial 'AP' and portal 'PVP'.

RESULTS

In the validation set, ACACIAS predicted correctly phases E0, Pre1, P2, Post3, and L4 in respectively 92%, 58%, 86%, 30%, and 99% of pts. Inter-patient variability in the duration of the arterial peak (5-95th percentiles of Full Width at Half Maximum: 10.6-27.5s) explained lower accuracies of ACACIAS in Pre1 and Post3 phases. In the testing set, 96% of NCP and 97% of PVP were correctly classified. The predicted arterial timing of AP was E0, Pre1, P2, Post3, and L4 in respectively 1, 34, 13, 25, and 17 pts and was associated with a significant difference in mean tumor density: 68, 55, 60, 71, and 60HU. The arterial HCC enhancement peaked at phase Post3 (+17%), ($P<0.02$, ANOVA).

CONCLUSION

ACACIAS predicted arterial timing accurately based on iodine biodistribution on medical images. A peak of HCC tumor density (+17%) was observed at the arterial phase 'Post3'. ACACIAS could improve extraction of tumor quantitative imaging biomarkers and monitoring of anti-cancer therapy efficacy by ensuring reproducible arterial phase acquisitions.

CLINICAL RELEVANCE/APPLICATION

ACACIAS ensures a reproducible tumor density measurement at arterial phase for treatment response assessment, as well as wide-ranging applications since tumor density is a surrogate of vascularity.

RC309-11 CT Imaging Biomarkers

Tuesday, Nov. 27 11:00AM - 11:25AM Room: E451A

Participants
Meghan G. Lubner, MD, Madison, WI (*Presenter*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;

For information about this presentation, contact:

mlubner@uwhealth.org

LEARNING OBJECTIVES

1. Discuss known and emerging CT imaging biomarkers in non-oncologic applications using liver disease as an example. 2. Review oncologic applications of CT texture analysis using colorectal neoplasms and renal cell carcinoma as examples.

LEARNING OBJECTIVES

1) Discuss a variety of quantitative features (size/volume, morphology, texture) that can be obtained retrospectively from CT data for both oncologic and non-oncologic applications.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Meghan G. Lubner, MD - 2014 Honored EducatorMeghan G. Lubner, MD - 2015 Honored EducatorMeghan G. Lubner, MD - 2018 Honored Educator

RC309-12 Quantitative Imaging in Spectral Detector CT: Suitability of Iodine Maps for Oncologic Imaging: An Initial Evaluation in Phantoms and 75 Patients

Tuesday, Nov. 27 11:25AM - 11:35AM Room: E451A

Participants
Nils Grosse Hokamp, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Nuran Abdullayev, MD, Cologne, Germany (*Abstract Co-Author*) Nothing to Disclose
Max Schlaak, Cologne, Germany (*Abstract Co-Author*) Nothing to Disclose
Christian Wybranski, MD, Magdeburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Thorsten Persigehl, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Thomas Streichert, Cologne, Germany (*Abstract Co-Author*) Nothing to Disclose

Jasmin A. Holz, PhD, Cologne, Germany (*Abstract Co-Author*) Nothing to Disclose
Hatem Alkadhi, MD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
David C. Maintz, MD, Koln, Germany (*Abstract Co-Author*) Nothing to Disclose
Stefan Haneder, MD, Cologne, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

nils.grosse-hokamp@uk-koeln.de

PURPOSE

Iodine maps are available from spectral detector computed tomograph (SDCT). They visualize the distribution of iodinated contrast media and allow for its quantification. Hence, they are a promising technique in oncologic imaging with respect to both, initial diagnosis (benign vs malignant) and follow-up examinations (therapy monitoring). In order to exploit a potential benefit in this respect, it is necessary to understand the intra- and inter-individual consistency of these.

METHOD AND MATERIALS

To evaluate accuracy of the reconstruction algorithm, an anthropomorphic liver phantom was repetitively examined at different time points; further images were reconstructed repetitively. Regions of interest (ROI) were placed automatically at identical positions using an in-house developed software. In addition, we included 75 patients, that underwent double (n=50) or triple (n=25) SDCT examination in this retrospective, IRB-approved study. Patients with significant change in liver function as indicated by laboratory results were excluded. Three ROI were drawn in each the liver parenchyma and the portal vein (PV) in portal-venous phase. Iodine uptake (IU) was normalized to the PV (IU_norm). Empirical standard deviation of the mean (ESD) was used and used to determine inter-scan and intra-individual consistency of IU_norm in phantoms and patients, respectively.

RESULTS

In phantoms, ESD between different acquisitions and timepoints was as low as 1.3%. InMean iodine uptake of the liver parenchyma was 2.2 ± 0.8 mg/ml (ranging from 0.5 - 4.8 mg/ml), IU_norm was 0.40 ± 0.07. Intra-individual consistency was rather high as indicated by an ESD of 7.7% showing a wide range from -44% - +36%.

CONCLUSION

Iodine quantification using Iodine maps from SDCT is technically feasible; however, in in-vivo measurements at different timepoints, intra-individual iodine quantification of the liver differs. Among other reasons, this is likely due to offsets in timing of image acquisition and not necessarily attributed to the specific reconstruction algorithm.

CLINICAL RELEVANCE/APPLICATION

Measurements of iodine uptake should be interpreted carefully when considering them for clinical decision making.

RC309-13 Innovations in Health IT

Tuesday, Nov. 27 11:35AM - 12:00PM Room: E451A

Participants
Arun Krishnaraj, MD, MPH, Charlottesville, VA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

arunk@virginia.edu

LEARNING OBJECTIVES

1) Identify policies impacting the spread of innovation in health IT. 2) Assess the role of greater transparency of health care data. 3) Describe how mobile and wearables are impacting the collection of health data.

RC310

Ultrasound in the First Trimester of Pregnancy

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S405AB

GU OB US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

LEARNING OBJECTIVES

1) Describe the typical appearances of a tubal ectopic pregnancy. 2) List findings that suggest an interstitial ectopic pregnancy. 3) Differentiate a spontaneous abortion in progress from a cervical ectopic pregnancy. 4) Recommend the appropriate follow up for early pregnancies of unknown location (PUL) identified on transvaginal sonography. 5) Differentiate with certainty a failed pregnancy from a pregnancy suspicious for but not diagnostic of failed pregnancy based on the sonographer finding. 6) Diagnose ectopic pregnancy and identify its location. 7) Recognize normal fetal anatomy in the first trimester and differentiate the normal fetus from an abnormal fetus. 8) Predict the sex of the developing fetus during the first trimester and understand the importance of sex determination in some conditions. 9) Recognize 'must know' major anomalies evident in first trimester. 10) Understand the role of first trimester sex designation. 11) Evaluate first trimester assessment of multiple pregnancies.

Sub-Events

RC310A Ectopic Pregnancy

Participants
Mindy M. Horrow, MD, Philadelphia, PA (*Presenter*) Spouse, Employee, Merck & Co, Inc

For information about this presentation, contact:

horrowm@einstein.edu

LEARNING OBJECTIVES

1) Describe the typical appearances of a tubal ectopic pregnancy. 2) List findings that suggest an interstitial ectopic pregnancy. 3) Differentiate a spontaneous abortion in progress from a cervical ectopic pregnancy.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Mindy M. Horrow, MD - 2013 Honored EducatorMindy M. Horrow, MD - 2016 Honored Educator

RC310B Abnormal Early Intrauterine Pregnancies

Participants
Carol B. Benson, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recommend the appropriate follow up for early pregnancies of unknown location (PUL) identified on transvaginal sonography. 2) Differentiate with certainty a failed pregnancy from a pregnancy suspicious for but not diagnostic of failed pregnancy based on the sonographer finding. 3) Diagnose ectopic pregnancy and identify its location. 4) Recognize normal fetal anatomy in the first trimester and differentiate the normal fetus from an abnormal fetus. 5) Predict the sex of the developing fetus during the first trimester and understand the importance of sex determination in some conditions.

ABSTRACT

During this session, findings in early pregnancy on transvaginal ultrasound will be discussed including pregnancies of unknown location (PUL), intrauterine pregnancies of uncertain viability (IPUV), and ectopic pregnancy. Criteria for definitive diagnosis of failed pregnancy will be reviewed, as will sonographic findings suspicious for but not diagnostic of failed pregnancy. Diagnosis of ectopic pregnancy will be discussed, including sonographic findings and determination of the location of the ectopic pregnancy. In addition, sonographic evaluation of the fetus during the first trimester will be presented with attention to the early diagnosis of some fetal malformation and the importance of sex determination for some conditions.

Active Handout:Carol Beer Benson

http://abstract.rsna.org/uploads/2018/18000742/Abnormal early IUPs RSNA RC310B.pdf

RC310C First Trimester Anomalies, Sex, and Other Things

Participants
Phyllis Glanc, MD, Toronto, ON (*Presenter*) Advisory Board, General Electric Company

For information about this presentation, contact:

phyllis.glanc@sunnybrook.ca

LEARNING OBJECTIVES

1) Recognize 'must know' major anomalies evident in first trimester. 2) Understand the role of first trimester sex designation. 3) Evaluate first trimester assessment of multiple pregnancies.

ABSTRACT

This refresher course will review the major anomalies which must be recognized in the later half of first trimester. We will also discuss the role of assessment of external genitalia in first trimester and what key features should be documented in the assessment in twin gestation.

RC311

Advances and Updates in SPECT/CT

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S504CD

CT NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

RC311A SPECT/CT in Endocrine/Oncology

Participants
Esma A. Akin, MD, Washington, DC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

eakin@mfa.gwu.edu

LEARNING OBJECTIVES

1) Through clinical case examples, this activity aims to refresh knowledge of SPECT-CT applications with emphasis on neuroendocrine disorders as well as parathyroid imaging.

RC311B SPECT/CT Technology: State of the Art

Participants
Timothy Turkington, PhD, Durham, NC (*Presenter*) Consultant, Data Spectrum Corporation

For information about this presentation, contact:

timothy.turkington@duke.edu

LEARNING OBJECTIVES

1. After this course, the attendee should be able to describe the basic functioning of a conventional gamma camera. 2. After this course, the attendee should be able describe three recent innovations of currently-available gamma cameras and SPECT/CT systems.

RC312

Vascular Series: CT Angiography: New Techniques and Their Application

Tuesday, Nov. 27 8:30AM - 12:00PM Room: S502AB

CT VA

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

Participants
Frank J. Rybicki III, MD, PhD, Ottawa, ON (*Moderator*) Medical Director, Imagia Cybernetics Inc
Dominik Fleischmann, MD, Stanford, CA (*Moderator*) Research Grant, Siemens AG

For information about this presentation, contact:

frybicki@toh.ca

LEARNING OBJECTIVES

1) To describe new methods that can be used to extract data from non-invasive vascular imaging. 2) To review best practices for vascular image acquisition. 3) To highlight interesting diagnoses that can be made with optimized vascular imaging protocols.

ABSTRACT

Vascular imaging contines to be a diagnositic mainstay in radiology practice. New emerging methods to derive blood flow metrics have entered the field over the last 10 years. These have been greatly emphasized in the last 2-3 years and have revitalized the field to include new daignostic domains. This series will review these methods as well as show the spectrum of diseases commonly encountered by the vascular and cardiovascular radiologist.

Sub-Events

RC312-01 Dual-energy and Low kVp CTA

Tuesday, Nov. 27 8:30AM - 9:05AM Room: S502AB

Participants
Shuai Leng, PHD, Rochester, MN (*Presenter*) License agreement, Bayer AG

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LEARNING OBJECTIVES

1) Understand basic principles of dual energy CT and different implementation methods. 2) Understand dual energy processing methods commonly used in CTA exams. 3) Use various types of dual energy CT images to improve diagnosis of CTA. 4) Asess impact of low kVp on image quality and radiation dose in CTA. 5) Select appropriate kVp for CTA scans for best diagnosis at lowest radiation dose.

RC312-02 Pre-clinical CT Imaging of Aortic Aneurysm and Dissection Using a Nanoparticle Contrast Agent

Tuesday, Nov. 27 9:05AM - 9:15AM Room: S502AB

Participants
Ketan B. Ghaghada, PhD, Houston, TX (*Presenter*) Research Consultant, Alzeca Biosciences, LLC
Pingping Ren, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Zbigniew Starosolski, PhD, Houston, TX (*Abstract Co-Author*) Stockholder, Alzeca Biosciences, LLC
Laxman Devkota, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Igor Stupin, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Eric Tanifum, PhD, Houston, TX (*Abstract Co-Author*) Consultant, Alzeca Bioscoences, LLC
Ananth Annapragada, PhD, Houston, TX (*Abstract Co-Author*) Stockholder, Alzeca Biosciences, LLC Stockholder, Sensulin, LLC Stockholder, Abbott Laboratories Stockholder, Johnson & Johnson
Scott A. Lemaire, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Ying H. Shen, MD,PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

kbghagha@texaschildrens.org

PURPOSE

Non-invasive structural and functional evaluation of aortic aneurysm and dissection (AAD) can (1) improve our understanding of disease initiation and progression in pre-clinical rodent models, and (2) facilitate in the management of patients at risk for aortic expansion, dissection and rupture. In this pre-clinical study, we investigated contrast-enhanced CT (CECT) imaging of aorta in a mouse model of sporadic AAD using a long circulating liposomal-iodine (Lip-I) nanoparticle contrast agent.

METHOD AND MATERIALS

Test mice were fed high fat diet for 4 weeks followed by continuous angiotensin-II (AngII) infusion for 4 weeks via a subcutaneous osmotic pump (n=8). Control mice (n=8) were fed regular diet and saline treatment. CECT was performed on day 7 and day 28 after starting AngII infusion. Additionally, non-contrast CT scans were acquired on day 28, prior to Lip-I injection, to determine aortic wall permeability. Lip-I was administered at a dose of 1.65 g I/kg for CECT imaging. CT images were analyzed for changes in lumen diameter and for contrast agent accumulation in aortic wall. CT findings were compared with post-mortem pathological examination of excised aorta.

RESULTS

CECT using Lip-I contrast agent enabled imaging of aortic aneurysm and dissection. The long circulating property of Lip-I provided uniform vascular opacification, thereby facilitating the visualization of structural changes in the aorta. CT imaging at Day 7 and day 28 enabled functional imaging of the aortic wall. Non-contrast images on day 28 demonstrated signal enhancement in the aortic wall of test mice; none of the control mice showed wall enhancement. CECT imaging also enabled the visualization of enlarged ascending aorta; lumen diameter increased by as much as 43% compared to controls. CT results corroborated with necropsy findings of pathology in excised aortas: 75% of test mice showed evidence of aortic disease compared to none in the control group; 25% of test mice exhibited dissection in the descending aorta; large suprarenal aneurysm was seen in one mouse; 62.5% of test mice exhibited enlargement of the ascending aorta.

CONCLUSION

Contrast-enhanced CT using a liposomal-I agent enabled structural and functional imaging of aorta in a mouse model of sporadic AAD.

CLINICAL RELEVANCE/APPLICATION

Structural and functional evaluation of the aortic wall using CECT can facilitate in the stratification of patients at risk for aneurysm expansion and rupture.

RC312-03 CT Imaging Before Transcatheter Aortic Valve Implantation (TAVI)? Using One-Stop Scan for Combined CT Angiography (CTA) Of the Head, Neck, Coronary and Aortic Arteries and Its Performance for Diagnosing

Tuesday, Nov. 27 9:15AM - 9:25AM Room: S502AB

Participants
Tao Shuai, Chengdu, China (*Presenter*) Nothing to Disclose

PURPOSE

To evaluate the effectiveness of one-stop scan for combined CT angiography (CTA) of the head, neck, coronary and aortic arteries before TAVI on a 16cm wide-detector CT and its performance for diagnosing coronary artery disease (CAD) and craniocervical artery disease

METHOD AND MATERIALS

110 patients (73.6±9.3 years) scheduled for TAVI underwent one contrast injection, one-stop CT scan first: ECG-triggered one heartbeat axial scan for coronary CT angiography (CCTA) and aortic valve, followed immediately by the non-ECG-gated scan for craniocervical and thoracic and abdominal CTA. Patient weight-dependent contrast dose volume at 1.0ml/kg was used. We analyzed CT attenuation values of the coronary arteries, head, neck aorta, iliac and femoral arteries. The craniocervical and CCTA images quality. The presence of stenosis (>=50 %) in CCTA was also evaluated using invasive coronary angiography result as a reference standard. Radiation dose was assessed.

RESULTS

The total dose-length product for the entire examination was low at 413.11±28.53 mGy.cm, and the total contrast dose was also low at 50±3.7ml. There was adequate attenuation (greater than 400HU) in all arteries. We could evaluate the peripheral access vessels and dimensions of the ascending aorta, aortic root, and aortic annulus in all patients. The image quality of craniocervical arteries was 100% diagnostic. The one-stop CT showed sensitivity of 89.7% and negative predictive value (NPV) of 92.4 % on the per-patient analysis, and the values were 91.5% and 96.7% on the per-vessel analysis.

CONCLUSION

Using the one-stop CT scan on a 16cm wide-detector CT system before TAVI provided high sensitivity and NPV in excluding obstructive CAD, and we provided excellent image quality for analyzing craniocervical artery disease for TAVI patients before surgery

CLINICAL RELEVANCE/APPLICATION

Wide-detector one-stop CT scan for combined CTA of head, neck, coronary and aortic arteries before TAVI is feasible with diagnostic image quality and low radiation dose

RC312-04 Impact of Replacing Traditional Medical Therapy with a Novel Personalized Treatment Strategy in Patients with Initially Uncomplicated Type-B Aortic Dissections

Tuesday, Nov. 27 9:25AM - 9:35AM Room: S502AB

Participants
Anna M. Sailer, MD,PhD, West Hollywood, CA (*Presenter*) Nothing to Disclose
Patty Nelemans, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Martin J. Willemink, MD,PhD, Menlo Park, CA (*Abstract Co-Author*) Speakers Bureau, Koninklijke Philips NV; Research Grant, Koninklijke Philips NV
Kai Higashigaito, MD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Lewis D. Hahn, MD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Dominik Fleischmann, MD, Stanford, CA (*Abstract Co-Author*) Research Grant, Siemens AG

PURPOSE

Medical treatment of initially uncomplicated acute Stanford type-B aortic dissection is associated with a high rate of late adverse events. A risk prediction model has been developed to predict individual risk of developing a complication within 5 years after diagnosis and thus identify individuals who potentially benefit from preventive endografting. The model is based on five baseline clinical and imaging parameters and has good discriminative ability with an AUC of 0.86. However, the potential clinical impact of basing clinical decisions on the model depends on the consequences of true positive (TP) versus false positive (FP) classifications. Early identification and correct treatment of patients who are at risk for an adverse event (TP) will lead to benefit, whereas unnecessary treatment of patients not at risk (FP) will cause harm.

METHOD AND MATERIALS

We used decision curve analysis (DCA) to assess applicability of the model in clinical practice. The net benefit of treating patients according to the prediction model is compared with the net benefit of the two alternative strategies 'treat all' and 'treat none' over a range of plausible threshold probabilities. A threshold probability reflects the relative weights that are attached to benefit versus harm, and can be different for individual doctors and patients. Data were used from 83 patients with initially uncomplicated type-B dissections who underwent follow-up with CT.

RESULTS

DCA showed that using a model for prediction of 1-year and 5-year risk of adverse events has higher net benefit than the strategy 'treat none' when one is not willing to treat more than 10 patients to prevent one patient with aortic dissection from having an adverse event. The strategy 'treat all' has highest net benefit only at threshold probabilities below 10%, i.e. when one is willing to treat 10 or even more patients to prevent one late adverse event from an aortic dissection.

CONCLUSION

Personalized risk assessment based on a prediction model to identify candidates for preventive treatment with endografting can lead to a net benefit in patient outcome when compared with the currently widely advocated wait-and-see approach.

CLINICAL RELEVANCE/APPLICATION

Personalized treatment based on imaging parameters and clinical parameters reduces the risk of late adverse events in patients with initially uncomplicated Type B aortic dissections.

RC312-05 Relationship between Contrast Dose and Radiation Dose in CTA

Tuesday, Nov. 27 9:35AM - 10:10AM Room: S502AB

Participants
Mannudeep K. Kalra, MD, Boston, MA (*Presenter*) Research Grant, Siemens AG; Research Grant, Canon Medical Systems Corporation

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LEARNING OBJECTIVES

1) How scan techniques and factors affect radiation dose and contrast enhancement in CT angiography studies. 2) How patient factors affect radiation dose and contrast enhancement in CT angiography. 3) Relationship between radiation dose and contrast media administration in CT angiography.

RC312-06 CTA: Acquisition Artifacts and Challenges

Tuesday, Nov. 27 10:20AM - 10:55AM Room: S502AB

Participants
Eric E. Williamson, MD, Rochester, MN (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Identify common imaging artifacts seen in CT angiography and address them, if possible. 2) Discuss techniques to address common challenges encountered in the clinical practice of vascular CT.

RC312-08 Diagnostic Accuracy of Single-Phase CTA for Acute Aortic Syndromes

Tuesday, Nov. 27 11:05AM - 11:15AM Room: S502AB

Participants
Matthew Thompson, MD, Orange, CA (*Abstract Co-Author*) Nothing to Disclose
Mayil S. Krishnam, MBBS, MRCP, Orange, CA (*Abstract Co-Author*) Nothing to Disclose
James Pao, MD, Orange, CA (*Presenter*) Nothing to Disclose

PURPOSE

Dual-phase CTA protocol has been the described standard protocol for evaluating acute aortic syndromes (AASs) for over 20 years without significant scrutiny over the necessity of the unenhanced scan, which is one of the highest exposure to radiation amongst CT examinations. However, with significant advances in diagnostic imaging quality and post-processing techniques available today, we sought to reevaluate the clinical utility of the unenhanced phase for AAS and hypothesize that single-phase CTA may be sufficiently accurate in the diagnosis of AAS, including intramural hematoma.

METHOD AND MATERIALS

We retrospectively reviewed patients who presented to our emergency department and underwent a dual-phase CTA for concern of acute aortic syndrome (AAS), within a consecutive 4 year period. Our reference standard of true positive and negative cases in our

subject population were determined by a review panel of two cardiovascular radiologists. After discovering 50 positive cases of AAS, 72 controls were selected randomly from the group of subjects negative for AAS. A study worklist was then created with both cases and control subjects (n = 122). Two radiologists, blinded to the diagnosis and the other reviewer, were asked to evaluate for an AAS by viewing only the contrast-enhanced (CTA) portions of the exams.

RESULTS

A total of 434 patients were identified as our study population. We found a total of 50 cases positive for AAS, giving a frequency of AAS to be 11.5%. Of the 50 cases positive for AAS, 13 were due to isolated intramural hematoma, 18 dissection, 6 penetrating atherosclerotic ulcer, 4 aortic rupture, and 9 a combination of IMH with dissection or PAU. The two blinded readers had perfect agreement (100%) with all cases (122/122), each designating 51 positive AAS cases and 71 negative. Each reader independently identified the same false positive case, therefore specificity was 98.6% and accuracy 99.2%. Since there were no false negatives and all true positives were identified, sensitivity was 100% for each reader.::

CONCLUSION

Single-phase CTA for the diagnosis of acute aortic syndromes is highly accurate. The unenhanced portion of the dual-phase protocol could effectively be eliminated.

CLINICAL RELEVANCE/APPLICATION

Diagnosing acute aortic syndromes with single-phase CTA would significantly reduce CT radiation exposure in these patients.

RC312-09 The Value of MDCT in the Differential Diagnosis of Chronic Thromboembolic Pulmonary Hypertension Patients

Tuesday, Nov. 27 11:10AM - 11:25AM Room: S502AB

Participants
Nan Yu, MD, Xian Yang, China (*Presenter*) Nothing to Disclose
Haifeng Duan, Xianyang City, China (*Abstract Co-Author*) Nothing to Disclose
Yongjun Jia, MMed, Xianyang City, China (*Abstract Co-Author*) Nothing to Disclose
Yong Yu, Xianyang City, China (*Abstract Co-Author*) Nothing to Disclose
Shan Dang, Xian, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Background: Chronic thromboembolic pulmonary hypertension (CTEPH) should be differentiated from other causes of pulmonary hypertension(PH), because CTEPH is the only form of pulmonary hypertension that can be surgically treated. However, due to non specific clinical and imaging manifestations, CTEPH remains under-diagnosed. The purpose of this study was to discern imaging findings that separate CTEPH from other causes of PE .

METHOD AND MATERIALS

Methods: A total of 56 patients diagnosed with PH were enrolled in the study, All the patients were underwent MDCT angiography. The CT images were assessed for the presence of chronic pulmonary embolism (PE). therefore, the 72 patients were divided into two groups: group1, CTEPH group (n=25); and group2, other causes of PE (pulmonary arterial hypertension n=5, PH due to left heart disease n=6, PH due to lung disease n=18, PH due to unclear or multifactorial mechanisms n=2). The symptoms, clinical signs, risk factors, blood test and radiological features were analyzed and compared in the two group.

RESULTS

There was no significant difference in the frequencies of clinical symptoms, signs, risk factors, blood test between patients with CTEPH and patients with nonthromboembolic PH, except the history of suffering from acute pulmonary embolism (APE) once ($x2=5.376$, $p=0.029$). The frequencies of direct signs signs of chronic PE, mosaic attenuation, ground glass opacity, and pulmonary artery widened were statistically significantly higher in patients with CTEPH than in patients with nonthromboembolic PH ($p<0.001$).

CONCLUSION

The clinical symptoms, signs and risk factors can not be dependent factors in CTEPH diagnosis due to nonspecific. However, Acorrding to MDCT angiography, most patients with CTEPH have direct signs of chronic PE. The secondary signs include mosaic attenuation, ground glass opacity, and pulmonary artery widened , which also helpful to distinguish CTEPH from other causes of PH.

CLINICAL RELEVANCE/APPLICATION

The imaging findings of MDCT is valuable in separating chronic thromboembolic pulmonary hypertension (CTEPH) from other causes of pulmonary hypertension (PH).

RC312-10 CTA: Post Processing and Workflow

Tuesday, Nov. 27 11:25AM - 12:00PM Room: S502AB

Participants
Michael L. Steigner, MD, Boston, MA (*Presenter*) Consultant, Canon Medical Systems Corporation

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LEARNING OBJECTIVES

1) Define post-processing principles. 2) Apply post-processing techniques. 3) Implement post-processing in the clinical workflow. 4) Emerging techniques and applications.

RC313

Pediatric Series: Musculoskeletal Imaging

Tuesday, Nov. 27 8:30AM - 12:00PM Room: N228

MK PD

AMA PRA Category 1 Credits ™: 3.00
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants
Arthur B. Meyers, MD, Orlando, FL (*Moderator*) Author with royalties, Reed Elsevier; Editor with royalties, Reed Elsevier
Tal Laor, MD, Boston, MA (*Moderator*) Nothing to Disclose
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Sub-Events

RC313-01 Anterior Cruciate Ligament Imaging in Children and Adolescents

Tuesday, Nov. 27 8:30AM - 8:50AM Room: N228

Participants
Arthur B. Meyers, MD, Orlando, FL (*Presenter*) Author with royalties, Reed Elsevier; Editor with royalties, Reed Elsevier

LEARNING OBJECTIVES

1) List two structures that can prevent reduction of tibial eminence fractures. 2) Describe the main types of anterior cruciate ligament reconstruction procedures that are used in skeletally immature children. 3) Identify the normal post-operative imaging appearance after physeal sparring anterior cruciate ligament reconstruction procedures.

RC313-02 Insall-Salvati Ratio and Visual Diagnosis of Patella Alta on MR versus Radiography in the Pediatric Population

Tuesday, Nov. 27 8:50AM - 9:00AM Room: N228

Participants
Darya Kurowecki, MD, Hamilton, ON (*Presenter*) Nothing to Disclose
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Kelly M. Cunningham, MD, Hamilton, ON (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To determine whether the Insall-Salvati ratio (ISR) measured on MR images is equivalent to that measured on radiographs in the pediatric population, and whether a visual diagnosis of patella alta corresponds to an ISR diagnosis of patella alta on MR and radiographs.

METHOD AND MATERIALS

A retrospective review of 49 pediatric patients (age range 7.5-17 years) with unfused growth plates who underwent knee MR imaging and lateral knee radiographs. All patients had knee imaging obtained for a variety of reasons. Measurements for calculating ISR (ratio of the patella tendon length to patella length) and a visual estimate of the presence of patella alta were obtained by three independent radiologists. Data were analyzed using paired t-tests and Pearson's correlation. A reliability assessment and inter-rater and inter-method agreements were calculated. Patella alta was defined visually as the middle third of the patella bisecting the growth plate and as ISR >1.2. Additional cut-off values of ISR >1.3 and >1.4 were also analyzed.

RESULTS

There is a statistically significant but not clinically significant difference between ISR determined on MR (mean=1.19) and radiographs (mean=1.25, $p < 0.05$). There is a strong correlation between ISR as determined on MR and radiographs (Pearson's r=0.6) with moderate consistency (Cronbach's alpha=0.78). There is a good level of agreement between the diagnosis of patella

alta on MR and radiographs when defined as ISR greater than 1.2 and 1.3 (Cohen's Kappa=0.61), but not 1.4 (Kappa=0.22). There is low agreement between a visual diagnosis of patella alta and a diagnosis of patella alta based on ISR across the two modalities (Kappa=0.09), and no agreement within the two modalities.

CONCLUSION

The study results demonstrate a strong association between ISR derived from MR images and radiographs in the pediatric population who are 7.5 years of age or older. Additionally, the results suggest that patella alta cannot be diagnosed visually on either modality.

CLINICAL RELEVANCE/APPLICATION

Clinically, it has been presumed that because ISR correlates well between radiographic and MRI measurements in adults that the same holds true in the pediatric population. This study confirms that ISR correlates well between radiographs and MRI in patients 7.5 years of age and older.

RC313-03 Clinical Implications of Focal Periphyseal Edema (FOPE): A Retrospective Review

Tuesday, Nov. 27 9:00AM - 9:10AM Room: N228

Participants
Leah C. Davis, DO, Charleston, SC (*Presenter*) Nothing to Disclose
William Davis, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Bashir Hakim, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Heather R. Collins, PhD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

The growth plate is a dynamic cartilaginous structure with distinct layers including resting, proliferative and hypertrophic zones. Focal periphyseal edema, or FOPE lesion, was originally described as focal bone marrow edema centered about a closing physis and is characterized by T2/STIR hyperintense and T1 hypointense signal on both sides of the physis. It may represent physiologic changes of physeal closure, with the marrow edema resulting from early osseous bridging, or tethering. Assuming this, FOPE lesions should be transiently present and resolve after physeal closure. No study has been performed to assess the clinical significance and natural course of FOPE lesions. The purpose of our study is to evaluate whether the presence of a FOPE lesion on MRI is associated with clinical symptoms of pain at the time of imaging, and whether symptoms resolve or persist on follow-up clinical examinations performed 9-12 months later.

METHOD AND MATERIALS

Inclusion criteria for our study was ages 11-18 years with knee pain and no acute trauma or surgery. 884 knee MRIs were returned from our initial search; 21 FOPE lesions were identified in 19 patients. Age and gender-matched patients were selected for the control group. Each FOPE lesion was evaluated for anatomic location, cross sectional location and size. Clinical data including age, gender, laterality, focal location of pain and reported trauma was obtained from a clinical note at or within 3 weeks of the MRI examination and from follow-up note 9-12 months later. When pain was reported using at least one cross-sectional descriptor in which the FOPE lesion was located, the lesion was described as 'concordant.'

RESULTS

Patients with FOPE lesions were significantly more likely to report resolution/improvement in pain at follow-up (64.29%) than persistent pain (7.14%) or no mention of pain (28.57%) in the follow up note [p=0.03], although there was no statistically significant difference in pain resolution at follow up between FOPE and control groups. FOPE patients were significantly more likely to have concordant rather than discordant pain [p = 0.04].

CONCLUSION

Our findings support previous suggestions that FOPE lesions themselves may be a symptomatic phenomenon of physeal closure.

CLINICAL RELEVANCE/APPLICATION

FOPE lesions on MRI should be recognized by their characteristic appearance and location around a closing physis and may be transiently painful.

RC313-04 Do Diffusion-tensor Imaging Parameters of the Physis Correlate with Subsequent Growth?

Tuesday, Nov. 27 9:10AM - 9:20AM Room: N228

Participants
Maria A. Bedoya-Velez, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Christian A. Barrera, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
J. C. Edgar, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Jorge Delgado, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Nancy A. Chauvin, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

It has been demonstrated that Diffusion-Tensor imaging (DTI) parameters of the femoral physis (ADC, track length and volume) are higher when the growth rate is fastest. The aim of this study is to determine the correlation between DTI tractography of the distal

femoral physis and the amount of height change during a 1-year period in children who are at puberty.

METHOD AND MATERIALS

Retrospectively, we identified children who had undergone DTI tractography of the knee and had recorded heights at the time of study and 10-14 months later. We included girls >= 11 yr. and boys >= 13 yr., all with open physes. DTI parameters of the femoral physis included: 20 directions, b values of 0 and 600 sec/mm², fractional anisotropy (FA) threshold of 0.15 and an angle threshold of 40°. We measured apparent diffusion coefficient (ADC), tract length, tract number, tract volume and tract concentration. Height change was calculated by subtracting the height at the DTI exam from the height recorded 10-14 months later. We correlated DTI parameters with height change during the following year.

RESULTS

25 children were included (10 girls, mean age 14.2 yr. range 11.9 - 16.1 yr.). The mean height at MRI was 165 cm (range 151 - 184 cm), and the mean height after 1 year was 169 cm (range 150 - 188 cm). Mean height change was 3.17 cm (range 0 - 12.7cm). Children with higher tract volumes, tract lengths and ADC values had a greater height change in 1 year (all $p < 0.001$). Linear regression showed that age was a predictor of height change, accounting for 23% of the variance ($p < 0.001$). After accounting for the variance associated with age, DTI parameters predicting additional variance in height change included femoral track number (R2 change = 0.42), tract volume (R2 change = 0.40), tract length (R2 change = 0.38) and tract concentration (R2 change = 0.31) ($p < 0.001$) (Figure 1).

CONCLUSION

Children with greater femoral track number and volume have greater height change. DTI parameters can help predict subsequent growth, suggesting that DTI of the knee is a biomarker for short-term growth potential.

CLINICAL RELEVANCE/APPLICATION

DTI of the knee is a growth biomarker. This may be useful in the evaluation of growth hormone (GH) therapeutic effectiveness in children with idiopathic short stature, GH deficiency or GH resistance.

RC313-05 Demonstration of the Fetal Bone Cortex on MRI Scans: Preliminary Clinical Study on Normal Fetal Specimens

Tuesday, Nov. 27 9:20AM - 9:30AM Room: N228

Participants
Yoshiko Matsubara, Hiroshima, Japan (*Presenter*) Nothing to Disclose
Chihiro Tani, MD, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Toru Higaki, PhD, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Shogo Kamioka, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuko Nakamura, MD, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuo Awai, MD, Hiroshima, Japan (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation; Research Grant, Hitachi, Ltd; Research Grant, Fujitsu Limited; Research Grant, Bayer AG; Research Grant, DAIICHI SANKYO Group; Research Grant, Eisai Co, Ltd; Medical Advisory Board, General Electric Company; ;

PURPOSE

Computed tomography (CT) studies of fetuses can be used to evaluate systemic bone disorders. As radiation exposure is a critical issue, we developed a novel magnetic resonance imaging (MRI) sequence that demonstrates the bone cortex and compared MRI- and CT findings on fetal bones.

METHOD AND MATERIALS

We placed 14 normal human fetal specimens (gestational age 28-32 weeks) in a plastic cylindrical container and scanned them with a 3T MRI scanner (TRILLIUM OVAL, Hitachi, Tokyo, Japan). We used our original sequence based on T2*WI (TE=7.2 ms ,FA=40°) edited with the Dixon method. CT scans obtained with adaptive iterative dose reduction (AIDR) were the reference images. We evaluated metacarpal and a metatarsal images of the 5th finger and the shape of the spine. Their visualization on MRI scans was scored as 4=better than on-, 3=almost the same as on CT images, 2=not clearly visible but evaluable, and 1=not visible. A score of 2 or higher was considered diagnostically acceptable.

RESULTS

The average visualization score of the metacarpal and the metatarsal on MRI scans was 3.4 and 3.1, respectively. The visualization score of the spine differed by location, it was 3.3 for the cervical and thoracic- and 2.6 for the lumber spine. None of the MRI scans had a score of 1.

CONCLUSION

With our MRI technique, the small bones were more clearly visible than on CT scans. Our MRI sequence can replace CT study.

CLINICAL RELEVANCE/APPLICATION

We document the utility of MRI for fetal bone scanning. Our method can be used for evaluating human fetal bone systems without radiation exposure.

RC313-06 It's A Thin Line: Development and Validation of Dixon MRI-Based Semi-Quantitative Assessment of Physeal Stress in the Wrists of Young Gymnasts and Non-Gymnasts

Tuesday, Nov. 27 9:30AM - 9:40AM Room: N228

Participants
Laura S. Kox, MD, Amsterdam, Netherlands (*Presenter*) Nothing to Disclose
Rik B. Kraan, MSc, Amsterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
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Gino Kerkhoffs, MD,PhD, Amsterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Aart J. Nederveen, PhD, Amsterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To reliably assess maturity- and stress-related metaphyseal water distribution in the wrists of gymnasts and non-gymnasts, using a semi-quantitative Dixon MRI-based method to aid early diagnosis of gymnastic physeal stress injury.

METHOD AND MATERIALS

Twenty-four gymnasts with wrist pain (12 girls), 18 asymptomatic gymnasts (9 girls), and 24 non-gymnast controls (12 girls) aged 12±1.5 years prospectively underwent hand radiographs and MRI of the wrist on a 3T scanner, including coronal T1-weighted and T2-weighted Dixon sequences. Skeletal age was determined using the radiographs. Two observers measured metaphyseal water signal fraction in 13 radial and ulnar regions of interest (ROIs) on Dixon MR images. Inter- and intra-rater reliability, inter-slice reliability (between 3 middle radial slices) and inter-ROI reliability (between 3 ROIs on same level) were assessed using intraclass correlation coefficients (ICCs). Water signal fractions and their within-person ratios in distal versus most proximal reference ROIs were compared between groups using one-way analysis of variance.

RESULTS

Inter- and intra-rater ICCs were 0.79-0.99 and 0.94-1.0 for T1-weighted, and 0.88-1.0 and 0.88-1.0 for T2-weighted Dixon. Inter-slice and inter-ROI ICCs were 0.55-0.94 and 0.95-0.97 for T1-weighted, and 0.70-0.96 and 0.96-0.97 for T2-weighted Dixon. Metaphyseal water signal fraction in symptomatic gymnasts was higher in six distal ROIs compared to asymptomatic gymnasts and in nine ROIs compared to non-gymnasts ($p<0.05$). Radial metaphyseal water score (defined as the ratio of a ROI located 5-10 mm proximal to the physis versus a ROI located 20-25 mm proximal to the physis) was 1.61 in symptomatic gymnasts and 1.35 in asymptomatic gymnasts on T2-weighted Dixon ($p<0.05$).

CONCLUSION

Semi-quantitative Dixon MRI-based water signal fraction assessment has good to excellent reproducibility and shows increased metaphyseal water scores in symptomatic gymnasts compared to asymptomatic gymnastic peers.

CLINICAL RELEVANCE/APPLICATION

This reliable, off-the-shelf semi-quantitative method for assessing metaphyseal bone marrow water content with short scan times can potentially be used as an indicator of bone marrow edema in the early diagnosis of gymnastic physeal stress injury.

RC313-07 Growth Plate Complex and Injuries

Tuesday, Nov. 27 9:40AM - 10:00AM Room: N228

Participants
Jie C. Nguyen, MD,MS, Philadelphia, PA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Review the histoanatomy of the growth plate and the physiology behind endochondral ossification. 2) Review the key components of the growth plate complex and the different injury patterns 3) Review the role of imaging in the treatment algorithm.

ABSTRACT

The growth plates (physes) are visible on virtually all imaging studies obtained in skeletally immature children. The proper function of these growth plates depends on an intricate balance between chondrocyte proliferation (requiring nourishment by the epiphyseal vessels) and death (facilitated by the metaphyseal vessels). Therefore, injury to either the growth plate (direct insult) or vascular compromise on either side of the growth plate (indirect insult) can cause growth plate dysfunction. Direct growth plate insults most commonly occur with Salter-Harris fractures and injuries that allow for transphyseal communication of vessels are at a higher risk for subsequent bone bridge formation. Indirect insults produce different sequelae depending upon whether the epiphyseal or metaphyseal blood supply is compromised. Epiphyseal osteonecrosis can produce slowed longitudinal bone growth with possible growth plate closure and is often accompanied by an abnormal secondary ossification center. In contrast, the loss of metaphyseal blood supply disrupts endochondral ossification and allows the persistence of chondrocytes within the metaphysis, which appear as growth plate widening that can be either focal or diffuse. Imaging remains critical for detecting acute injuries and identifying subsequent growth disturbances. Depending on the imaging findings and patient factors, these growth disturbances may be amenable to conservative or surgical treatment options. Therefore, an understanding of the normal growth plate anatomy and physiology and associated pathophysiologies can increase diagnostic accuracy, allow anticipation of future growth disturbances, and ensure optimal imaging by the radiologist with the ultimate goal of timely and appropriate intervention.

RC313-08 Orthopedic Imaging of Children with Cerebral Palsy

Tuesday, Nov. 27 10:20AM - 10:40AM Room: N228

Participants
Tal Laor, MD, Boston, MA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To identify the impact of cerebral palsy on musculoskeletal development in children. 2) To recognize the radiographic manifestations of cerebral palsy on the lower extremities. 3) To understand how radiographic findings in children with cerebral palsy can direct treatment.

RC313-09 The Glenohumeral Joint in Brachial Plexus Birth Palsy (BPBI): Cartilage and Shoulder Muscle Evaluation with T2 Relaxation Time Mapping and Correlation with Disease Severity

Tuesday, Nov. 27 10:40AM - 10:50AM Room: N228

Participants
Mi-Jung Lee, MD, PhD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Alexandra Plemmons, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Roger Cornwall, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Kendra Eckstein, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Hee Kyung Kim, MD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the T2 relaxation times of glenoid cartilage and shoulder muscles in children with brachial plexus birth injury (BPBI) as they relate to glenohumeral dysplasia and shoulder function.

METHOD AND MATERIALS

This retrospective study included children with unilateral BPBI who underwent bilateral shoulder 1.5T or 3T MRI. On axial images, mean T2 relaxation times were measured in the glenoid cartilage and in the deltoid, subscapularis, and infraspinatus muscles. Glenoid retroversion and posterior humeral head displacement were measured, and glenohumeral dysplasia was classified by Waters grade. Shoulder function measured by the Mallet Scale and Active Movement Scale (AMS) was evaluated in the subset of patients in whom an MRI and clinical examination were available prior to any surgery and less than 4 months apart. Relationships among all imaging and clinical data were assessed with Pearson correlations for continuous variables and Kendall's Tau-b for categorical variables. T2 values were compared between sides with paired t-tests.

RESULTS

74 children (age 5-216 months, mean 66 months) were included. Age negatively correlated with glenoid cartilage T2 values in unaffected (rho=-0.455, p<0.001) and affected (rho=-0.444, p<0.001) sides, but not with muscle T2 values. Glenoid cartilage T2 values did not differ between affected and unaffected sides. T2 values of all shoulder muscles were significantly higher on the affected side (all p<0.001) and positively correlated with Waters grade (tau=0.22, p=0.016 in deltoid; tau=0.21, p=0.019 in subscapularis; and tau=0.18, p=0.039 in infraspinatus). In the clinical subset (n=24), muscle T2 values did not correlate with global shoulder function on the Mallet scale, but individual muscle T2 values correlated inversely with corresponding specific AMS shoulder functions (tau=-0.33, p=0.036 for deltoid/abduction; tau=-0.55, p<0.001 for infraspinatus/external rotation).

CONCLUSION

Glenoid cartilage T2 relaxation time decreases with age in children, but is unaffected by BPBI. Shoulder muscle T2 relaxation time does not change with age, but is affected by BPBI and correlates with glenohumeral dysplasia and clinical muscle function.

CLINICAL RELEVANCE/APPLICATION

T2 relaxation time can be used to quantify denervation-induced atrophy of specific muscles and to assess the role of this atrophy in the pathophysiology, prognosis, and outcomes of BPBI in children.

RC313-10 How and How Much are the Muscles Affected in Juvenile Localized Scleroderma? A Qualitative and Quantitative MR Study

Tuesday, Nov. 27 10:50AM - 11:00AM Room: N228

Awards
Student Travel Stipend Award

Participants
Silvia Karem Janet Flores Quispe, MD, Padua, Italy (*Presenter*) Nothing to Disclose
Annachiara Cavaliere, MD, Este, Italy (*Abstract Co-Author*) Nothing to Disclose
Michael Weber, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Tiziana Toffolutti, Padova, Italy (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Juvenile localized scleroderma (JLS) is characterized by skin thickening and subcutaneous tissue involvement, but it can also extend to the deep tissues affecting muscles and bones. Thus, aim of our study was to perform a qualitative and quantitative MR-based evaluation of muscles in JLS patients (JLSp).

METHOD AND MATERIALS

An electronic search of JLSp referring to our tertiary center from January 2012 to January 2018 was performed. Inclusion criteria were: at least one MR scan at diagnosis including axial T2w fat-sat and axial T1w images of both extremities. The last available follow-up MR, satisfying the above-mentioned criteria was also included. Fatty atrophy (Mercury Scale) and muscle edema (5 points scale) were assessed for the qualitative analyses. Subcutaneous area (SA), muscle perimeter (MP) and muscle area (MA)

were measured (i.e., single slice evaluation at the mostly affected level) on the injured (i) and healthy contralateral (hc) extremity (Student's T-test; p<0.05). Two radiologists performed each measurement independently and the intraclass correlation coefficient was computed.

RESULTS

Fourteen JLSp (9 females; mean age 7.1±3.6 yrs) met the inclusion criteria and 23 MR examinations (i.e., 14 at diagnosis and 9 at follow-up) were evaluated. Muscle edema was detected in 12 patients (mean value 1.36) whereas fatty replacement was identified only in one case (grade 2). At diagnosis all quantitative parameters were significantly lower on the injured side (SAi=27.72±17.15cm2 vs SAhc=35.72±26.54cm2; MPi=22.91±5.78cm vs MPhc=26.66±6.91cm; MAi= 40.67±18.56cm2 vs MAhc=46.05±22.50cm2, p<0.05,each; ICC raters>.950, each). At follow-up the muscle edema decreased in 6 JSLp and SA, MP, and MA didn't show any significant difference between the two extremities (p>0.05).

CONCLUSION

JLSp showed low-grade muscle edema and significant hypoplasia rather than atrophic changes. The therapeutic treatment didn't reduce only the edema but also the quantitative differences between the two extremities. Further studies including a larger population and the evaluation of muscle volume should be performed to further assess this evidence.

CLINICAL RELEVANCE/APPLICATION

Muscle hypoplasia rather than atrophy affects JLSp thus an MR-based qualitative and quantitative muscle evaluation, at diagnosis and follow-up, is expected to have a strong clinical impact.

RC313-11 Automated Segmentation of the Femoral Head on MRI to Extract Biomarkers of Early Hip Disease Predictors in 9 Year Old Children: A Population-Based Prospective Cohort Study

Tuesday, Nov. 27 11:00AM - 11:10AM Room: N228

Participants
Desiree K. de Vreede, MD,MENG, Rotterdam, Netherlands (*Presenter*) Nothing to Disclose
Mattias Hansson, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

The objective of the present study is to use a novel approach to automatically segment the femoral head from hip MR images and to extract biomarkers that represent early predictors of hip disease. These biomarkers will be related to BMI, physical activity and diet in a large population-based prospective cohort study.

METHOD AND MATERIALS

We collected hip MR images in 2870 children at the age of 9 years as part of a MRI study embedded in a prospective cohort study, which follows children from fetal life until early adulthood. The MRI hip protocol (3.0T) was identical for all participants and comprised of two coronal sequences; a T2 and a T1 -weighted sequence. The slice thickness was 1.2 mm for both sequences, all slices were contiguous. Automatic segmentation of the anatomical structure of interest from the MR image was performed using a multi-atlas appearance model, which is multi-modal in that it takes both weighted sequences as input. The model was evaluated using 10-fold cross-validation over a set of T2 and a T1 sequences with corresponding manually drawn femoral head segmentations. After segmentation, shape characteristics of the femoral head will be automatically extracted in a similar way.

RESULTS

We were able to segment the femoral bone from MR images accurately (with dice numbers of 0.793-0.869) and are currently working on a method to automatically extract several shape characteristics of the femoral head such as volume, neck-shaft angle and femoral neck width.

CONCLUSION

Automatic segmentation of the femoral head from MR images can be accurately done using a multi-atlas appearance model, and shape characteristics can be automatically derived from these segmentations.

CLINICAL RELEVANCE/APPLICATION

Automatic segmentation of biomarkers is the first step in relating biomarkers that are early identifiers of disease to BMI, physical activity and diet. With the knowledge obtained from a large population-based cohort, we could intervene in the diet or physical activity levels of young children with early disease characteristics.

RC313-12 Semantic Labeling of Pediatric Musculoskeletal Radiographs Using Deep Learning

Tuesday, Nov. 27 11:10AM - 11:20AM Room: N228

Awards
Trainee Research Prize - Resident

Participants
Paul H. Yi, MD, Baltimore, MD (*Presenter*) Nothing to Disclose
Tae Kyung Kim, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jinchi Wei, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Tae Soo Kim, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

Gregory D. Hager, PhD, MSc, Baltimore, MD (*Abstract Co-Author*) Co-founder, Clear Guide Medical LLC CEO, Clear Guide Medical LLC
Cheng Ting Lin, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Haris I. Sair, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Ferdinand K. Hui, MD, Richmond, VA (*Abstract Co-Author*) Speakers Bureau, Terumo Corporation Speakers Bureau, Penumbra, Inc Stockholder, Blockade Medical Inc
Jan Fritz, MD, Baltimore, MD (*Abstract Co-Author*) Research Grant, Siemens AG; Scientific Advisor, Siemens AG; Scientific Advisor, Alexion Pharmaceuticals, Inc; Speaker, Siemens AG

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PURPOSE

To develop and test the performance of deep convolutional neural networks (DCNNs) for the automated classification of pediatric musculoskeletal radiographs by anatomic area.

METHOD AND MATERIALS

We obtained 50 anonymized pediatric radiographs each of the shoulder (AP), elbow (lateral), hand (PA), pelvis (AP), and knee (AP) (250 total images). These radiographs were combined into a single database and used to train 5 DCNNs, one to detect each anatomic region. For each DCNN, the radiographs were randomly split into training (70%), validation (10%), and test (20%) datasets. The training and validation datasets were augmented 30x using multiple rotations, flipping, random cropping, and non-rigid deformation. These augmented images were used to train and validate the ResNet-18 DCNN pretrained on ImageNet. All DCNN development and testing was performed using PyTorch on a 2.5 GHz Intel Haswell dual socket (12-core processors) with 128 GB of RAM and 2 NVIDIA K80 GPUs. Receiver operating characteristic (ROC) curves with area under the curve (AUC) and standard diagnostic measures (e.g., sensitivity, specificity, and accuracy) were used to evaluate the DCNN's performance.

RESULTS

All 5 DCNNs trained for classification of the radiographs into anatomic region achieved AUCs of 1 (Table 1). Accuracy, sensitivity, and specificity were 100% for all DCNNs except for the shoulder DCNN, which had 97% accuracy, 90% sensitivity, and 100% specificity. The shoulder DCNN was incorrect in 2 of 60 test cases (both false negatives), which were correctly labeled by a musculoskeletal radiologist. Classification of test radiographs occurred at a rate of 33 radiographs per second.

CONCLUSION

DCNNs trained on a small set of images with 30x augmentation through standard processing techniques can classify pediatric musculoskeletal radiographs into anatomic region with near-perfect to perfect accuracy at superhuman speeds. DCNNs such as these may improve radiologist workflow through automated labeling of radiographs, identification of relevant comparison examinations, and improvement of hanging protocols. The proof-of-concept from our work may apply to other body parts and radiographic views to create an all-encompassing semantic labeling DCNN.

CLINICAL RELEVANCE/APPLICATION

DCNNs have good-to-perfect accuracy for automatically classifying pediatric musculoskeletal radiographs into anatomic region at superhuman speeds, which may enhance radiologist workflow.

RC313-13 Binomial Determination of Acute Orthopedic Pediatric Elbow Emergencies Using a Convolutional Neural Network: Initial Results

Tuesday, Nov. 27 11:20AM - 11:30AM Room: N228

Participants
Jesse C. Rayan, MD, Houston, TX (*Presenter*) Nothing to Disclose
Nakul Reddy, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
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Wei Zhang, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The majority of pediatric elbow trauma requiring radiographic evaluation are initially interpreted by non-radiologists or by an adult radiologist unfamiliar with normal developmental variations. Accurate interpretation of acute orthopedic emergencies in the pediatric elbow can be challenging. Automated determination of normal versus abnormal radiographs can significantly improve workflow, patient care, and allow the emergency room provider to focus on other clinical duties. The purpose of this study is to determine if convolutional neural networks (CNN) can binomially classify pediatric elbow radiographs as normal versus abnormal.

METHOD AND MATERIALS

With IRB approval, we retrospectively retrieved 4311 radiographic studies containing 11988 images of the elbow and associated radiology reports over a 12-month period from January-December 2017 at a dedicated children's hospital. A text-classification model 'fast-text' (Joulin et al.) was trained to assist classification of radiology reports into normal and abnormal. A CNN based on the Inception-v3 architecture (Szegedy et al.) was modified to accept an input layer of 1100 x 1100 pixel single-channel images. Training was performed with transfer learning from a CNN pre-trained on radiographs from the 2017 RSNA Pediatric Bone Age Challenge on a desktop system with a GTX 1080 Ti. A separate validation dataset was created and verified with two radiology residents examining 911 images and reported findings from 330 studies. Training was performed for over 250 epochs until accuracy plateaued.

RESULTS

Evaluation (inference) takes 0.4 seconds per radiograph. Sensitivity for an individual radiograph was 88%, with a specificity of 68%. Combining results for a complete elbow radiographic series, sensitivity was 95%, and specificity was 50%.

CONCLUSION

Automated binomial classification of pediatric elbow radiographs into normal and abnormal is feasible using CNN. Initial results show that the product errs on sensitivity over specificity.

CLINICAL RELEVANCE/APPLICATION

At high volume centers or centers without a radiologist such as stand alone urgent care centers, automated diagnosis of elbow or other diagnostically challenging pediatric appendicular radiographs after acute injury can potentially improve patient care and workflow. CNN facilitated radiographic interpretation is a potential viable tool as improvements in CNN algorithms improve specificity.

RC313-14 SPARCC Magnetic Resonance Imaging Scoring System for Assessment of Sacroiliitis in Pediatric Patients with Juvenile Spondyloarthritis/Enthesitis Related Arthritis: A Reliability, Validity, and Responsiveness Study

Tuesday, Nov. 27 11:30AM - 11:40AM Room: N228

Participants
Jyoti Panwar, MD, FRCR, Toronto, ON (*Presenter*) Nothing to Disclose
Shirley M. Tse Sr, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
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Jennifer Stimec, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
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Shilpa Radhakrishnan, MBBS, DMRD, Chennai, India (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Intra- and inter-reader reliability, construct validity and responsiveness of the Spondyloarthritis Research Consortium of Canada (SPARCC) MRI scoring system were investigated for scoring sacroiliitis in pediatric juvenile spondyloarthritis (JSpA)/enthesitis related arthritis (ERA) patients who have received biologic and/or non-biologic treatment.

METHOD AND MATERIALS

Ninety whole body MRI examinations with dedicated coronal oblique planes of the sacroiliac joints in 46 patients were independently reviewed and scored by two pediatric musculoskeletal radiologists, blinded to clinical details, using the SPARCC system. Intra- and inter-reader reliability was assessed by intra-class correlation coefficients (ICCs). Construct validity testing was done by 1) correlating the SPARCC MRI scores of sacroiliitis with clinical disease activity indicators (cross-sectional validity); 2) correlating the change in the MRI score with the change in clinical indicators before and after treatment (longitudinal validity). Responsiveness of the MRI and clinical indicators was also evaluated, grouped by biologic and non-biologic treatment.

RESULTS

When applied in children with JSpA/ERA, the SPARCC showed almost perfect (ICC 0.79-1.00) intra- and inter-reader reliability. There was poor cross-sectional and longitudinal correlation between clinical assessment indicators and MRI scoring. SPARCC scores showed higher responsiveness to treatment-related change than most clinical outcome measures. Three clinical outcome measures correlated longitudinally with SPARCC score in non-biologic treatment: active joint count ($r=0.72$, $p<0.001$), FABER test ($r=0.58$, $p=0.012$), and Physician Global Assessment ($r=0.61$, $p=0.034$).

CONCLUSION

SPARCC MRI scoring system is a reliable tool with relatively higher responsiveness than clinical indicators and is suitable for objective quantification of sacroiliitis when applied to pediatric JSpA/ERA patients. If the results of this pilot study are reproduced in larger series this scoring system may serve as a reliable quantitative method for early detection of axial disease, to monitor disease activity and response to therapy.

CLINICAL RELEVANCE/APPLICATION

The application of this radiologic scoring index into clinical practice may serve as a reliable quantitative method to assess the degree of SI joint inflammation even in the subclinical stage and potentially to monitor disease activity, and response to therapy.

RC313-15 Imaging of Juvenile Idiopathic Arthritis

Tuesday, Nov. 27 11:40AM - 12:00PM Room: N228

Participants
Karen Rosendahl, Bergen, Norway (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To identify features of joint inflammation and destructive change on plain radiographs, ultrasound and MRI. 2) To appreciate the role of ultrasound for detecting and grading of inflammation in JIA. 3) To understand the appearances of synovitis and its mimickers on MRI.

RC314

Interventional Series: Venous Disease

Tuesday, Nov. 27 8:30AM - 12:00PM Room: E352

CH VA IR

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants
Kush R. Desai, MD, Chicago, IL (*Moderator*) Speakers Bureau, Cook Group Incorporated; Consultant, Cook Group Incorporated; Consultant, The Spectranetics Corporation; Consultant, AngioDynamics, Inc; Consultant, Boston Scientific Corporation
Akhilesh K. Sista, MD, New York, NY (*Moderator*) Research Grant, Penumbra Inc; Scientific Advisory Board, Thrombolex

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LEARNING OBJECTIVES

1) Describe current management of pulmonary embolism, including interventional techniques. 2) List rationale for venous thrombolysis. 3) Describe the current state of practice surrounding inferior vena cava filters. 4) Learn about techniques for endovascular management of chronic venous occlusions

Sub-Events

RC314-01 PE I: Diagnosis and Triage of Pulmonary Embolism

Tuesday, Nov. 27 8:30AM - 8:45AM Room: E352

Participants
Akhilesh K. Sista, MD, New York, NY (*Presenter*) Research Grant, Penumbra Inc; Scientific Advisory Board, Thrombolex

LEARNING OBJECTIVES

1) Understand the stratification of acute PE and its rationale.

RC314-03 Catheter-Directed Thrombolysis for Submassive Pulmonary Embolism: Retrospective Review of 113 Patients with 6 Month Follow-Up

Tuesday, Nov. 27 9:00AM - 9:10AM Room: E352

Awards
Student Travel Stipend Award

Participants
Brian D. Fogler, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose
Mina S. Makary, MD, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose
Priyanka Dube, DO, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose
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Kannan Natarajan, MD, Westfield, IN (*Abstract Co-Author*) Nothing to Disclose
Joshua D. Dowell, MD, PhD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Catheter-directed thrombolysis (CDT) is an established treatment option for patients with massive pulmonary embolism (PE); however, there is limited literature about its role for patients with submassive PE. This work evaluated the long-term clinical outcomes of CDT therapy for submassive PE.

METHOD AND MATERIALS

A single center retrospective observational study was performed with institutional IRB approval. Imaging and medical records of patients who underwent CDT for submassive PE (n=113, 52%M:48%F, 18% with cancer history) from 2013-2017 were reviewed. The primary outcomes evaluated were pre and post-procedure systolic pulmonary arterial pressure (PAP), post-procedure complications, follow up assessments at 1 and 6 months and right ventricular systolic pressure (RVSP) at 6 months post procedure.

RESULTS

Pre-procedural mean blood pressure was 132.0 ± 5.1 / 80.0 ± 3.0 mmHg, heart rate was 105.5 ± 3.4 bpm, RV/LV ratio by CT angiogram was 1.6 ± 0.1, PAP was 55.5 ± 2.7 mmHg, and RVSP was 48.3 ± 3.6 mmHg. Duration of tPA therapy was 20.7 ± 1.5 hrs and mean tPA dose was 23.7 ± 2.4 mg. Post-procedure, the mean PAP decreased to 38.3 ± 3.5 mmHg ($p < 0.01$). Hemorrhagic

complications relating to CDT occurred in 6.1% of patients who underwent treatment and the mortality rate, unrelated to the procedure, during hospitalization was 3.5%. During follow-up, 94.1% of patients expressed clinical improvement at 1 month and 90.3% at 6 months post-procedure. Of those with 6 month follow-up echocardiograms after treatment (n=36), RVSP significantly decreased to 32.2 ± 5.7 mmHg ($p < 0.01$).

CONCLUSION

With a low complication and mortality rate, decreased PAP and RVSP, and high rates of clinical improvement, long-term clinical outcomes support the use of CDT as a safe and effective treatment option for patients with submassive PE.

CLINICAL RELEVANCE/APPLICATION

The data regarding the long-term consequences of using CDT in patients with submassive PE is limited. The results of this large, single-center, retrospective study demonstrate improved PAP and RSVP, excellent clinical outcomes and low complication rates, supporting the use of CDT in this patient population.

RC314-04 Early Catheter Directed Thrombolysis (CDT) Has No Effect on Survival or Escalation to Massive Pulmonary Embolism (PE) in Patients Presenting with High Risk Submassive PE

Tuesday, Nov. 27 9:10AM - 9:20AM Room: E352

Participants
Barbara Manchec, MD, Orlando, FL (*Presenter*) Nothing to Disclose
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Tri Tran, Orlando, FL (*Abstract Co-Author*) Nothing to Disclose
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Thomas J. Ward, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To evaluate the impact on time from diagnosis to catheter directed thrombolysis (CDT) in patients with acute, high-risk, submassive pulmonary embolism (PE) on escalation to massive PE and survival.

METHOD AND MATERIALS

This single-center, IRB approved, retrospective study identified 835 contiguous patients with acute submassive PE between January 2011 and July 2017. This cohort was reviewed to identify patients with high-risk submassive PE (simplified Pulmonary Embolism Severity Index (PESI) score >= 1, evidence of right ventricular (RV) dysfunction as seen on computed tomography or echocardiography, and an elevated RV biomarker, troponin or brain natriuretic peptide) treated with catheter directed thrombolysis (CDT). 76 contiguous patients (60.5 ± 15.5 years old, 45% male, PESI score 104.4 ± 29.3) were identified. Demographic, treatment, and outcome details were retrospectively reviewed. Patients were treated with intravenous heparin prior to initiation of CDT.

RESULTS

39 (51%) patients had CDT within 12 hours of diagnosis, 37 (49%) had CDT after 12 hours. 72 (95%) patients had bilateral thrombolysis, 5% had unilateral thrombolysis - 3 (4%) on the right and 1 (1%) on the right. The average duration of lysis was 20±6.9 hours with an average tPA infiusion rate of 1.5±0.6 mg/catheter/hour. Escalation to massive PE occurred in 4 patients (5.3%, 95% CI: 2-13%), 2 in each group (5.4% vs 5.1%, p=1.0). Survival at 30 and 90 days was 95.5% and 95.3%. Multiple regression analysis demonstrated that increased time to treatment (30-day p=0.413; 90-day p=0.44) and PESI score (30-day p=0.95; 90-day p=0.98) were not predictive of worse survival while escalation to massive PE prior to CDT was predictive of worse survival (30-day p=0.04; 90-day p=0.04).

CONCLUSION

In patients with acute, high-risk, submassive PE, up to 13% of patients may escalate to massive PE prior to CDT. Early CDT was not associated with decreased escalation to massive PE or increased survival at 30 and 90 days. However, escalation to massive was associated with worse survival.

CLINICAL RELEVANCE/APPLICATION

In patients with acute, high-risk, submassive PE, up to 13% of patients may escalate to massive PE prior to CDT. Early CDT was not associated with decreased escalation to massive PE or increased survival at 30 and 90 days. However, escalation to massive was associated with worse survival.

RC314-05 Chronic Venous Recanalization

Tuesday, Nov. 27 9:20AM - 9:35AM Room: E352

Participants
Kari J. Nelson, MD, Orange, CA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To review indications and techniques for chronic venous recanalization. 2) To discuss clinical follow-up and management of chronic venous recanalization patients.

RC314-06 Biology of Pulmonary Embolism

Tuesday, Nov. 27 9:35AM - 9:50AM Room: E352

Participants
Akhilesh K. Sista, MD, New York, NY (*Presenter*) Research Grant, Penumbra Inc; Scientific Advisory Board, Thrombolex

LEARNING OBJECTIVES

1) Describe the method by which pulmonary embolism causes right ventricular failure.

RC314-07 Two Methods for Blocking Superficial Venous Blood Flow during Thrombolytic Treatment on Lower Extremity Deep Venous Thrombosis: A Comparative Study

Tuesday, Nov. 27 9:50AM - 10:00AM Room: E352

Participants
Yan Li, Nanjing, China (*Presenter*) Nothing to Disclose
Yu-Chen Chen, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose
Jian-Ping Gu, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the effectiveness and patient comfort between two methods for blocking superficial venous blood flow during thrombolytic treatment on lower extremity deep venous thrombosis (DVT) so as to provide the evidence for clinical choice.

METHOD AND MATERIALS

Eighty patients with lower extremity DVT were randomly divided into sphygmomanometer and tourniquet group (group A and group B), 40 patients for each group. All the patients were treated with daily dosage of urokinase using dial sphygmomanometer cuff and tourniquet to block lower extremity superficial vein blood flow, respectively. The pressure of the dial sphygmomanometer blocking lower extremity superficial vein blood flow was measured during lower extremity venography. Leg swelling reduction rate, venous patency, thrombus removal rate and average comfort index were observed during the blocking process.

RESULTS

The average pressure value for group A was 70mmHg±10mmHg. The difference of the swelling reduction rate and venous patency was significant between groups. Comparing the two groups at different time points, the average thrombus clearance rate of group A was higher than that of group B. The leg pain scores of group A were lower than those of group B. Postoperative comfort ratio of group A was higher than that of group B, and the proportion of severe discomfort in group A was lower than that of group B.

CONCLUSION

Compared with the tourniquet, using dial sphygmomanometer cuff to block lower extremity superficial vein blood flow would get better thrombolytic effect on DVT and higher patient comfort during the treatment process.

CLINICAL RELEVANCE/APPLICATION

In summary, compared with the tourniquet, using the dial sphygmomanometer cuff to block the superficial vein of lower extremity blood flow will obtain a better thrombolytic effect, higher patients' comforts during the treatment process, and provide a simpler and easier nursing tool that is worth spreading in clinical use.

RC314-08 Compressive Venous Syndromes

Tuesday, Nov. 27 10:00AM - 10:15AM Room: E352

Participants
Sanjeeva P. Kalva, MD, Dallas, TX (*Presenter*) Consultant, General Electric Company; Royalties, Reed Elsevier; Royalties, Springer Nature; Investor, Althea Healthcare; Consultant, C. F. Koo Foundation; Consultant, Medtronic plc; Research Grant, AngioDynamics, Inc

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LEARNING OBJECTIVES

1) Discuss the pathophysiology of compressive venous syndromes. 2) Review the etiology, symptoms, work up and imaging findings of common venous compression syndromes - May Thurner, Thoracic outlet, Nutcracker Syndrome, Popliteal Venous Compression. 3) Discuss the management options of these entities.

RC314-09 IVC Filters: Evidence and Ongoing Trials

Tuesday, Nov. 27 10:30AM - 10:45AM Room: E352

Participants
Matthew S. Johnson, MD, Indianapolis, IN (*Presenter*) Research Consultant, Bayer AG; Research Consultant, Bristol-Myers Squibb Company; Research Consultant, Boston Scientific Corporation; Research Consultant, Cook Group Incorporated; Research Consultant, BTG International Ltd; Research support, BTG International Ltd; Research Consultant, Surefire Medical, Inc; Research support, Surefire Medical, Inc; Research Consultant, Johnson & Johnson; Research Consultant, Avantec; ;

LEARNING OBJECTIVES

1) Describe caval filters currently available for use in the United States. 2) Understand accepted indications for filter placement and

areas of controversy in those indications. 3) Describe potential complications related to vena cava filter usage. 4) Discuss the rationale for the PRESERVE trial. 5) Apply understanding of the indications and potential complications of vena cava filters to their clinical use.

RC314-10 A Retrospective Comparison of Patients Receiving EKOS Thrombolysis for Massive or Sub-Massive Pulmonary Embolism to Historic Controls Receiving Medical Therapy

Tuesday, Nov. 27 10:45AM - 10:55AM Room: E352

Awards
Student Travel Stipend Award

Participants
Anushi Patel, MD, Longwood, FL (*Presenter*) Nothing to Disclose
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PURPOSE

Treatment of massive or sub-massive pulmonary embolism (PE) poses a unique challenge as conventional medical therapy alone may be insufficient to restore adequate cardiac function in patients with right ventricular dysfunction. This has led to growing interest in alternative therapy, specifically EKOS thrombolysis, with hopes to improve outcomes in this specific patient population. We evaluated differences in outcomes between patients receiving both EKOS thrombolysis plus systemic anticoagulation versus systemic anticoagulation alone.

METHOD AND MATERIALS

Retrospective single center data was compiled of ICU patients with imaging proven PE admitted between January 2014 and December 2016. 31 patients received adjunctive EKOS thrombolysis in addition to systemic anticoagulation. 92 control patients were treated with systemic anticoagulation alone. At our institution, patients that receive EKOS thrombolysis have radiologic and clinical signs of sub-massive or massive PE including right heart strain. Groups were compared using the non-parametric Wilcoxon rank sum test for continuous data (total length of stay [LOS], ICU LOS, and total hospitalization costs) and using Fisher's exact tests for categorical data (survival rates at discharge, 30- and 90-days after treatment).

RESULTS

All 31 patients in the treatment group and 75 patients (82%) in the control group were alive 90 days after treatment ($p=0.006$). Higher 30-day survival rate was seen in the treatment group (100%) compared to control group (86%, $p=0.037$). The length of stay (LOS) was significantly longer for the control group (median 384 hours) compared to EKOS group (median 168 hours, $p<0.001$). ICU LOS was longer ($p<0.001$) and total cost was higher ($p<0.001$) in the control group as well. The exception is no statistically significant difference in survival at time of discharge.

CONCLUSION

Patients treated with adjunctive EKOS thrombolysis benefited from improved outcomes, specifically, lower total and ICU LOS and higher 30- and 90- day survival rates. In addition, lower total care costs suggests that EKOS is a cost-effective treatment.

CLINICAL RELEVANCE/APPLICATION

Compared to systemic anticoagulation alone, adjunctive EKOS thrombolysis demonstrates improved clinical outcomes and cost-effectiveness and is recommended in the appropriate patient population.

RC314-11 Low-Voltage Computed Tomography Venography for Patients with Deep Vein Thrombosis of the Lower Extremities: A Comparison with Venous Ultrasonography

Tuesday, Nov. 27 10:55AM - 11:05AM Room: E352

Participants
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Yosuke Horii, Niigata, Japan (*Abstract Co-Author*) Nothing to Disclose
Rei Ogawa, Chuo, Japan (*Abstract Co-Author*) Nothing to Disclose
Ken Sato, Niigata-Shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuki Kumagai, Niigata, Japan (*Abstract Co-Author*) Nothing to Disclose
Motohiko Yamazaki, MD, Niigata, Japan (*Abstract Co-Author*) Nothing to Disclose
Hidefumi Aoyama, MD, PhD, Niigata, Japan (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To compare the ability of computed tomography venography (CTV) with that of venous ultrasonography (US) to visualize deep vein thrombosis (DVT) of the lower extremities from the femoropopliteal to calf veins.

METHOD AND MATERIALS

We retrospectively reevaluated CTV data sets for 308 consecutive patients suspected of DVT or pulmonary embolism (PE). Fifty-five of the 308 patients who had undergone US within 1 day of low-voltage CTV (SIEMENS) were included. In these patients, we compared CTV and US regarding the distribution of DVT in 10 segments of the lower extremities (each side of the femoral, popliteal, posterior-tibial, peroneal and soleus veins). Sixteen of the total 550 segments were not examined by US; hence, 534 segments in

all were evaluated.

RESULTS

CTV readings were evaluated using US as the standard. As a result, 64 of the 534 segments were true positive, 46 were false positive, 23 were false negative, and 401 were true negative. Total sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy were 73.6%, 89.7%, 58.2%, 94.6% and 87.1%, respectively. Results for the 216 segments above the knee (each side of femoral and popliteal veins) vs 318 segments below the knee (each side of posterior-tibial, peroneal and soleus veins) were as follows: sensitivity, 90.0% vs 71.4%, specificity, 93.2% vs 86.7%, PPV, 39.1% vs 63.2%, NPV, 99.5% vs 90.5% and accuracy, 93.1% vs 83.0%, respectively.

CONCLUSION

Compared to US, low-voltage CTV has sufficient sensitivity and specificity above the knee and useful specificity below the knee for evaluation of DVT.

CLINICAL RELEVANCE/APPLICATION

(dealing with low-voltage CT venography) 'Compared to US, low-voltage CTV has sufficient sensitivity and specificity above the knee and useful specificity below the knee for evaluation of DVT.'

RC314-12 DVT Lysis: An Update

Tuesday, Nov. 27 11:05AM - 11:20AM Room: E352

Participants
Kush R. Desai, MD, Chicago, IL (*Presenter*) Speakers Bureau, Cook Group Incorporated; Consultant, Cook Group Incorporated; Consultant, The Spectranetics Corporation; Consultant, AngioDynamics, Inc; Consultant, Boston Scientific Corporation

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LEARNING OBJECTIVES

1) Understand the morbidity and long term sequelae of deep venous thrombosis, including post-thrombotic syndrome. 2) Review the trials governing the interventional treatment of deep venous thrombosis. 3) Describe procedural techniques available in modern endovascular treatment of acute DVT.

RC314-13 IVC Filters: Past, Present, and Future

Tuesday, Nov. 27 11:20AM - 11:35AM Room: E352

Participants
John A. Kaufman, MD, Portland, OR (*Presenter*) Advisory Board, Argon Medical Devices, Inc; Medical Advisory Board and Owner, Bio2Medical; Consultant, Cook Group Incorporated; Consultant, NOvate Medical Technologies; Owner, Veniti, Inc;

RC314-14 Evaluation of Recurrence of Pulmonary Arteriovenous Malformations after Coil Embolization by CT or Time-Resolved MR Angiography

Tuesday, Nov. 27 11:35AM - 11:45AM Room: E352

Participants
Katsuki Oji, Yufu, Japan (*Presenter*) Nothing to Disclose

PURPOSE

To evaluate the accuracy of CT and time-resolved MR (TR-MRA) angiography for evaluation of recurrence of pulmonary arteriovenous malformations (PAVMs) after coil embolization in comparison with selective pulmonary angiography (PAG).

METHOD AND MATERIALS

Between 2007 and 2017, consecutive 37 patients with PAVM were treated by coil embolization. Among the 37 patients, 23 patients underwent follow-up PAG after embolization with 25.6months mean follow-up period. We retrospectively reviewed CT, TR-MRA, and selective pulmonary angiography in the 23 cases. In all cases, CT and/or TR-MRA were performed within 3 months prior to PAG. We evaluated recurrence rate by MDCT and TR-MRA compared with PAG as gold standard. The "recurrence" on TR-MRA and PAG was defined as the embolized lesion showing the early venous filling. For evaluation of CT, recurrence was defined as less than 70% reduction in size of dilated sac or draining vein.

RESULTS

All 49 PAVMs were successfully occluded immediately after embolization. 36 PAVMs were evaluated by TR-MRA, and 46 PAVMs were evaluated by MDCT. Recurrence was detected in 6 lesions (12.2%) by PAG. Sensitivity of TR-MRA and CT were 25%, 33.3%, and specificity were 96.9% and 77.5%, respectively.

CONCLUSION

More than half of recurrent PAVMs could not be detected by CT and/or TR-MRA, PAG are required for accurate evaluation of recurrent PAVMs.

CLINICAL RELEVANCE/APPLICATION

Recurrent PAVMs could not be correctly diagnosed by CT and/or TR-MRA. Furthermore, specificity of CT was lower than TR-MRA, PAG are required for accurate diagnosis of recurrent PAVMs.

RC314-15 Advanced Filter Retrieval Techniques

Tuesday, Nov. 27 11:45AM - 12:00PM Room: E352

Participants
Thuong G. Van Ha, MD, Chicago, IL (*Presenter*) Research Grant, Cook Group Incorporated

LEARNING OBJECTIVES

1) List reasons for failure of standard IVC filter retrieval techniques. 2) Describe different advanced retrieval techniques and when to use them. 3) Discuss risk and benefits of advanced retrieval techniques. 4) List potential complications of advanced retrieval techniques.

RC315

Breast Series: MRI

Tuesday, Nov. 27 8:30AM - 12:00PM Room: Arie Crown Theater

BR MR

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Bonnie N. Joe, MD, PhD, San Francisco, CA (*Moderator*) Nothing to Disclose
Hiroyuki Abe, MD, Chicago, IL (*Moderator*) Nothing to Disclose

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Sub-Events

RC315-01 Outcome Data: Does MRI Help?

Tuesday, Nov. 27 8:30AM - 8:50AM Room: Arie Crown Theater

Participants
Francesco Sardanelli, MD, San Donato Milanese, Italy (*Presenter*) Speakers Bureau, Bracco Group; Advisory Board, Bracco Group; Research Grant, Bayer AG; Advisory Board, General Electric Company; Reserach Grant, General Electric Company; Speakers Bureau, Siemens AG; Reserach Grant, Real Imaging Ltd;

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LEARNING OBJECTIVES

1) Know the current debate about the need of outcome data for an appropriate use of breast MRI in clinical practice. 2) Understand why the acceptance of breast MRI has a large variability by other clinicians depending on indication, from screening of BRCA1/2 or P53 mutated women to the preoperative setting. 3) Appraise the high complexity of the current debate on the evidence in favor or against preoperative breast MRI. 4) Identify those applications where more research is needed for an increased use of breast MRI, also considering the perspective of prognostic breast MRI.

RC315-02 Comparison of Diagnostic Performance of DBT and MRI Added to Mammography for Preoperative Staging of Screening-Detected Breast Cancer: Which Method Is More Appropriate Depending On the Mammographic Density?

Tuesday, Nov. 27 8:50AM - 9:00AM Room: Arie Crown Theater

Participants
So Yeon Yang, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ji Soo Choi, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Young Ko, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Boo-Kyung Han, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ko Woon Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Mi-Ri Kwon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
E-Ryung Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To compare the diagnostic performance of digital breast tomosynthesis (DBT) and magnetic resonance imaging (MRI) added to mammography for preoperative staging of screening-detected breast cancer depending on mammographic density.

METHOD AND MATERIALS

This retrospective study enrolled 281 patients with 332 screening-detected breast cancers recruited from Jan to Dec 2013. Three radiologists independently reviewed three image sets of (mammography alone, DBT plus mammography and MRI plus mammography) of the patients, and they recored final BI-RADS categories of detected lesions. BI-RADS categories 4-5 defined positive results and BI-RADS category 1-3 defined negative results. Readers' sensitivities and positive predictive values (PPVs) were analyzed for each reading mode. Readers' performances with the three reading modes were compared for dense breast (heterogeneously or extremely

dense, n=263) and non-dense breast (entirely fatty or scattered areas of fibroglandular density, n=120) groups, respectively.

RESULTS

In non-dense breast group, readers' sensitivities with DBT plus mammography (92.5-94.4%) were lower than MRI plus mammography (96.3-98.1%), but higher than mammography alone (88.8-92.5%). Readers' PPVs with DBT plus mammography (97.1-100%) were higher than those with MRI plus mammography (94.7-100%) and mammography alone (94.7-97.0%). However, there was no statistically significant difference in both readers' sensitivities and PPVs between DBT plus mammography and MRI plus mammography (p>0.05). In dense breast group, sensitivities with MRI plus mammography (93.3-98.2%) were significantly higher than those with DBT plus mammography (87.6-92.0%) or mammography alone (84.9-87.6%) (p<0.05), but PPVs with MRI plus mammography (92.1-97.5%) were lower than those with DBT plus mammography (96.1-97.6%) or mammography alone (96.1-97.5%) without a statistical significance.

CONCLUSION

In non-dense breast group, diagnostic performances of DBT and MRI for preoperative staging of screening-detected breast cancer were not significantly different when using as an adjunctive to mammography. In dense breast group, however, DBT had lower sensitivitiy than MRI.

CLINICAL RELEVANCE/APPLICATION

In non-dense breast group, DBT plus mammography may provide similar diagnostic performance to MRI plus mammography for preoperative staging of screening-detected breast cancer.

RC315-03 Pre-Chemotherapy Morphology and ADC Characteristics of Primary Breast Cancers Vary By Hormone-Receptor and HER2 Subtype

Tuesday, Nov. 27 9:00AM - 9:10AM Room: Arie Crown Theater

Participants
Bo La Yun, MD, Seongnam, Korea, Republic Of (*Presenter*) Nothing to Disclose
Wen Li, PhD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Ella F. Jones, PhD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Lisa Wilmes, PhD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
David Newitt, PhD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Jessica Gibbs, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Nola M. Hylton, PhD, San Francisco, CA (*Abstract Co-Author*) Research support, General Electric Company

PURPOSE

To evaluate the hormone-receptor (HR) and HER2 subtype dependence of pre-treatment MRI morphology and apparent diffusion coefficient (ADC) characteristics of primary breast cancers.

METHOD AND MATERIALS

A retrospective analysis of DCE-MRI, DW-MRI and T2WI was performed on pre-treatment MRI studies of 220 breast cancer patients who were enrolled in a neoadjuvant breast cancer trial. DCE-MRI and T2WI were reviewed according to the BI-RADS lexicon, and MRI morphologic pattern was categorized using a 1-5 scale for tumor containment. Extent of necrosis and presence of peritumoral edema were also ranked. ADC values at 5, 15, 25, 50, 75 and 95 percentile were computed from the DW-MRI based on an ROI encompassing the entire tumor volume. Fisher's exact test was used to compare the morphologic features and one-way ANOVA and Scheffe post hoc test were used to compare ADC measurements among all breast cancer subtypes.

RESULTS

The triple negative (TN) subtype exhibited mass more frequently than non-mass enhancement (NME) (p=0.004), with masses showing irregular versus spiculated margin (p=0.034). HR-/HER2+ subtype had NME more frequently than mass (p=0.027). HR+/HER2+ showed heterogeneous enhancement rather than rim enhancement (p<0.001). There was no specific pattern observed in NME among subtypes. In the MRI morphologic pattern, TN showed a well-defined pattern with more than 10% necrosis versus other subtypes. The difference in ADC values at the lower 5 and 15 percentiles was found to be statistically significant between TN vs. HR-/HER2+ (p=0.007 in 5 percentile and p=0.014 in 15 percentile), HR-/HER2+ vs. HR+/HER2- (p=0.002 in 5 percentile and p=0.004 in 15 percentile), and HR+/HER2- vs. HR+/HER2+ (p=0.028 in 5 percentile and p=0.014 in 15 percentile).

CONCLUSION

The BI-RADS lexicon (lesion classification, internal enhancement pattern and margin of the mass), MR morphologic pattern, and the amount of necrosis may be useful for distinguishing breast cancer subtypes. Among the variable measurements, the lower 5 or 15 percentiles of the ADC distributions showed potential to distinguish breast cancer subtypes.

CLINICAL RELEVANCE/APPLICATION

Adding the lower 5 or 15 percentile ADC with MR morphologic patterns may help refine MRI methods for distinguishing breast cancer subtypes prior to neoadjuvant chemotherapy.

RC315-04 Pre-Operative Breast Magnetic Resonance Imaging: Relationship Between Magnetic Resonance-Detected Additional Cancer and Survival Outcomes

Tuesday, Nov. 27 9:10AM - 9:20AM Room: Arie Crown Theater

Participants
Eun Sook Ko, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ko Woon Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ji Soo Choi, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the additional cancer detection yield of pre-operative MRI in women with invasive breast cancer that was occult on

mammogrpahy and ultrasonography (US), to identify a subgroup of women who are likely to have additional cancer, and to investigate whether the presence of MRI-detected additional cancer (MDAC) affects patients' long-term survival outcomes.

METHOD AND MATERIALS

The pre-operative MRI examinations of 1,843 women who had undergone surgery for invasive breast cancer were reviewed for the presence of additional multifocal/multicentric /contralateral disease that was occult on mammgoraphy and US. Clinicopathological findings and mammographic breast density were compared between patients with MDAC and those without. Logistic regression analysis was conducted to find factors associated with MDACs. A Cox proportional hazards model was used to analyze the effects of MDACs or other variables on disease-free survival (DFS) or overall survival (OS). Kaplan-Meier curves and log-rank tests were used to analyze survival between the two groups.

RESULTS

Of 1,843 patients, 178 (9.7%) had an MDAC. Multivariate analysis showed that invasive lobular cancer (odds ratio: 1.151, 95% confidence interval [CI]: 1.080, 1.239; P = 0.0002) and extensive intraductal component (odds ratio: 1.113, 95% CI: 1.080, 1.148; P < 0.0001) were independently associated with a higher probability of MDAC. Kaplan-Meier curves did not show that MDACs affected DFS (P = 0.343) or OS (P = 0.991).

CONCLUSION

MDACs had no significant impact on survival outcomes.

CLINICAL RELEVANCE/APPLICATION

No studies have focused on survival outcomes in MRI-detected additional cancers (MDACs) that were occult at mammography and ultrasonography (US).

RC315-06 Long-Term Survival Outcomes in Invasive Lobular Carcinoma Patients with and Without Preoperative MR Imaging: A Matched Cohort Study

Tuesday, Nov. 27 9:30AM - 9:40AM Room: Arie Crown Theater

Participants
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Woo Jung Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ga Young Yoon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate and compare the effect of preoperative breast magnetic resonance (MR) imaging on recurrence-free survival (RFS) and overall survival (OS) outcomes among patients with invasive lobular carcinoma (ILC).

METHOD AND MATERIALS

A total of 287 ILC patients (age range, 31-82 years; mean age, 49.8 years) between January 2005 and December 2012 were included in the analysis. Of these patients, 120 (41.8%) had undergone preoperative breast MR imaging (MR group) and the remaining 167 (58.2%) had not (no MR group). These two study groups were matched for 21 covariates in term of patient demographics, tumor characteristics, and various clinical features. The RFS and OS outcomes were compared using Kaplan-Meier estimates. MR effects were estimated after adjusting for significant potential confounders of specific outcomes in the multivariate modeling.

RESULTS

In the matched cohort, no statistically significant association was observed between MR imaging and total recurrence (hazard ratio [HR], 1.096; 95% CI: 0.497-2.416; P=0.821), loco-regional recurrence (HR, 1.204; 95% CI: 0.294-4.924; P=0.796), contralateral breast recurrence (HR, 0.945; 95% CI: 0.147-6.061; P=0.952), or distant recurrence (HR, 1.020; 95% CI: 0.339-3.070; P=0.973). MR imaging was associated with an improved OS with 51% reduction, but not significantly (HR, 0.485; 95% CI: 0.149-1.585; P=0.231). Analysis with a multivariate Cox regression model indicated that MR imaging was not a significant independent factor for better RFS (HR, 0.823; 95% CI: 0.409-1.658; P=0.586) or improved OS (HR, 0.478; 95% CI: 0.167-1.366; P=0.168).

CONCLUSION

Preoperative MR imaging is not a prognostic factor and produces no recurrence or survival outcome benefits in ILC patients.

RC315-07 Preoperative Breast MRI: Multicenter Prospective Study

Tuesday, Nov. 27 9:40AM - 9:50AM Room: Arie Crown Theater

Participants
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PURPOSE

To investigate the effect of breast MRI for preoperative staging on clinical evaluation and treatment plan in women diagnosed with breast cancer.

METHOD AND MATERIALS

In the prospective, multicenter study, the institutional ethics committee approval was obtained for all centers. Conventional imaging (mammography and ultrasonography) findings, preoperative breast MRI findings, treatment plan and histopathology results were evaluated in 432 consecutive breast cancer patients at nine centers. Cases that were scheduled to receive neoadjuvant chemotherapy were excluded. The effect of preoperative breast MRI added to conventional breast imaging on clinical-radiological evaluation and on surgical treatment plan was investigated. Chi-square and McNemar tests were used for statistical analysis.

RESULTS

Two-hundred thirty-four cases (54.2%) were premenopausal and 198 cases (45.8%) were postmenopausal. Cancer was detected in 134 women (31%) at the time of screening, and cancer was found in 298 (69%) women who had undergone diagnostic radiological evaluation due to complaints or physical examination. Physical examination was positive in 248 (57%) women and negative in 184 (43%) women. 23 women had bilateral breast cancer. The frequencies of multifocal and multicentric tumor detection were 9-7%, 16-11%, 17-28% for MG, US and MRI, respectively. Breast-conserving surgery (BCS) was performed on a total of 210 cancers and modified radical mastectomy (MRM) on 255 cancers. A total of 8 cases required re-excision surgery due to positive surgical margin. MRI changed the surgical treatment plan in 14% of patients for whom BCS was planned based on conventional imaging. The difference between the conventional imaging and MRI in the preoperative evaluation was considered statistically significant (p=0.001).

CONCLUSION

Breast MRI added to conventional breast imaging in the preoperative evaluation of patients with breast cancer contributes to an accurate treatment plan by lower need for re-excision surgery and providing accurate treatment of the 14% cases.

CLINICAL RELEVANCE/APPLICATION

This study showed that breast MRI contributes to the preoperative evaluation and treatment plan in women who were diagnosed with breast cancer.

RC315-08 Ongoing Trials Update

Tuesday, Nov. 27 9:50AM - 10:10AM Room: Arie Crown Theater

Participants
Christiane K. Kuhl, MD, Aachen, Germany (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

To list the current studies published on the use of MRI for screening To list cancer detection rates and predictive values of abbreviated MRI for screening in comparison to those of digital breast tomosynthesis and breast ultrasound.

RC315-09 Breast MRI-based Radiomics Nomogram for the Prediction of Recurrence in Patients with Triple-negative Breast Cancer: A Nested Case-Control Matched Study

Tuesday, Nov. 27 10:10AM - 10:20AM Room: Arie Crown Theater

Participants
Su Min Ha, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
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Hwa Jung Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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Ga Young Yoon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To develop a breast MRI-based radiomics nomogram including clinicopathologic factors for individualized prediction of local or distant recurrences in patients with triple-negative breast cancers (TNBC).

METHOD AND MATERIALS

From 2006 to 2013, a total of 2604 patients were diagnosed as TNBC and 836 patients underwent preoperative breast MRI. Among them, patients with recurrence and without recurrence were matched in terms of age, stage, and type of chemotherapy, and developed 115 nested case-control pairs. Within the intratumor and peritumoral regions on early post-contrast T1-weighted images, percent enhancement (PE) map, signal enhancement ratio (SER) map, and T2-weighted images, a total of 1029 quantitative MR radiomic features, each referred to as a computer-extracted image phenotypes (CEIP), were calculated based on the semiautomatically derived three-dimensional tumor segmentations. Elastic Net was used for feature selection and radiomics score building. A radiomics nomogram was constructed from a multivariable logistic regression prediction model with the radiomics score and independent pathologic predictors. We divided 115 case-control pairs into a training set (n=154) and a validation set (n=76), and the internal validation for the validation set was performed.

RESULTS

The radiomics score, consisted of 20 selected CEIPs, was significantly associated with the prediction of recurrence (C-index of 0.867 for training set and 0.778 for validation set). Independent pathologic factors in the nomogram were lymphovascular invasion, Ki-67 status, and lymph node ratio (C-index of 0.665 for training set and 0.668 for validation set). Radiomics nomogram showed better prediction of recurrence (C-index of 0.879 for training set and 0.802 for validation set) due to incremental value of 0.214 and 0.134, respectively, by addition of radiomics score to the pathologic predictors.

CONCLUSION

Our results indicate that the radiomics nomogram which incorporates the MRI-based radiomics score and pathologic features, show promise for the individualized prediction of local or distant recurrence in patients with TNBC.

CLINICAL RELEVANCE/APPLICATION

Nomogram using breast MRI-based radiomics score and pathologic predictors can facilitate the individualized prediction of recurrence in patients with TNBC.

RC315-11 Advanced Sequences

Tuesday, Nov. 27 10:40AM - 11:00AM Room: Arie Crown Theater

Participants
Nariya Cho, MD, PhD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Review the standard dynamic contrast-enhanced MRI (DCE-MRI) and quantitative MRI using two compartment model. 2) Understand the current status of abbreviated breast MRI. 3) Explore the clinical value of ultrafast DCE-MRI.

ABSTRACT

Breast dynamic contrast-enhanced (DCE)-MRI refers to MR imaging techniques with temporal resolution of 2 minutes or less to assess the changes of contrast uptake and washout in tumors. Recent technological advances realize various combinations of spatial and temporal resolution of breast MRI. Refined quantification (Ktrans, Ve, Kep) of exchange of contrast agent between vascular space and interstitial space provide sophisticated hemodynamic information. Pre-contrast with only one post-contrast image makes MRI screening more feasible by reducing time and cost while maintaining diagnostic performance. DCE-MRI with a 4 to 7-second temporal resolution during the first minute before a standard image acquisition shows the potential to improve lesion conspicuity and characterization. This session will focus on the review of variations of breast DCE-MRI.

RC315-12 Agreement between Radiologist-Assigned Categories and Quantitative Measures of Background Parenchymal Enhancement on Breast MRI

Tuesday, Nov. 27 11:00AM - 11:10AM Room: Arie Crown Theater

Participants
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Mahmoud Abdalah, PhD, Tampa, FL (*Abstract Co-Author*) Nothing to Disclose
Olya Stringfield, PhD, Tampa, FL (*Abstract Co-Author*) Nothing to Disclose
Malesa M. Pereira, MPH, Tampa, FL (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Because background parenchymal enhancement (BPE) on breast magnetic resonance imaging (MRI) reflects the volume and intensity of contrast uptake, quantitative values of enhancement can be measured by 1) averaging the voxels of enhancement (PE = percent enhancement) above a pre-defined threshold, 2) computing the total volume of FGT that enhances above the threshold value (absolute volume of BPE), and 3) estimating the percentage of breast tissue that enhances above the threshold value relative to the total breast volume (BPE%). We developed a semi-automated segmentation algorithm to extract these quantitative measures of BPE. In this study, we investigated the agreement of computed measures of BPE with radiologist-assigned categories.

METHOD AND MATERIALS

In this IRB approved HIPAA compliant retrospective study, we identified 123 patients with breast MRI performed for screening indications. As previously described, the breast segmentation algorithm co-registers pre- and post-contrast T1-weighted fat-suppressed and non-fat-suppressed sequences. Active contours method merged chest components and non-fat voxels were clustered using Otsu's method to identify fibroglandular tissue (FGT) voxels. Within the segmented FGT on the first post-contrast phase, we computed median and inter-quartile ranges for absolute volume of BPE and BPE% using a PE=30% threshold. Student's t-test evaluated BPE volume and BPE% by radiologist-assigned categories.

RESULTS

Using the previously described 30% threshold, median and inter-quartile ranges for the volume of BPE by radiologist-assigned category were as follows (cm3): minimal (57.2, 24.4-100.1), mild (41.8, 30.7-65.4), moderate (70.6, 43.5-111.1), marked (67.1, 54.3-137.9). BPE% median and inter-quartile ranges were as follows (%): minimal (3.5, 1.7-5.5), mild (3.2, 1.7-4.6), moderate (4.7, 2.7-7.4), marked (5.7, 4.0-10.0). BPE volume and BPE% differed significantly between minimal/mild and moderate/marked radiologist-assigned categories (p=0.030 and 0.004, respectively) (Figure: Box plot of BPE% by BPE category).

CONCLUSION

Quantified BPE volume and BPE% were significantly different between minimal/mild and moderate/marked radiologist-assigned categories.

CLINICAL RELEVANCE/APPLICATION

Given the inter-reader variability in BPE categorical assessments, the development and validation of quantitative measures is a necessary step towards incorporation of BPE into future risk prediction models.

RC315-13 Correlation between 3T Multi-Parametric MRI and Molecular Subtypes of Breast Cancer

Tuesday, Nov. 27 11:10AM - 11:20AM Room: Arie Crown Theater

Participants
Stefania Montemezzi, MD, Verona, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Cavedon, DPhil, Verona, Italy (*Presenter*) Nothing to Disclose
Lucia Camera, Verona, Italy (*Abstract Co-Author*) Nothing to Disclose
Maria Grazia Giri, Verona, Italy (*Abstract Co-Author*) Nothing to Disclose
Alice Pozzetto, MD, Verona, Italy (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To test whether 3T multi-parametric magnetic resonance imaging (mp-MRI) provides information related to molecular subtypes of breast cancer.

METHOD AND MATERIALS

Women with mammographic or US findings of breast lesions (BI-RADS 4-5) underwent 3T mp-MRI (DCE, DWI and MR spectroscopy). DCE-MRI was evaluated by classifying the wash-in/wash-out curve in three classes (I-III). DWI was used to calculate the mean ADC value within a region of interest centered on the tumor. MR spectroscopy (MRS) was evaluated by means of the signal-to-noise ratio (SNR) of the total choline peak (tCho). The histological type of breast cancer was assessed. Estrogen-receptor (ER), progesterone-receptor (PgR), Ki-67 status and HER-2 expression, assessed by immunohistochemistry (IHC), were used to identify four molecular subtypes: Luminal-A, Luminal-B, HER2-enriched and triple-negative tumors. Non-parametric tests (Kruskal-Wallis, k-sample equality of medians, and Mann-Whitney) and logistic regression were performed to investigate correlations between mp-MRI features (lesion volume, margins, ADC, type of DCE curve, and tCho SNR) and molecular subtypes.

RESULTS

483 patients (505 lesions) were included in the study. Volume was smaller in Luminal-B and larger in triple-negative tumors (non-parametric tests, $p<0.03$ and $p<0.004$, respectively). A prevalence of irregular margins was observed in triple negative tumors ($p<0.01$). The type of DCE curve was significantly different in Luminal-A (lack of type III curves compared to average, $p<0.03$). ADC values were higher in Luminal-A ($p<0.04$ and $p<0.016$ in non-parametric tests and logistic regression, respectively). tCho SNR was higher in triple-negative tumours ($p<0.05$ and $p<0.01$).

CONCLUSION

A significant correlation was found between some MRI features and molecular subtypes of breast tumors. The strongest correlations were observed between Luminal A tumors and ADC, Luminal A tumors and DCE-MRI findings, Triple negative tumors and tCho SNR. These results warrant further research to improve the prognostic value of multi-parametric MRI.

CLINICAL RELEVANCE/APPLICATION

Significant correlations were observed between multi-parametric MRI features and molecular subtypes of breast tumors. Further research is needed to improve the prognostic value of mp-MRI.

RC315-14 Apparent Diffusion Coefficient Difference Value on Diffusion-Weighted Imaging: Association with Distant Metastasis-Free Survival of Patients with Invasive Breast Cancer

Tuesday, Nov. 27 11:20AM - 11:30AM Room: Arie Crown Theater

Participants
Jin You Kim, MD, Busan, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jin Joo Kim, MD, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Suk Kim, MD, Pusan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To investigate whether apparent diffusion coefficient (ADC) parameters on diffusion-weighted imaging (DWI) are associated with distant metastasis (DM)-free survival in patients with invasive breast cancer.

METHOD AND MATERIALS

This retrospective study was approved by the institutional review board. The requirement to obtain informed consent was waived. Between June 2013 and June 2014, 258 consecutive women (mean age, 50.9 years; age range, 23-85 years) with newly diagnosed invasive breast cancer who underwent preoperative breast MR imaging with DWI were evaluated. All DWI were retrospectively reviewed by two radiologists blinded to the clinical information. The mean, minimum, and maximum ADC values were measured by

manually placing regions of interest within the lesions and the ADC difference value (which is the difference between minimum and maximum ADC) was calculated to evaluate intratumoral heterogeneity. Cox proportional hazards models were used to reveal the associations between ADC parameters and DM-free survival after adjusting for clinicopathological factors.

RESULTS

In 25 (9.7%) patients, DM developed without prior locoregional recurrence at a mean follow-up of 48.7 months. The mean of ADC difference value was significantly higher in patients with DM than in those without DM (0.781 × 10-3mm2/s vs. 0.620 × 10-3mm2/s, P = .007). Kaplan-Meier survival analysis showed that patients with high ADC difference value (>0.793 × 10-3mm2/s) had shorter DM-free survival times compared with those with low ADC difference value (<=0.793 × 10-3mm2/s) (log-rank test; P < .001). Furthermore, multivariate Cox proportional hazards analysis showed that a high ADC difference value (>0.793 × 10-3mm2/s) (hazard ratio [HR] = 3.448; 95% confidence interval [CI]: 1.567, 7.586; P = .002), presence of axillary node metastasis (HR = 5.101; 95% CI: 2.127, 12.234; P < .001), and estrogen receptor negativity (HR = 2.429; 95% CI: 1.104, 5.343; P = .027) were associated with worse DM-free survival.

CONCLUSION

High ADC difference value on DWI was significantly associated with worse DM-free survival of patients with invasive breast cancer.

CLINICAL RELEVANCE/APPLICATION

Quantitative analysis of ADC difference value as a biomarker of intratumoral heterogeneity can be used to identify a subgroup of breast cancer patients at higher risk of developing distant metastasis.

RC315-15 Bradiomics (Breast Radiomics) Can Improve Breast Cancer Detection: Preliminary Clinical Results Using Multivariate Magnetic Resonance Tensor Modeling Fitting

Tuesday, Nov. 27 11:30AM - 11:40AM Room: Arie Crown Theater

Participants
Anabel M. Scaranelo, MD, PhD, Toronto, ON (*Presenter*) Nothing to Disclose
Edna Furman-Haran, PhD, Rehovot, Israel (*Abstract Co-Author*) Nothing to Disclose
Hadassa Degani, PhD, Rehovot, Israel (*Abstract Co-Author*) Nothing to Disclose
Vivianne Freitas, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Dov Grobgeld, Rehovot, Israel (*Abstract Co-Author*) Nothing to Disclose
Karen Bodolai, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Nancy Talbot, MSc, RT, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Pavel Crystal, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To evaluate performance measurements of a radiomics model breast lesions extracted from 30 directions fitting of MR images without gadolinium enhancement.

METHOD AND MATERIALS

Research ethics board approved this prospective study including data of 269 MR studies from patients of 3 institutions. All consented women presented with clinically/imaging suspicious or a biopsy proven breast cancer and an indication for dynamic contrast-enhanced (DCE) breast MRI. Before gadolinium injection, diffusion MR imaging (b values, 0, 800 sec/mm2) was performed using a dedicated 3.0T scanner with 16-channel breast coil. A total of 7 readers independently assessed DCE where BPE, lesion size and BIRADS category for each breast were recorded. Two readers blind to DCE results in consensus assessed the 11 features extracted from pixel-by-pixel fitting modeling optimized to lambda-1 values. Histopathology was used as the gold standard. Adequate statistical tests were used to compare the diagnostic values

RESULTS

There were 248 malignant and 37 benign lesions in 229 patients. 7 patients presented with bilateral cancers. The bradiomics feature tensor model reduced false-positive results from 57 to 29 (specificity 88.9% [95% IC 0.843-0.923]) and diffusion imaging alone was less sensitive 89.9% (95% CI 0.855-0.931) than the conventional reading of DCE that provided sensitivity of 95.1% (95% CI 0.916-0.973) and specificity of 78.2% (95% CI 0.727-0.83) at the threshold including in situ disease. Diagnostic accuracy was 89.41% (95% CI 0.8941-0.9190) for tensor modeling and 86.77% (95% CI 0.8358-0.8954) for DCE.

CONCLUSION

The bradiomics model based on diffusion tensor allowed for similar diagnostic accuracy of obtained using clinical set reading DCE. This may translate to less recalls and improve clinical outcomes.

CLINICAL RELEVANCE/APPLICATION

The use of MR techniques that lead to high diagnostic accuracy without IV contrast may play a role in the clinical set.

RC315-16 Computer-Aided Diagnosis (CAD)-assessed Kinetic Features of Invasive Breast Cancers: Correlation with Clinical-pathologic Prognostic Factors

Tuesday, Nov. 27 11:40AM - 11:50AM Room: Arie Crown Theater

Participants
Sung Eun Song, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Kyu Ran Cho, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Bo Kyoung Seo, MD, PhD, Ansan, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation; Research Grant, Guerbet SA; Research Grant, Koninklijke Philips NV;
Ok Hee Woo, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

Deuk Jae Sung, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To investigate the association of kinetic features with clinical-pathologic factors in breast cancer patients using computer-aided diagnosis (CAD).

METHOD AND MATERIALS

Between July 2016 and March 2017, 85 patients with invasive breast cancers (mean, 1.8cm; range, 0.8-4.8cm) who had undergone preoperative 3.0T MR imaging and surgery were retrospectively enrolled. All MR image were processed using CAD, and kinetic features of tumors were acquired: peak enhancement, angio-volume, early and delayed enhancement profiles. The relationships between kinetic features and clinical-pathologic factors were assessed. Mann-Whitney test, Spearman's correlation test and binary logistic regression analysis were used for statistical analysis.

RESULTS

In correlation tests, CAD-assessed peak enhancement and angio-volume were significantly correlated with histologic grade, Ki-67 index, and tumor size: r = 0.355 (P = .001), r = 0.330 (P = .002), and r = 0.231 (P = .033) for peak enhancement, r = 0.410 (P = .005), r = 0.341 (P < .001), and r= 0.505 (P < .001) for angio-volume. Plateau compoment at delayed phase was significanly correlated with Ki-67 index (r = 0.255 [P = .019]), but correlated coefficient between rapid component at early phase and Ki-67 index did not reach statistical significance (r = 0.202 [P = .063]). In binary logistic regression analysis, higher peak enhancement was a significant independent predictor of higher histologic grade (odds radio [OR] = 1.004; 95% CI: 1.001,1.008; P = .024), larger angio-colume was a predictor of larger tumor size (OR = 1.384; 95%CI: 1.141, 1.679; P = .001), higher plateau component was a predictor of negative estrogen receptor status (OR = 0.928; 95%CI: 0.877, 0.982; P = .010), and both higher plateau component and angio-volume were predictors of higher Ki-67 index (OR = 1.051; 95%CI: 1.011, 1094; P = .013 for plateau component. OR = 1.178; 95%CI:1.023;1.356; P = .023 for angio-volume).

CONCLUSION

Of the CAD-assessed preoperative breast MRI kinetic features, higher peak enhancement may predict higher histologic grade, larger angio-volume may predict larger tumor size, higher plateau component may predict negative estrogen receptor status, and both higher plateau component and angio-volume may predict higher Ki-67 index.

CLINICAL RELEVANCE/APPLICATION

CAD-assessed preoperative breast MRI kinetic features can be considered as a useful imaging biomarker reflecting clinical-pathologic prognostic factors.

RC315-17 Correlation of MRI Texture Features With Tumor Infiltrating Lymphocytes and Pathologic Complete Response in HER2 Positive and Triple Negative Subtypes of Breast Cancer

Tuesday, Nov. 27 11:50AM - 12:00PM Room: Arie Crown Theater

Participants
Gaiane M. Rauch, MD, PhD, Houston, TX (*Presenter*) Nothing to Disclose
Hongtu Zhu, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Heng Li, Houston, TX (*Abstract Co-Author*) Research funded, Varian Medical Systems, Inc
Beatriz E. Adrada, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Lumarie Santiago, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Wei T. Yang, MD, Houston, TX (*Abstract Co-Author*) Consultant, General Electric Company; Medical Advisory Board, Seno Medical Instruments, Inc
Rosalind P. Candelaria, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Jessica W. Leung, MD, Houston, TX (*Abstract Co-Author*) Scientific Advisory Board, Hologic, Inc; Speakers Bureau, Hologic, Inc; Speakers Bureau, FUJIFILM Holdings Corporation
Mohamed Elbanan, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Alper H. Duran, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Ebru Unlu, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Minhua Wang, MD,PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Stacy Moulder, MD, Houston, TX (*Abstract Co-Author*) Research funded, AstraZeneca PLC; Research funded, F. Hoffmann-La Roche Ltd; Research funded, Oncothyreon; Research funded, Novartis AG; Research funded, Merck KGaA
Yun Wu, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Elizabeth Mittendorf, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Alastair Thompson, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To evaluate associations of quantitative MRI texture features and tumor infiltrating lymphocytes (TIL) levels in HER2+ and triple negative (TN) subtypes of breast cancer (BC) receiving neoadjuvant chemotherapy (NAC), as potential prognostic non-invasive imaging markers for pathologic complete response prediction (pCR).

METHOD AND MATERIALS

Retrospective review of BC patients who had MRI at staging, neoadjuvant chemotherapy and surgery from January 1, 2008 through December 31, 2015 was performed. Demographic, imaging, and pathologic data including TIL levels were documented. Quantitative MRI texture analysis was performed using 3 types of textural features (TF): local binary patterns (LBP), gray-level co-occurrence matrix (GLCM), and threshold adjacency statistics (TAS). Associations between MRI quantitative TF, TIL levels, and pCR were evaluated by Pearson correlation and logistic regression.

RESULTS

There were 50 HER2+ and 38 TN patients (median age 51 years, range 29-59) with pretreatment MRI and TIL status for analysis; 27 HER2+ patients and 15 TN patients had pCR at surgery. For HER 2+ patients 9 TF significantly correlated with pCR ($p<0.05$): f1 (angular 2nd moment), l3 (75 percentile), l4 (standard deviation), t1-t6 (adjacency 0-5). Four TF were significantly associated with high TIL levels ($p<0.05$): texture l4 (standard deviation), t2 and t3 (adjacency 1 and 2). Additional 4 TF had weak association with TIL ($p<0.1$): feature f8 (sum entropy), t1, t3 and t4 (adjacency 0, 3 and 4). Three TF were significantly associated with both, pCR and TIL ($p<0.05$): texture l3 (75 percentile), l4 (standard deviation), t9 (adjacency 8). For TN patients 4 TF f2 (contrast), t1,t3 and t4 (adjacency 0 ,2,3) were significantly associated with pCR ($p < 0.005$). No TF were significantly associated with TIL levels for TNBC, only t3 and t4 (adjacency 4 and 5) showed weak association with TIL levels ($p<0.1$).

CONCLUSION

Quantitative tumor MRI texture analysis in HER2+ BC showed 9 TF associated with pCR, 8 TF with TIL and 3 TF with both pCR and TIL; for TNBC 4 TF were associated with pCR, and 2 TF weakly associated with TIL.

CLINICAL RELEVANCE/APPLICATION

Analysis of associations of MRI quantitative TF with pCR and TIL in HER2+ and TNBC may help to develop prognostic non-invasive imaging markers for treatment response prediction.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC316

Communicating Effectively with Patients in the Digital Age (Sponsored by the RSNA Public Information Committee)

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S503AB

PR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Max Wintermark, MD, Lausanne, Switzerland (*Moderator*) Advisory Board, General Electric Company; Consultant, More Health; Consultant, Magnetic Insight; Consultant, Icometrix; Consultant, Nines;
Christoph I. Lee, MD, Mercer Island, WA (*Presenter*) Research Grant, General Electric Company; Investigator, General Electric Company
Arvind Vijayasarathi, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose
Ashley H. Aiken, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Create patient-friendly radiology reports. 2) Use available technology to improve communication with patients. 3) Use digital tools and the Internet to inform patients of the value of imaging services and expertise.

ABSTRACT

Patients are becoming increasingly involved in their healthcare with direct access to their radiology reports and online information about radiologists and imaging procedures. Patients want radiology reports they can understand and informative, readily available information online about providers and services, so that they may make better informed decisions about their healthcare. This course will provide specific examples and a strategy for communicating honestly and directly with patients via a wealth of digital tools.

Active Handout:Ashley Hawk Aiken

http://abstract.rsna.org/uploads/2018/17001994/NIRADS.patientcommunication RC316.pdf

RC317

Emerging Technology: Dual Energy and Spectral CT Update 2018

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S505AB

CH CT GI MK NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Savvas Nicolaou, MD, Vancouver, BC (*Moderator*) Institutional research agreement, Siemens AG

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LEARNING OBJECTIVES

1) Briefly review the principles of Dual Energy CT/Spectral imaging. 2) Review virtual non-contrast imaging, iodine mapping, 3 material decomposition, and monoenergetic imaging. 3) Review cases demonstrating abdominal organ perfusion and oncologic applications in the abdomen. 4) To outline novel applications of dual energy CT in assessing bone marrow edema, gout, ligament/tendon analysis and metal artifact reduction. 5) To outline novel techniques using Dual Energy CT in pulmonary embolism, cardiac ischemia assessment. 6) Review DECT/spectral imaging applications in the brain.

Sub-Events

RC317A Update on the Clinical Applications of Multi-Energy CT in Cardiothoracic Imaging

Participants
Prabhakar Rajiah, MD, FRCR, Dallas, TX (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To describe the different implementations of multi-energy CT technology. 2) To discuss the updates on the utility of multi-energy CT in cardiothoracic imaging. 3) To review the applications of multi-energy CT in cardiothoracic imaging.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Prabhakar Rajiah, MD, FRCR - 2014 Honored Educator

RC317B Novel Neuroradiology Dual Energy/Spectral CT Clinical Applications

Participants
Aaron D. Sodickson, MD,PhD, Boston, MA (*Presenter*) Institutional research agreement, Siemens AG; Speaker, Siemens AG; Speaker, General Electric Company

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LEARNING OBJECTIVES

1) Review Dual Energy CT fundamentals and post-processing applications. 2) Demonstrate the utility of Dual Energy CT to add value in neuro-imaging, including pathology detection, lesion characterization, diagnostic confidence, and reduced length-of-stay.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Aaron D. Sodickson, MD,PhD - 2014 Honored EducatorAaron D. Sodickson, MD,PhD - 2017 Honored EducatorAaron D. Sodickson, MD,PhD - 2018 Honored Educator

RC317C Dual Energy/Spectral CT of the Abdomen: What Matters Most to the Clinician

Participants
Desiree E. Morgan, MD, Birmingham, AL (*Presenter*) Institutional Research Grant, General Electric Company

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dmorgan@uabmc.edu

LEARNING OBJECTIVES

1) Apply strategies of dual energy CT for streamlined characterization of incidentally detected intra-abdominal abnormalities such as hepatic steatosis, adrenal adenomas, and renal lesions. 2) Develop and utilize post processing techniques that improve detection and identification of clinically relevant imaging features of abdominal tumors. 3) Understand limitations and compare workflow differences among major dual/multienergy scanning systems for abdominal applications.

RC317D Current and New Clinical Applications in Musculoskeletal Dual Energy/Spectral CT

Participants
Fabio Becce, MD, Lausanne, Switzerland (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Comprehend the basic principles and technical aspects of dual- and multi-energy CT when imaging the musculoskeletal system. 2) Apply dual-energy CT when assessing various musculoskeletal disorders, from crystal-related arthropathies to bone marrow edema. 3) Identify potential new applications of dual-energy CT in musculoskeletal imaging, such as CT arthrography and iron-related disorders.

RC318

Challenging Cases in Body Oncologic Imaging (Interactive Session)

Tuesday, Nov. 27 8:30AM - 10:00AM Room: E353A

CT MR NM OI US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Gary A. Ulaner, MD, PhD, New York, NY (*Moderator*) Research support, General Electric Company; Research support, F. Hoffmann-La Roche Ltd; Research support, Novartis AG

For information about this presentation, contact:

ulanerg@mskcc.org

LEARNING OBJECTIVES

1) Learn how to correlate CT and FDG PET findings to optimize diagnosis. 2) Identify iatrogenic effects which mimic malignancy on FDG PET/CT. 3) Learn histologies of breast cancer which may not be appreciably FDG-avid.

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC318A Magnetic Resonance Imaging

Participants
Alexander R. Guimaraes, MD, PhD, Portland, OR (*Presenter*) Consultant, Agfa-Gevaert Group

LEARNING OBJECTIVES

1) Updated understanding of soft tissue contrast mechanisms inherent in MRI including T1rho, diffusion weighted imaging, DCE-MRI. 2) Updated protocols for each organ site. 3) Potential benefits of PET/MRI in diagnosing disease.

ABSTRACT

This course is designed to update the attendee on novel MRI techniques and the benefits of MRI in diagnosing challenging cases within the abdomen and pelvis. Multiparametric MRI offers the unique ability to monitor the tumor microenvironment. Increasingly, multiparametric MRI is used for diagnosis and grading of malignancy in various organ systems (e.g. prostate cancer).

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Alexander R. Guimaraes, MD, PhD - 2018 Honored Educator

RC318B Ultrasound

Participants
Deborah J. Rubens, MD, Rochester, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the technical parameters to optimize to improve ultrasound diagnosis. 2) Identify discrete ultrasound features to discriminate between various pathologic entities. 3) Characterize disease processes in solid organs, vessels and soft tissues using the unique features of ultrasound and appreciate how ultrasound is complementary to CT, MRI and PET in the oncology patient.

ABSTRACT

This session will highlight a variety of disease processes in the oncology patient using grayscale, color and spectral Doppler ultrasound. Technique and potential pitfalls will be highlighted as they contribute to diagnostic acumen of the sonologist. Cases will include neoplastic, infectious and vascular processes in multiple organs. Differential diagnosis will be stressed with companion case examples, as well as when to use comparative imaging such as CT, MRI or PET/CT

RC318C PET/CT

Participants
Gary A. Ulaner, MD, PhD, New York, NY (*Presenter*) Research support, General Electric Company; Research support, F. Hoffmann-La Roche Ltd; Research support, Novartis AG

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ulanerg@mskcc.org

LEARNING OBJECTIVES

1) Learn where CT findings can improve FDG PET interpretation and where FDG PET findings can improve CT interpretation.

ABSTRACT

FDG PET/CT has become an indispensible modality in the treatment of cancer. While proven to be of great clinical benefit in the management of a wide array of malignancies, there are many potential pitfalls which may be detrimental if not properly identified and explained. In particular, FDG-avidity may be incorrectly ascribed to malignancy when corresponding CT findings demonstrate the FDG-avidity to be benign. In other cases, the presence of FDG avidity correctly deterimes the presence of malignancy despite to lack of correlate findings on CT. In this presentation, challenging FDG PET/CT cases will be used to demonstrate how correlation of FDG PET and CT findings leads to optimal FDG PET/CT interpretation.

RC320

Role of MR Imaging in Cancer Staging and Treatment

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S403B

BR GI MR RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Kathryn J. Fowler, MD, San Diego, CA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Overview of MRI use in cancer staging, treatment delivery, and response assessment. -Understand the imaging approach to staging rectal cancer -Review pertinent anatomy -Discuss reporting of stage -Understand response indicators and how to report

Sub-Events

RC320A Role of MR Imaging in GI Cancer Staging

Participants
Kathryn J. Fowler, MD, San Diego, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review basic MRI approach to staging gastrointestinal malignancies (pancreatic and rectal). 2) Understand the application of MR/imaging features for assessing response to therapy.

RC320B MR-guided Radiotherapy for GI Cancers

Participants
Michael F. Bassetti, MD, Madison, WI (*Presenter*) Research Grant, Merck KGaA; Research Grant, AstraZeneca PLC;

LEARNING OBJECTIVES

1) Identify the clinical sites where MR-guided radiation may have the highest impact. 2) Understand the unique sources of uncertainty of MR-guided radiation that differ from conventional LINAC radiation. 3) Identify the most common indications for on-line MR -guided adaptive radiotherapy observed in clinical practice.

RC320C Role of MR Imaging in Breast Cancer Staging

Participants
Bethany L. Niell, MD,PhD, Tampa, FL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify evidence-based indications for MR imaging in breast cancer staging. 2) Describe the frequencies of ipsilateral multifocal or multicentric disease and contralateral breast cancer detected on breast MRI. 3) Explain potential pitfalls and limitations of breast MRI performed for staging.

RC320D MR-guided Radiotherapy for Breast Cancer

Participants
Maria A. Thomas, MD, PhD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Michael F. Bassetti, MD, Madison, WI (*Presenter*) Research Grant, Merck KGaA; Research Grant, AstraZeneca PLC;

LEARNING OBJECTIVES

1) Identify potential applications of MR-guided radiotherapy for breast cancer. 2) Describe the advantages and disadvantages of MR-guided radiotherapy for breast cancer.

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104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC321

Advances in CT: Technologies, Applications, Operations-Spectral CT

Tuesday, Nov. 27 8:30AM - 10:00AM Room: E351

CT PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc
Lifeng Yu, PhD, Chicago, IL (*Coordinator*) Nothing to Disclose

ABSTRACT

CT has become a leading medical imaging modality, thanks to its superb spatial and temporal resolution to depict anatomical details. New advances have enabled extending the technology to depict physiological information. This has enabled a wide and expanding range of clinical applications. These advances are highlighted in this multi-session course. The course offers a comprehensive and topical depiction of these advances with material covering CT system innovations, CT operation, CT performance characterization, functional and quantitative applications, and CT systems devised for specific anatomical applications. The sessions include advances in CT system hardware and software, CT performance optimization, CT practice management and monitoring, spectral CT techniques, quantitative CT techniques, functional CT methods, and special CT use in breast, musculoskeletal, and interventional applications.

Sub-Events

RC321A Data Acquisition and Rendition Methods

Participants
Cynthia H. McCollough, PhD, Rochester, MN (*Presenter*) Research Grant, Siemens AG

For information about this presentation, contact:

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LEARNING OBJECTIVES

1. Describe the various methods used to acquire multi-energy CT data. 2. Differentiate between the methods used to present the information obtained with multi-energy CT. 3. Choose the most appropriate image rendition method for a specified clinical task.

Active Handout:Cynthia H. McCollough

http://abstract.rsna.org/uploads/2018/16001048/McCollough - Multi energy CT Refresher Course 2018 (1).pdf

RC321B Applications

Participants
Sebastian T. Schindera, MD, Aarau, Switzerland (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the various clinical applications of multi-energy CT. 2) Discuss the most important challenges of multi-energy CT in clinical routine. 3) Identify future opportunities of multi-energy CT.

RC321C Future Prospects-Photon Counting

Participants
Taly G. Schmidt, PhD, Milwaukee, WI (*Presenter*) Research Grant, General Electric Company

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LEARNING OBJECTIVES

1) Understand the potential benefits and current status of photon-counting detection for Spectral CT. 2) Understand the challenges of photon-counting Spectral CT.

RC322

Functional MR Imaging for Normal Tissue Response Assessment in Radiotherapy

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S104A

BQ MR PH RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Kristy K. Brock, PhD, Houston, TX (*Moderator*) License agreement, RaySearch Laboratories AB

Sub-Events

RC322A State of the Art in Functional MR Imaging for Normal Tissue Assessment

Participants
Kiaran P. McGee, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify underlying biological processes associated with functional magnetic resonance imaging techniques. 2) List most commonly used functional imaging techniques in magnetic resonance imaging. 3) Explain the physics of various functional magnetic resonance imaging technique described in the presentation.

RC322B Clinical Need for Functional MR Imaging for Normal Tissue Assessment in Radiation Therapy

Participants
Aaron J. Grossberg, MD, PhD, Portland, OR (*Presenter*) Nothing to Disclose

RC322C Technical Challenges in the Integration of Functional MR Imaging for Normal Tissue Assessment into Radiotherapy

Participants
Martha M. Matuszak, PhD, Ann Arbor, MI (*Presenter*) Research funded, Varian Medical Systems, Inc; Consultant, Varian Medical Systems, Inc

LEARNING OBJECTIVES

1. Discuss the challenges in incorporating functional MR into treatment planning

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC323

Evolving Perspectives on Ultrasound Safety

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S504AB

PH SQ US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
J. Brian Fowlkes, PhD, Ann Arbor, MI (*Coordinator*) Equipment support, Koninklijke Philips NV; Equipment support, General Electric Company; Equipment support, Canon Medical Systems Corporation; Research collaboration, Sonetics Inc; Stockholder, HistoSonics, Inc; Founder, HistoSonics, Inc

For information about this presentation, contact:

fowlkes@umich.edu

LEARNING OBJECTIVES

1) Understand the physical principles related to ultrasound safety and the potential for biological effects of ultrasound. 2) Utilize ultrasound in a safe and effective manner in clinical practice. 3) Increase their knowledge and understanding of the regulatory environment associated with medical ultrasound.

Sub-Events

RC323A Ultrasound Safety: Understanding the Potential Bioeffects

Participants
J. Brian Fowlkes, PhD, Ann Arbor, MI (*Presenter*) Equipment support, Koninklijke Philips NV; Equipment support, General Electric Company; Equipment support, Canon Medical Systems Corporation; Research collaboration, Sonetics Inc; Stockholder, HistoSonics, Inc; Founder, HistoSonics, Inc

For information about this presentation, contact:

fowlkes@umich.edu

LEARNING OBJECTIVES

1) Understand the physics associated with the potential bioeffects of ultrasound. 2) Increase basic knowledge of the controls and operator feedback related to ultrasound safety. 3) Be sufficiently proficient to utilized on-screen displays related to ultrasound safety. 4) Identify additional resources for understanding the physical effects of ultrasound.

Active Handout:J. Brian Fowlkes

http://abstract.rsna.org/uploads/2018/17000402/SafetyBasics_Fowlkes2018_V3 RC323A.pdf

RC323B Ultrasound Safety: What the Clinician Should Know

Participants
Jacques S. Abramowicz, MD, Chicago, IL (*Presenter*) Author with royalties, Wolters Kluwer nv; Medical Advisory Board, Samsung Electronics Co, Ltd

For information about this presentation, contact:

jabramowicz@bsd.uchicago.edu

LEARNING OBJECTIVES

View Learning Objectives under main course title.

ABSTRACT

Ultrasound is, arguably, one of the most common diagnostic procedures in clinical obstetrics. Its use for over more than 60 years has not been associated with fetal scientifically-proven harmful effects. Ultrasound, however, is a form of energy with potential rise of temperature and mechanical effects in insonated tissues. Knowledge of end-users on bioeffects of ultrasound and how to keep it safe is grossly lacking, but slowly improving, thanks to the efforts of various professional organizations. When a clear medical indication exists and the scan is performed by a professional knowledgeable in ultrasound bioeffects and safety and with respect to the As Low As Reasonably Achievable (ALARA) principle, risks to the fetus are minimal, if at all present. Education of clinical end-users continue to be of major importance, particularly given the ever-increasing use of new ultrasound technologies, such as Doppler and three/four-dimensional ultrasound.

Active Handout:Jacques S. Abramowicz

http://abstract.rsna.org/uploads/2018/17000403/Ultrasound Safety_ RC323B.pdf

RC323C Ultrasound Safety: What You Should Know About Therapeutic Ultrasound

Participants
Kenneth Bader, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

baderk@uchicago.edu

LEARNING OBJECTIVES

View Learning Objectives under main course title

ABSTRACT

Ultrasound is known most ubiquitously as a diagnostic imaging modality. High-intensity insonation conditions can be utilized for therapeutic benefit, generally categorized as ablation or enhanced drug delivery. In this session, 1) the physical principles by which ultrasound can be utilized for therapeutic benefit will be identified. 2) An overview will be provided of clinical and pre-clinical devices, and the current target disease pathologies. 3) Finally, the image guidance methods and metrics for evaluating treatment efficacy will be reviewed.

Active Handout:Kenneth Bader

http://abstract.rsna.org/uploads/2018/17000405/BaderRSNA018_RC323TherapeuticUltrasound RC323C.pdf

RC324

A Primer of Primaries (In Conjunction with the American Institute for Radiologic Pathology)

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S403A

OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Mark D. Murphey, MD, Silver Spring, MD (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the typical clinical and pathological features that allow distinction of common malignancies in multiple organ systems. 2) Define the characteristic imaging patterns that are important to differentiate common primary malignancies in multiple organ systems. 3) Understand the pathological basis for imaging patterns of common malignancies in multiple organ systems.

ABSTRACT

Common primary malignancies in numerous organ systems will be reviewed. These include molecular subtypes of breast cancer, hepatocellular carcinoma, cholangiocarcinoma, renal cell carcinoma, lung cancer, glioma, neuroblastoma and chondrosarcoma. These diseases often reveal a characteristic appearence on imaging, reflecting their pathology which is emphasized in a multiorgan multimodality approach.

Sub-Events

RC324A Adenocarcinoma of the Lung: A Rapidly Evolving Disease

Participants
Jeffrey R. Galvin, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title

Active Handout:Jeffrey R. Galvin

http://abstract.rsna.org/uploads/2018/17002322/AIRP Head to Toe Lung CancerRC324A.pdf

RC324B Imaging of Molecular Subtypes of Breast Cancer

Participants
Jennifer A. Harvey, MD, Charlottesville, VA (*Presenter*) Stockholder, Hologic, Inc; Research Grant, Volpara Health Technologies Limited; Stockholder, Volpara Health Technologies Limited;

For information about this presentation, contact:

jharvey@virginia.edu

LEARNING OBJECTIVES

View Learning Objectives under main course title

Active Handout:Jennifer A. Harvey

http://abstract.rsna.org/uploads/2018/17002323/Harvey Molecular subtypes of BC handout RC324B.pdf

RC324C Cardiac Myxoma

Participants
Aletta Ann Frazier, MD, Kensington, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Aletta Ann Frazier, MD - 2013 Honored Educator

RC324D Imaging of Neuroblastoma

Participants
Ellen M. Chung, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title

RC324E Imaging of Chondrosarcoma and Distinction from Enchondroma

Participants
Mark D. Murphey, MD, Silver Spring, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Highlight characteristic imaging appearances of glial neoplasms and their correlation with gross pathology and histopathology. 2) Introduce important revisions to the 2016 WHO classification of glial neoplasms, emphasizing molecular markers.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Mark D. Murphey, MD - 2015 Honored Educator

RC325

Mini-course: Image Interpretation Science - Radiologic Expertise: Incorporating Perception into Training

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S102CD

ED PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Coordinator*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Summarize evidence for changes in visual search as a function of expertise. 2) Describe other specialties where similar trends have been documented. 3) Provide an overview of attempts to predict who will make a good radiologist. 4) Summarize current training paradigms in medical imaging. 5) Describe alternative ways to teach image interpretation using expert visual search strategies. 6) Review the importance of self & group interpretation assessment. 7) Provide an overview of the PERFORMS project goals & methods. 8) Summarize PERFORMS progress & results to date.

ABSTRACT

Medical image perception has a long history in radiology, including an emphasis on training and education. This aspect is especially important as it impacts current and future learners (residents and fellows) as well as those out of trainig but gaining experience through everyday clinical interpretation. This course will focus on three important aspects of traiing and image perception: the importance of image perception in resident education; the potential role of preceptual training in radiographic image interpretatio; and the role of image perception and radiology litigation.

Sub-Events

RC325A On the Development of Expertise in Image Interpretation

Participants
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Summarize evidence for changes in visual search as a function of expertise. 2) Describe other specialties where similar trends have been documented. 3) Provide an overview of attempts to predict who will make a good radiologist.

ABSTRACT

Medical images constitute a core portion of the information physicians utilize to render diagnostic and treatment decisions. At a fundamental level, the diagnostic process involves two aspects - visually inspecting the image (perception) and rendering an interpretation (cognition). Key indications of expert interpretation of medical images are consistent, accurate and efficient diagnostic performance, but how do we know when someone has attained the level of training required to be considered an expert? How do we know the best way to present images to the clinician in order to optimize accuracy and efficiency? The advent of digital imaging in many clinical specialties, including radiology, pathology and dermatology, has dramatically changed the way that clinicians view images, how residents are trained, and thus potentially the way they interpret image information, emphasizing our need to understand how clinicians interact with the information in an image during the interpretation process. With improved understanding we can develop ways to further improve decision-making and thus improve patient care.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Elizabeth A. Krupinski, PhD - 2017 Honored Educator

RC325B Using Expert Interpretation Strategies to Teach Trainees

Participants
William Auffermann, MD, PhD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

william.auffermann@hsc.utah.edu

RC325C Formal Assessment of Practicing Radiologists

Participants
Yan Chen, Loughborough, United Kingdom (*Presenter*) Research Grant supported by Hologic

LEARNING OBJECTIVES

1) Comprehend how test sets of images can be employed to provide formal assessment of radiological skills. 2) Understand what causes inter and intra individual differences in performance and how to improve diagnostic skills. 3) Review the importance of self & group image interpretation assessment. 4) Provide an overview of the PERFORMS self-assessment scheme in breast screening. 5) Summarize progress of the PERFORMS scheme.

RC327

Health Policy & Practice Series: How to Take on the Role of Quality Officer in Radiology-Just Do It!

Tuesday, Nov. 27 8:30AM - 12:00PM Room: N229

HP SQ

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

Participants
Kimberly E. Applegate, MD, MS, Lexington, KY (*Moderator*) Nothing to Disclose
Nadja Kadom, MD, Atlanta, GA (*Moderator*) Nothing to Disclose
K. Pallav Kolli, MD, San Francisco, CA (*Moderator*) Investor, Adient Medical Inc

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Understand how errors occur (commonly) in complex systems. 2) Be familiar with the use of checklists (reporting templates), and reminder systems in radiology. 3) Understand ways to build accountability (use policies, audits, and patient advisors).

Sub-Events

RC327-01 Quality and Safety in Radiology: The Basics

Tuesday, Nov. 27 8:30AM - 9:00AM Room: N229

Participants
Kimberly E. Applegate, MD, MS, Lexington, KY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title

RC327-02 Starting a Quality and Safety Program

Tuesday, Nov. 27 9:00AM - 9:30AM Room: N229

Participants
Nadja Kadom, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the components of a Q&S Program. 2) Identify methods for growing the program. 3) Present program achievements.

RC327-03 Adopting Peer Learning: A Practical Approach for Improving Clinical Performance Feedback and Learning among Colleagues within a Radiologic Practice

Tuesday, Nov. 27 9:30AM - 9:40AM Room: N229

Participants
Jennifer C. Broder, MD, Burlington, MA (*Presenter*) Nothing to Disclose
Christopher D. Scheirey, MD, Burlington, MA (*Abstract Co-Author*) Nothing to Disclose
Dmitry Elentuck, MD, Burlington, MA (*Abstract Co-Author*) Nothing to Disclose
Jeffrey A. Hashim, MD, Burlington, MA (*Abstract Co-Author*) Nothing to Disclose
Mara M. Kunst, MD, Lawrence, MA (*Abstract Co-Author*) Nothing to Disclose
Karen L. Reuter, MD, Wellesley Hls, MA (*Abstract Co-Author*) Nothing to Disclose
Juan E. Small, MD, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose
Christoph Wald, MD, PhD, Burlington, MA (*Abstract Co-Author*) Advisor, Koninklijke Philips NV

For information about this presentation, contact:

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PURPOSE

We practice in a subspecialized hospital-based group with an annual exam volume of approximately 350,000 cases. Whereas published and retrospective error and disagreement rates in radiology literature are reported to be as high as 30%, our legacy peer review program yielded less than 1% discrepancy among submitted cases, anecdotally similar to other departments around the country. Under this circumstance of presumed under-reporting we were constrained in determining how our radiologists can improve their diagnostic performance. We aimed to implement a program that would effectively increase feedback to radiologists regarding their own clinical performance and allow others to also learn from these cases.

RESULTS

Baseline data (April 2016-March 2017): RADPEER data, n=4396, 98.5% (4332) cases with complete agreement and 1.5% (64) without complete agreement. Of the latter, 49 (1.1% of total) were RADPEER 2A or 2B and 15 were RADPEER 3 or 4 (0.4% of total). 'Great call' was an optional qualifier but not a single reviewer chose to assign that to a submission. During the year 47 cases were discussed in 12 monthly morbidity and mortality meetings, composed of anonymous case presentations by Section Heads as well as original author radiologists presenting their own cases. Specifications for a new system as determined by staff: Separation from ongoing performance evaluation; discourage judgment; encourage constructive feedback; allow people to share learning opportunities with each other; allow people to learn from other people's mistakes and successes; allow cases to be submitted anonymously; require conference presentations to be anonymous without revealing the radiologist who interpreted the exam; allow for subspecialized peer learning conferences. During the first year of our peer learning program implementation (April 2017-March 2018): 1036 cases with learning opportunities were submitted, an increase of identified learning opportunities by 1,519%. Submissions included 488 discrepancies (47%), 396 great calls (38%), 157 cases for discussion (15%). Peer learning conferences became more efficient: 296 number of cases were shown in a total of 24 number of peer learning conferences. Simultaneously, the random-scored peer review program evaluated an additional 6,087 cases, now generating 286 cases (5%) with learning opportunities. Of these, 252 (4.1% of total) were RADPEER 2A or 2B, 34 were RADPEER 3 or 4 (0.9% of total).

CONCLUSION

Implementation of a peer learning system has significantly increased sharing of cases with learning opportunities in our practice. The model has allowed us to learn from both discrepancies and from successful interpretations of challenging cases. This has increased the amount of feedback to individual radiologists, the number of cases shared with other members of the practice, and the number of times per year we come together to discuss improvement. After separating the random scored peer review from ongoing performance evaluation, we saw an increase in identification of discrepancies within the pool of random cases, though fewer cases of learning opportunities were identified than in the non-random peer learning submissions. This indicates that separating peer reviews from performance evaluation will increase colleague willingness to identify discrepancies, however random peer review is less productive in identifying learning opportunities.

METHODS

During an initial open forum we solicited ideas and concerns about our existing peer review program, our monthly morbidity and mortality conference, and suggestions for change from the radiology staff. Based on this, we understood specifications of an acceptable new peer review system. 'Peer learning' (as proposed by Larson, et al.) met these specifications. A department-wide 'peer learning program' proposal was developed, approved by the hospital administration, and implemented. Attending participation is required as part of Ongoing Professional Practice Evaluation (OPPE.) The program allows for anonymous submission of non-random cases identified by peers including discrepancies, great calls, and cases for discussion without scoring or other explicit judgment. Cases are routed to the appropriate Section Head for review. Submitted feedback is then shared with the interpreting radiologist. Monthly morbidity and mortality conference was replaced with a combination of regular subspecialty and whole-department peer learning conferences. These highlight a subset of high-yield cases with learning or systems improvement opportunities. The original scored peer review program which evaluates random cases was continued separately from the peer learning program, however, scores were no longer used for ongoing professional performance evaluation. These scored results are only shared with the interpreting radiologist on an ongoing basis; department Q/S Vice Chair reviews individual cases only when a specific request is made for review.

PDF UPLOAD

http://abstract.rsna.org/uploads/2018/18007549/18007549_dn3h.pdf

RC327-04 Notification System for Overdue Radiology Recommendations Improves Rates of Follow-up and Diagnosis

Tuesday, Nov. 27 9:40AM - 9:50AM Room: N229

Awards
Student Travel Stipend Award

Participants
Jaimee E. Mannix, MD , Boston, MA (*Presenter*) Nothing to Disclose
Justine Lavoye, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Michael Wasserman, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Nicholas Wilson, MD , Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Keita Onoue, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Marina C. Bernal Fernandez, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Khalid I. Hassan, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Rutuparna Sarangi, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Samir Haroon, MD, Lexington, MA (*Abstract Co-Author*) Nothing to Disclose
Mustafa Qureshi, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Avneesh Gupta, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

Jaimee.mannix@bmc.org

PURPOSE

To determine the impact of a dedicated communication system on completion of overdue workups advised on imaging.

METHOD AND MATERIALS

The institutional review board approved this HIPAA-compliant study. Informed consent was waived. A search of 4,539 imaging reports over 2 months in 2016 at our institution for the words 'recommend' or 'advised' yielded 1,599 patients. If recommended follow-ups were not performed within 1 month of the advised time per search of the electronic medical record, providers were subsequently notified. The rate of compliance was calculated without notification, and after notification if the recommended workup became overdue.

RESULTS

Of 1,599 patients studied, 823 had non-urgent but important findings on imaging with a firm recommendation for further workup. Of

these, 125 were excluded as follow up was not yet overdue and 18 were excluded due to death or transfer of care to another institution. Of the remaining 680, follow up had been completed for 481 (70.7%) without additional notification. 199 (29.3%) were overdue for follow up, and providers were contacted regarding the recommendations. Of the 199 patients for whom reminders were sent to providers, 72 (36.2%) were lost to follow up, 5 (2.5%) had their recommendations ignored, 32 (16.1%) were declined for follow-up by the provider as not indicated, and 90 (45.2%) received the recommended follow up only after a reminder. This yielded 9 clinically important diagnoses, including 1 biopsy-proven malignancy, 3 growing mass lesions, 1 new mass lesion, 3 thyroid nodules requiring biopsy, and 1 molar pregnancy.This dedicated system of communication for overdue recommendations reduced incomplete follow-ups from 29.3% (199/680) to 16.0% (109/680; p <0.0001), and resolved a total of 61.3% of cases of overdue patients when including those deemed not clinically indicated (122/199).Extrapolation of this data for our institution would yield an additional 5,940 patients who receive recommended follow up, including an additional 594 clinically important diagnoses annually.

CONCLUSION

A dedicated system of communication of overdue recommendations significantly reduces the number of incomplete follow-ups, and yields clinically important diagnoses.

CLINICAL RELEVANCE/APPLICATION

A communication system for notification of overdue recommendations leads to a significant decrease in the number of incomplete follow-ups and an increase in clinically important diagnoses.

RC327-05 Educational Impact of High-Fidelity Simulation Training (HFST) in Improving Radiology Staff Compliance with Contrast Emergency Management (CEM) Treatment Guidelines

Tuesday, Nov. 27 9:50AM - 10:00AM Room: N229

Participants
Tatiana M. Fonseca, Boston, MA (*Presenter*) Nothing to Disclose
Katayoun Samadi, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Alexandra Penzias, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Joanne Forde, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Hillary R. Kelly, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Alexi Otrakji, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Sanjay Saini, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Mary-Theresa Shore, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Gloria M. Salazar, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

tati_fonseca2@hotmail.com

PURPOSE

Anaphylaxis is the most severe presentation of contrast reactions and can be fatal. However, adverse events from intravenous administration of contrast media are rare, resulting in infrequent opportunities for radiology personnel to manage such situations in clinical practice, and many studies have reported that radiologists lack sufficient knowledge in CEM. Thus, we evaluated the impact of HFST in the clinical management of adverse reactions to contrast media by comparing accurate diagnosis and compliance with treatment guidelines before and after implementation of the training program.

METHOD AND MATERIALS

In this IRB-approved study, a retrospective review of the contrast reactions departmental database was conducted between 2010 and the first quarter of 2017. The HFST annual program was implemented in October 2012 using a mannequin (SimMan 3G, Laerdal medical) to train staff in CEM per clinical guidelines based on the American College of Radiology (ACR) manual. The performance of radiology department personnel was assessed for each month, evaluating whether performance of radiology staff in CEM was compliant with clinical guidelines and compared their performance before and after HFST. The percentage of cases compliant with CEM guidelines for each month was analyzed using a statistical process chart. All analyses were conducted with QI Macros for Excel or Minitab version 17.1.

RESULTS

A total of 769 contrast reactions cases were included in this analysis (M: F 309:460). All patients underwent contrast-enhanced studies (CT or MRI). Up to 30% of CEM occurred at outpatient centers. There were no deaths occurred during the CEM provided by responding radiologists. Implementation of HFST began in October 2012 (dashed red line), with a trend towards better compliance for the first 2.5 years of training and significant and sustained improvement of staff compliance with clinical guidelines of CEM after July 2015 (red points in SPC chart above mean line).

CONCLUSION

HFST is an effective educational method to train radiology staff in CEM, with significant improvement in compliance with CEM guidelines in clinical practice.

CLINICAL RELEVANCE/APPLICATION

Delayed or inadequate patient treatment during contrast-induced anaphylaxis can lead to fatal outcomes. We have implemented a HFST program with significant improvement in staff compliance with ACR clinical guidelines in clinical practice.

RC327-06 Sonographer as a Source of Variability for Swear Wave Elastography: Separatingpatient and Sonographer Variability Using Complete Block Design

Tuesday, Nov. 27 10:00AM - 10:10AM Room: N229

Participants
Grayson L. Baird, PhD, Providence, RI (*Presenter*) Nothing to Disclose
Alyssa S. Berube, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Wendy J. Smith, RT, Providence, RI (*Abstract Co-Author*) Nothing to Disclose

Michael D. Beland, MD, Providence, RI (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation; Consultant, General Electric Company

PURPOSE

Shear Wave elastography (SWE) is a non-invasive method of estimating liver fibrosis in patients with suspected liver disease. Variations in the elastic properties of soft tissue are measured by evaluating tissue behavior when a mechanical stress is applied. Quality assurance checks revealed that SWE values were systematically higher and more variable for some sonographers compared with others. These differences could be caused by differences between patients, SWE machines/probes, sonographers, or a combination thereof. The present study aims to determine the source of these differences.

METHOD AND MATERIALS

Complete balanced block design was conducted where 6 healthy liver subjects were scanned by the same 6 sonographers at the same time using the same machine. As recommended by the manufacturer, 12 SWE measurements were obtained from the right lobe of the liver; this was done for each subject by each sonographer. Generalized mixed modeling with sandwich estimation, where observations were nested within patients, was used to evaluate SWE differences between sonographers using SAS/GLIMMIX.

RESULTS

Because the same healthy subjects were scanned at the same time using the same machine by all sonographers, median SWE values obtained between sonographers should be almost identical. Nonetheless, statistically significant differences were observed between sonographers such that one sonographer's median SWE value was as low as 4.9 while another's was as high as 5.5 (which also passes a clinical threshold), $p<.001$. Variability was also different between sonographers, where some sonographers SWE values were more variable than others, $p<.01$.

CONCLUSION

These results highlight the need to standardize scanning protocols to reduce systematic differences and variability in SWE values between sonographers; these results may also justify a second scanning of patients who border clinical thresholds. Given that healthy liver volunteers, as a group, passed a clinical threshold, and if the variability inherent between sonographers cannot be controlled for in practice, then the reliability of clinical thresholds is placed into question.

CLINICAL RELEVANCE/APPLICATION

Liver shear wave elastography is subject to variability between sonographers. Caution should be used in interpreting shear wave values, particularly when relying on strict thresholds for determining treatment.

RC327-07 Quality & Safety: How to Teach Yourself to Be a Quality & Safety Expert

Tuesday, Nov. 27 10:20AM - 10:50AM Room: N229

Participants
Naomi R. Schechter, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List and define the National Academy of Medicine's 'Six Aims'. 2) Define and describe the elements of a 'Culture of Safety'. 3) Assemble a flow chart for basic radiology processes. 4) Interpret run charts, control charts, Ishikawa and Pareto diagrams. 5) Explain the basic rationale and procedure for conducting a Root Cause Analysis. 6) Describe the skill-set required to be effective at quality improvement in Radiology, assess and compare their own skill set in this space, and specify which, if any, additional skills they will need to acquire.

ABSTRACT

This course will provide guidance and resources to those who wish to develop expertise in Radiology Quality & Safety, and is especially designed to serve the needs of radiologists who are new to the field but ultimately seek to take on quality improvement leadership roles within their own organizations.

RC327-08 Preventive Effect of Changing Contrast Media in Patients with a Prior Mild Acute Hypersensitivity Reaction to Gadolinium-Based Contrast Agent

Tuesday, Nov. 27 10:50AM - 11:00AM Room: N229

Awards
Student Travel Stipend Award

Participants
Chang Hyun Ryoo, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Young Hoon Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung-Eun Cheon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
In One Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Soon Ho Yoon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

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PURPOSE

Currently, premedication and changing the culprit contrast agent are used to prevent recurrent acute hypersensitivity reactions (HSRs) to iodinated contrast media. However, strategies for the prevention of acute HSRs to gadolinium-based MR contrast agents (GBCAs) have not yet been established. The purpose of this study was to evaluate effectiveness of premedication and changing contrast agent for prevention of HSR recurrence in patients with a history of mild acute HSR to gadolinium-based MR contrast agent (GBCA).

METHOD AND MATERIALS

The outcomes from patients with mild acute HSR to GBCA who subsequently underwent enhanced MRI between October 2012 and July 2017 were analyzed. Data on application of premedication, premedication regimen and types of GBCA used were obtained from the institutional contrast media monitoring system. Recurrence rates of acute HSR were compared according to preventive strategies.

RESULTS

186 patients with a history of mild acute HSR to GBCA were re-exposed to GBCA 397 times during the study period. The overall recurrence rate was 19% (78/397). Changing the culprit GBCA significantly reduced the recurrence rate, compared to reusing the culprit GBCA (26% and 6.9%, p<0.0001). Premedication using antihistamine or antihistamine plus steroid demonstrated no significant protective effect (recurrence rate, 20.4% and 17.3% with and without premedication respectively, p=0.509). Premedication in addition to changing CM also showed no additional protective effect (7.2% and 6.1%, respectively, p=0.590).

CONCLUSION

Changing the culprit GBCA could reduce a chance of HSR recurrence in patients with a prior mild acute HSR to GBCA, while premedication showed no protective effect.

CLINICAL RELEVANCE/APPLICATION

In patients with a history of HSR to GBCA, changing GBCA could be more effective than premedication.

RC327-09 Developing a Technologist-Focused Training Program to Improve 3D Mammographic Technical Recall Rates

Tuesday, Nov. 27 11:00AM - 11:10AM Room: N229

Awards
Student Travel Stipend Award

Participants
Laura K. Harper, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Curtis L. Simmons, MD , Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Amy Lynn Conners, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

With conversion from 2D to 3D screening mammography, we noticed an increase in our institution's technical recall rate. The purpose of this study was to assess the effect of a technologist training program on technical recall rate and fulfillment of technical parameters of 3D mammograms.

METHOD AND MATERIALS

3D screening technical recall indications from 7/1/2017 to 12/31/2017 were reviewed. In December 2017, a training program was implemented requiring the technologist who initially scanned the screening exam to rescan with a senior technologist with enhanced training in the Mammography Quality Standards Act (MQSA) technical standards. Technical recalls acquired from 1/1/2018 to 3/15/2018 were then reviewed and compared to the pre-intervention data. Additionally, 100 consecutive screening mammograms performed pre- and post-intervention were reviewed for technical adequacy parameters. Data was analyzed with a student's T test and chi squared test. A p value <0.05 was considered statistically significant.

RESULTS

There were 76 exams with 114 indications for technical recall from 7/1/2017 to 12/31/2017 and 31 exams with 43 indications for technical recall from 1/1/2018 to 3/15/2018. Pre- vs post-training recall indications included: phototiming 9(8%) vs 4(9%), insufficient posterior visualization 52(46%) vs 29(67%), artifact 6(5%) vs 1(2%), motion 15(13%) vs 4(9%), nipple not in profile 4(4%) vs 1(2%), skin fold 12(11%) vs 1(2%), inadequate compression 9(8%) vs 0(0%), other reasons 7(6%) vs 3(4%). After the intervention, recalls for artifact, motion, nipple not in profile, skin folds, inadequate compression, and insufficient inferior visualization significantly decreased ($p < 0.05$). For the 100 pre- vs post- intervention mammograms, there was a significant decrease in breast cut off (p=0.018), distance from inframammary fold to bottom of film (p=0.016), and inadequate CC (p=.0096) and MLO (p=0.019) compression.

CONCLUSION

After implementing a technician training program, the number of recalls significantly decreased for multiple technical parameters, and the overall quality of exams improved. Our program is ongoing and improvement in other technical parameters will be the focus of the remaining program.

CLINICAL RELEVANCE/APPLICATION

A technologist training program can significantly improve technical quality of 3D screening mammograms.

RC327-10 Radiology Trainees' Perceptions and Likelihood of "Speaking Up' About Patient Safety Concerns and Unprofessional Behavior in the Clinical Learning Environment

Tuesday, Nov. 27 11:10AM - 11:20AM Room: N229

Participants
Donna Luff, BA,PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Melissa O'Donnell, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
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Patrick Johnston, MSc, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Priscilla J. Slanetz, MD, MPH, Belmont, MA (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To (1) compare radiology trainees' perceptions regarding the climates for speaking up about patient safety and unprofessional behavior in the clinical environment and (2) assess their likelihood of speaking up in the medical hierarchy.

METHOD AND MATERIALS

58/61 (95%) trainees from nine hospitals who attended a communication workshop completed validated survey items (pre-workshop) assessing their perceptions of the extent to which their clinical environment supports speaking up about patient safety and unprofessional behavior. The survey also queried perceived potential for patient harm in a hypothetical vignette, and likelihood of speaking up about the error within a team hierarchy.

RESULTS

84% of trainees felt encouraged by colleagues to speak up about safety concerns; 57% reported the same for unprofessional behavior ($p<0.001$). 17% found it difficult to speak up about safety concerns compared to 34% who found it challenging to speak up about unprofessional behavior ($p<0.018$). Trainees were also less likely to agree that speaking up about unprofessional behavior (compared to safety concerns) resulted in meaningful change (66 vs 95%; $p<0.001$). In a 'bystander' role (situations not involving them or their patients directly), significantly fewer reported that the clinical culture makes it easy to speak up about unprofessional behavior compared to safety concerns (48 vs 76%; $p<0.001$). Likewise, fewer reported having observed others in bystander roles speaking up about unprofessional behavior compared to safety concerns (43 vs 76%; $p<0.001$). In a clinical vignette describing a breach in sterile technique, respondents were less likely to speak up to an attending (48%) compared to a nurse, intern, or resident (79, 84, and 81%, respectively; $p<0.001$). Even when perceiving high potential harm, residents were less likely to speak up to an attending compared to all other team members (67 vs 100%; $p<0.001$).

CONCLUSION

Although harms to communication and teamwork associated with unprofessional behavior are well-established, trainees in our sample perceived less support for speaking up about unprofessional behavior than patient safety concerns. Hierarchy remains a barrier to speaking up about safety.

CLINICAL RELEVANCE/APPLICATION

Open communication is crucial to patient safety. Radiology trainees indicate gaps in speaking up culture particularly around unprofessional behavior and team hierarchy.

RC327-11 It Takes a Village... Active Faculty Engagement in Quality Improvement Using a Departmental Quality Improvement Committee

Tuesday, Nov. 27 11:20AM - 11:30AM Room: N229

Participants
Kerry L. Thomas, MD, Tampa, FL (*Presenter*) Nothing to Disclose
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PURPOSE

As healthcare transitions from volume care to value care, physicians and hospital systems must continually evaluate departmental quality to improve outcomes and patient satisfaction. It is imperative for radiologists to participate in quality improvement to maintain certification. However, departmental quality improvement initiatives and individual physician Patient Quality Initiative (PQI) projects are typically performed independently. As a result, radiology faculty members are often not fully engaged in departmental quality improvement initiatives. Even when asked to participate, radiologists can be reluctant because they often do not receive meaningful recognition for their time-consuming "behind the scenes" efforts. Similarly absence of departmental support for individual faculty PQI projects can render them impossibly difficult. To address this problem, we developed a physician- led departmental quality improvement committee.

RESULTS

Prior to the creation of the Quality Improvement Committee, individual faculty members were struggling to accomplish improvement efforts on their own. In the year prior to committee implementation, only 4 quality improvement projects were actively pursued or completed by the body imaging department's 13 faculty members. However, over 30 new projects were initiated within a year of the committee's initiation. Implemented projects stemming from the committee include: patient feedback surveys, MRI protocol updates, patient wait time reduction, CT oral contrast water utilization, structured reporting, technologist QA conferences, improved contrast reaction reporting, website improvement and faculty scheduling optimization. The creation of the committee generated several advantages. One advantage was a project management system to identify, track, timeline, and prioritize projects. Second, a fully sanctioned committee brought the advantage of full administrative support increasing buy-in, resources, and enthusiasm for projects. Lastly, by bringing several members together with different areas of expertise, projects could be solved quickly and efficiently often using similar resources and methods by using a multidisciplinary approach. Due to these factors and by increasing the numbers of stakeholders involved, the total number of projects in progress or completed is well over 30. Planned quarterly committee meetings allowed cross-talk to generate an overall improved patient experience. Also, each committee

member reports becoming immediately more involved with interdepartmental staff and hospital leadership as a direct result of each improvement project.

CONCLUSION

Developing a formal quality improvement committee in the radiology department and actively engaging faculty members increased the number of faculty members engaged in patient quality improvement. The strong support and participation by the departmental leadership (chairman, vice chairs and department administrator) was crucial to the success of the committee. The committee facilitated an expeditious ability to complete improvement projects efficiently within the radiology department by developing a tracking system, prioritizing departmental resources, and using a multidisciplinary approach. In less than one year, we have successfully completed several projects and identified new areas for continuous quality improvement. We believe this committee could serve as a model for other radiology groups and hospital practices who are struggling with quality improvement success.

METHODS

Invitations to join the committee were sent to faculty members who had previously expressed interest in quality improvement initiatives. Additional invitations were sent to the departmental chair and vice chairs, the department administrator, modality supervisors, and the nursing supervisor. At the initial meeting, the committee established multiple subcommittees, each led by a faculty radiologist. These include: CT, MRI, Ultrasound, Nuclear Medicine, Interventional Radiology, Safety and Patient experience. Each subcommittee chair identified at least one project for improving quality and/or the patient experience. The subcommittees worked with other departmental and hospital staff to achieve their aims using a multidisciplinary approach. As projects progressed, committee members reported updates and obstacles to other faculty members for feedback and ideas for moving forward. To avoid additional long meetings, much communication utilized email, updates at already scheduled faculty, and division meetings as well as "water cooler chats" in the reading room.

PDF UPLOAD

http://abstract.rsna.org/uploads/2018/18008053/18008053_corx.pdf

RC327-12 Pre-Procedure Time Out in CT-Guided Procedures: Effect on Workflow and Patient Safety

Tuesday, Nov. 27 11:30AM - 11:40AM Room: N229

Participants
Sujithraj Dommaraju, MBBS, Boston, MA (*Presenter*) Nothing to Disclose
Bettina Siewert, MD, Boston, MA (*Abstract Co-Author*) Reviewer, Wolters Kluwer nv
Suzanne Swedeen, MSc, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Bridget O'Bryan-Alberts, RN, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Elisabeth Appel, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Andres Camacho, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Olga R. Brook, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To audit completeness of the pre-procedural time out in Radiology procedures and its impact on the procedure outcomes and patients safety.

METHOD AND MATERIALS

In this IRB-approved, HIPAA-complaint study, pre-procedure time out was observed by an independent observer in the variety of CT-guided procedures performed between January and March 2018 in large academic institution. Pre-procedure time-out checklist (Figure 1) was introduced in 2007 in our institution and since then has been used as the standard protocol.

RESULTS

53 CT-guided procedures were observed: biopsies (27/53; 51%), drainages (13/53; 25%), tumor ablations (11/53; 21%), and fiducial seed placements (2/53; 4%). Average patient's age was 64.8±10.7 years with 26/53, 49% females. Pre-procedure timeout was performed in all 53 (100%) procedures. Scripted prompt was used in 31/53, 58% of the cases. Median duration of the time-out was 60 seconds (IQR 60-90). Patient identifiers (name, medical records number and date of birth) were reviewed during the time out in all cases. Allergies were reviewed in 51/53, 96% of the cases. Medications were reviewed in 51/53, 96% of the cases. Labs were reviewed in all (100%) of cases. All omissions occurred in time outs without use of scripted prompt. Elevated INR was discovered during time out in 1/53 (2%) case and that case were therefore postponed. Procedures were delayed in 3/53, 6% occasions by 3 minutes to find solutions to problems uncovered during the time out: to confirm when last dose of aspirin was taken; code status was unknown and needed to be confirmed with patient's son as the patient was intubated; patient reported allergy to Levocaine which needed to be differentiated from Lidocaine (used routinely in the procedure). Additional issues (3/53, 6%) raised during the time out included: confirmation of appropriate media for specimens to be collected, availability of gelfoam for patient with low platelet count, and confirmation of platelet count, previously not available.

CONCLUSION

Standardized pre-procedure time-out for CT-guided procedures takes one minute to execute, however it detects safety issues in up to 13% of the cases. Omissions occur when the scripted prompt is not being used.

CLINICAL RELEVANCE/APPLICATION

Standardized pre-procedure time-out should be performed routinely using a scripted prompt to improve patient's outcomes.

RC327-13 Get it Out before it Gets Away: Initiation of Dedicated IVC Filter Retrieval Program

Tuesday, Nov. 27 11:40AM - 11:50AM Room: N229

Participants

Padma P. Manapragada, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
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Joel M. Raborn, MD, Birmingham, AL (*Presenter*) Nothing to Disclose
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PURPOSE

To assess the efficacy of a dedicated inferior vena cava (IVC) filter retrieval program on filter retrieval rates and number of patients lost to follow-up.

RESULTS

Prior to the program, 76 patients (31 males, 45 females; mean age: 64.2 years) had retrievable filters placed. 80.2% were placed due to a contraindication to anti-coagulation. 3 patients (3.9%) experienced a minor complication at the time of placement. From this group, five filters were removed (6.6%), 42 patients were lost to follow-up (55.3%), 22 patients died (28.9%), and seven filters were deemed permanent by a physician after placement (9.2%). All five retrievals were successful and no complications were reported. After program initiation, 106 patients (54 males, 52 females; mean age: 58.8 years) had retrievable filters placed. 81.1% were placed due to a contraindication to anti-coagulation. Two patients (1.9%) had a complication at the time of placement. In this group, an attempt at retrieval was made in 29 patients (27.4%), 10 patients were lost to follow-up (9.4%), 23 patients died (21.7%), 28 filters were deemed permanent by a physician after placement (26.4%), and decisions were still pending in 17 patients (16%). One filter retrieval was unsuccessful thus overall retrieval rate was 26.4%. One patient (3.4%) had a minor complication during filter retrieval. Initiation of a filter retrieval program increased our retrieval rate (6.6% vs. 26.4%; $p=0.0006$) and reduced the number of patients with filters that were lost to follow-up (55.3% vs. 9.4%; $p<0.0001$).

CONCLUSION

The dedicated IVC filter retrieval program was effective in increasing filter retrieval rates and decreasing the number of patients lost to follow-up and hence increasing accountability for IVC filters. Future directions include improvement in patient assessment prior to filter placement to reduce the number of retrievable filters being left in place as permanent filters. Additionally, referring physician and patient education efforts are underway to improve understanding about the importance of filter removal when appropriate.

METHODS

We initiated a dedicated IVC filter retrieval program in July 2016. The program consisted of tracking all patients with filters placed by interventional radiology (IR) via the electronic medical record (EMR). At the time of filter placement, patients were scheduled for a retrieval consult in the IR clinic and placed on a patient worklist in the EMR. The patient worklist is private and can only be viewed by our physician assistants (PA) and the lead IR supervising the program. The consults were scheduled for 2-3 months after filter placement. At the time of retrieval consult, the IR would schedule the patient for removal, recommend an additional follow-up appointment, or deem that the filter needed to stay in place as appropriate. Documentation of the plan was made in the patient's chart and on the private patient worklist in the EMR. Any missed appointments were followed up by a PA. When the PA was able to reach the patient, they re-scheduled the appointment. If the PA was unable to reach the patient after multiple attempts, we sent a letter to the patient's home address and a message to their primary care physician through the EMR requesting that they call our clinic to schedule a follow-up appointment. If a patient missed 3 clinic appointments despite re-scheduling, we also sent a letter to the patient's home address and a message to their primary care physician through the EMR requesting that they call our clinic to schedule a follow-up appointment. The program was overseen by a single IR physician. To assess this program's efficacy, we reviewed the records of all patients who had retrievable IVC filters placed by IR nine months prior to and nine months after program initiation. Demographics and clinical factors were then collected and compared. A p value of < 0.05 was considered statistically significant.

PDF UPLOAD

http://abstract.rsna.org/uploads/2018/18005892/18005892_iszl.pdf

RC327-14 Natural Language Processing for Identification of Incidental Lung Nodules: Aiding the Evaluation of Radiology Recommendations for Guideline Concordance

Tuesday, Nov. 27 11:50AM - 12:00PM Room: N229

Awards
Student Travel Stipend Award

Participants
Ryan Chung, MD, New York, NY (*Presenter*) Nothing to Disclose
Kira Garry, BA,MPH, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Leora I. Horwitz, New York, NY (*Abstract Co-Author*) Nothing to Disclose
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Dadong Li, PhD, New York City, NY (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To develop a natural language processing (NLP) tool for finding incidental lung nodules in CT reports, and to use the tool to streamline assessment of recommendations for concordance with Fleischner Society guidelines.

METHOD AND MATERIALS

We searched the electronic health record for patients who had chest CT during 2014 and 2017, before and after implementation of an institution-wide macro for recommendations using Fleischner guidelines. We excluded those with malignancy, immunocompromised state, or indication of lung cancer screening. 906 unstructured chest CT reports were randomly selected and manually reviewed to determine the presence of incidental lung nodules, the presence of management recommendations, and whether recommendations agreed with the Fleischner Society guidelines at the time of the scan. Using nodule terminology, an NLP tool was trained and validated for detection of incidental lung nodules, and for exclusion of previously known or definitively benign nodules. The tool was used to identify incidental lung nodules from 2017 reports. Guideline concordance of recommendations was compared between 2014 and 2017 reports using the chi-squared test.

RESULTS

The NLP tool identified incidental lung nodules with sensitivity and specificity of 91.1% and 82.2%, respectively. Positive and negative predictive values were 59.7% and 97.0%. Comparing 2014 and 2017, there was no difference in the proportion of reports with incidental lung nodules [95/456 (20.8%) vs. 101/450 (22.4%); p=0.6], or in the proportion of reports with incidental lung nodules containing follow-up recommendations [67/95 (70.5%) vs. 80/101 (79.2%); p=0.2]. After implementation of a Fleischner guideline macro, a significantly higher proportion of incidental nodule reports contained guideline-concordant recommendations for low-risk patients [67/101 (66.3%) vs. 44/95 (46.3%); p<0.01].The difference in the proportion of reports with concordant recommendations for high-risk patients trended toward significance [70/101 (69.3%) vs. 53/95 (55.8%); p=0.05].

CONCLUSION

An NLP tool can streamline identification of incidental lung nodules in unstructured reports, aiding assessment of quality measures such as guideline concordance of recommendations.

CLINICAL RELEVANCE/APPLICATION

NLP can efficiently identify incidental lung nodules despite varied terminology and context, facilitating assessment of quality measures such as guideline-concordant management recommendations.

RC329

MR Imaging of Rectal Cancer Before and After Therapy and Recent Advances in Imaging (Interactive Session)

Tuesday, Nov. 27 8:30AM - 10:00AM Room: N227B

GI MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Hero K. Hussain, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

Sub-Events

RC329A Pre-operative MRI Staging of Rectal Cancer: What Every Report Should Address

Participants
Kartik S. Jhaveri, MD, Toronto, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss key relevant clinical background of imaging in rectal cancer. 2) Highlight structured reporting template for rectal cancer evaluation with MRI. 3) Review key points for reporting of MRI of rectal cancer staging.

RC329B Response to Chemoradiotherapy: How Do We Assess?

Participants
Marc J. Gollub, MD, New York, NY (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Review the available methods to evaluate response to chemoradiotherapy including T2 signal, DWI, volumetry and quantitative functional MRI. 2) Introduce the concept of complete response and its assessment at MRI. 3) Illustrate pitfalls in tumor and node assessment after therapy.

RC329C MRI and Its Value in Organ Preservation

Participants
Regina G. Beets-Tan, MD, PhD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn about organ preservation in rectal cancer. 2) To understand the value of DWI MRI after CRT for assessment of complete response. 3) To learn about parametric imaging for prediction of response.

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RC331

Tumor Ablation Beyond the Liver: Practical Techniques for Success

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S404AB

GI IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Debra A. Gervais, MD, Boston, MA (*Presenter*) Nothing to Disclose
Muneeb Ahmed, MD, Boston, MA (*Presenter*) Research Grant, General Electric Company; Stockholder, Agile Devices, Inc; Scientific Advisory Board, Agile Devices, Inc
Terrance T. Healey, MD, Providence, RI (*Presenter*) Nothing to Disclose
Anil N. Kurup, MD, Rochester, MN (*Presenter*) Research Grant, Galil Medical Ltd; Research Grant, EDDA Technology, Inc; Royalties, Wolters Kluwer nv

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LEARNING OBJECTIVES

1) Describe indications for tumor ablation in extrahepatic sites. 2) Describe approaches and techniques to help prevent and manage organ specific complications. 3) Review results of tumor ablation in the lung, kidney, and bone.

ABSTRACT

Pulmonary malignancies, and specifically lung cancer, are a leading cause of death worldwide. Utilization of best current therapies results in an overall five-year relative survival rate for all stages combined to be only 15%, necessitating the use of alternative therapies. Image-guided ablation of lung malignancies is a revolutionary concept whose clinical applications are just beginning to be developed. It has some advantages over traditional radiotherapy and chemotherapy. Its safety profile is similar to percutaneous image guided lung biopsy. Almost all image-guided ablative procedures can be performed in an outpatient setting, mostly with conscious sedation. Multiple applications can be performed without any additional risks. Contraindications are few and include uncontrollable bleeding diathesis and recent use of anticoagulants. Image-guided ablation of lung malignancies is performed with two basic rationales. In the first group it is used with an intention of achieving definitive therapy. These are patients who are not candidates for surgery because of co-morbid medical contraindications to surgery, like poor cardiopulmonary reserve or patients refusing to undergo operation. This cohort could potentially derive significant benefit form a minimally invasive alternative therapy. In the second group it is used as a palliative measure as follows: (a) to achieve tumor reduction before chemotherapy (b) to palliate local symptoms related to aggressive tumor growth, such as chest pain, chest wall pain or dyspnea (c) hematogenous painful bony metastatic disease (d) tumor recurrence in patients who are not suitable for repeat radiation therapy or surgery Image-guided ablation is expanding treatment options for the local control of non-small cell lung cancer and metastatic disease. Skeletal metastases are extremely common and may be treated for palliation of pain or local control. Clinically significant, durable pain relief occurs in 75-100% of patients treated for this reason. Local control rates in bone/extravisceral soft tissue vary, and most series report rates of 70-98%. Patients selected for palliation of pain should have moderate-severe pain and a targetable, corresponding lesion. Lesions should be treatable with attention to critical structures, especially major nerves. Care should be used when placing probes in the constrained environment of intact bone. Cement should be added in weight-bearing regions.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Debra A. Gervais, MD - 2012 Honored Educator

RC332

Clinical Optimization: Current and Future States

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S404CD

LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Melissa A. Davis, MD, New Haven, CT (*Moderator*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Overview of optimization of radiology practices through the use of RAs and other non-MD support. Course participants will gain an understanding of how their practices can use these personnel for higher value/intellectual capital endeavors. 2) Optimization of radiology practices through technology. Course participants will gain an understanding of workflow management, electronic health record integration, and implementation of new systems through capital deployment. 3) Optimization of radiology through practice evaluation and redesign. Course participants will be presented with innovative ways to assess and optimize radiologist's time and workflows.

Sub-Events

RC332A Optimization of Radiology Practices through the Use of RAs and Other No-MD Support

Participants
Catherine J. Everett, MD, MBA, New Bern, NC (*Presenter*) Nothing financial to disclose

LEARNING OBJECTIVES

1) Describe the history and qualifications of radiology extenders. 2) Define the current role of radiology extenders in the practice of radiology.

RC332B Optimization of Radiology Practices through Technology

Participants
Amy L. Kotsenas, MD, Rochester, MN (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Gain an understanding of how technology can aid in optimization of radiology practices. 2) Develop practical strategies to implement technology to improve practice efficiency.

RC332C Optimization of Radiology through Practice Evaluation and Redesign: Full Analysis of Radiologist Time and How to Optimize It

Participants
Melissa A. Davis, MD, New Haven, CT (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

View Learning Objectives under main course title.

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RC350

Contrast Reaction (Hands-on)

Tuesday, Nov. 27 8:30AM - 10:00AM Room: E260

SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Carolyn L. Wang, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Carina W. Yang, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Erik Soloff, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Ryan O'Malley, MD, Seattle, WA (*Presenter*) Nothing to Disclose
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Stephen C. O'Connor, MD, Boston, MA (*Presenter*) Nothing to Disclose
Patrick W. Eiken, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Richard H. Cohan, MD, Ann Arbor, MI (*Presenter*) Co-author, Wolters Kluwer nv
Senta M. Berggruen, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Anup J. Alexander, MD, Maywood, IL (*Presenter*) Nothing to Disclose
James H. Ellis, MD, Ann Arbor, MI (*Presenter*) Research Consultant, General Electric Company ; Medical Advisory Board, Nuance Communications, Inc
Rishi Agrawal, MD, Chicago, IL (*Presenter*) Speakers Bureau, Boehringer Ingelheim GmbH

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LEARNING OBJECTIVES

1) Recognize various types of contrast reactions and the proper management of various types of contrast reactions through simulation-based training. 2) Learn with hands-on practice the proper administration of various routes of epinephrine as well as other medications to treat the more common allergic-like contrast reactions. 3) Recognize and manage a contrast reaction in a sedated patient. 4) Recognize and manage a contrast reaction in a pediatric patient. 5) Recognize and practice team communication skills necessarily for high stress infrequent scenarios using simulation-based training.

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RC352

Live Ultrasound Interventional Procedures: Thermal Ablation, Cyst Aspiration, Abscess Drainage, Vascular Access, Core Biopsy, Foreign Body Removal (Hands-on)

Tuesday, Nov. 27 8:30AM - 10:00AM Room: E264

US IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

Patrick Warren, MD, Columbus, OH (*Moderator*) Nothing to Disclose
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Veronica J. Rooks, MD, Honolulu, HI (*Presenter*) Nothing to Disclose
James W. Murakami, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Kristin M. Dittmar, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Carmen Gallego, MD, Madrid, Spain (*Presenter*) Nothing to Disclose
Mabel Garcia-Hidalgo Alonso, MD, Madrid, Spain (*Presenter*) Nothing to Disclose
Hollins P. Clark, MD, Winston Salem, NC (*Presenter*) Research Consultant, Galil Medical Ltd
Njogu Njuguna, MD, Springfield, MA (*Presenter*) Nothing to Disclose
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Jeremiah J. Sabado, MD, Wilmington , DE (*Presenter*) Nothing to Disclose
John D. Lane, MD, Bayside, WI (*Presenter*) Nothing to Disclose
Humberto G. Rosas, MD, Madison, WI (*Presenter*) Nothing to Disclose
William W. Mayo-Smith, MD, Boston, MA (*Presenter*) Nothing to Disclose
Yassine Kanaan, MD, Dallas, TX (*Presenter*) Nothing to Disclose
Allison S. Aguado, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
Linda J. Warren, MD, Vancouver, BC (*Presenter*) Shareholder, Hologic, Inc
Kathleen M. Boyer, DO, Aiea, HI (*Presenter*) Nothing to Disclose
Michael A. Mahlon, DO, Tacoma, WA (*Presenter*) Nothing to Disclose
Robert M. Marks, MD, San Diego, CA (*Presenter*) Nothing to Disclose
Ulises Barajas, MD, Juarez, Mexico (*Presenter*) Nothing to Disclose
Kara D. Gaetke-Udager, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Remy Ngwanyam, MD, Boston, MA (*Presenter*) Nothing to Disclose
Jonathan R. Wood, MD, Honolulu, HI (*Presenter*) Nothing to Disclose

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James.Murakami@nationwidechildrens.org

LEARNING OBJECTIVES

1) Identify basic skills, techniques, and pitfalls of freehand invasive sonography. 2) Discuss and perform basic skills involved in thermal tumor ablation in a live learning model. 3) Perform specific US-guided procedures to include core biopsy, abscess drainage, vascular access, cyst aspiration, soft tissue foreign body removal, and radiofrequency tumor ablation. 4) Incorporate these component skill sets into further life-long learning for expansion of competency and preparation for more advanced interventional sonographic learning opportunities.

RC353

Deep Learning & Machine Intelligence in Radiology

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S406A

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Paul J. Chang, MD, Chicago, IL (*Moderator*) Co-founder, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Bayer AG; Advisory Board, Bayer AG; Advisory Board, Aidoc Ltd; Advisory Board, EnvoyAI; Advisory Board, Inference Analytics

Sub-Events

RC353A Introduction to Deep Learning

Participants
Luciano M. Prevedello, MD, MPH, Dublin, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the principles of knowledge extraction from data (Machine Learning). 2) Understand main intuitions behind deep machine learning models (Deep Learning). 3) Understand how Deep Learning can be applied to medical image analysis and the main challenges associated to the application of Deep Learning in this domain.

RC353B Deep Learning and Machine Intelligence in Radiology: A Reality Check

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Bayer AG; Advisory Board, Bayer AG; Advisory Board, Aidoc Ltd; Advisory Board, EnvoyAI; Advisory Board, Inference Analytics

LEARNING OBJECTIVES

1) A "realistic" perspective on how deep learning and machine intelligence can add value to radiology will be discussed. 2) The significant challenges with respect to practical implementation of deep learning/machine intelligence offerings by existing radiology workflow and existing IT infrastructure will be reviewed. 3) Strategies for preparing the radiology department and IT for deep learning/machine intelligence will be discussed.

ABSTRACT

Current and near future requirements and constraints will require radiology practices to continuously improve and demonstrate the value they add to the healthcare enterprise. Merely 'managing the practice' will not be sufficient; groups will be required to compete in an environment where the goal will be measurable improvements in efficiency, productivity, quality, and safety. There has been great interest (as well as fear and hype) regarding the application of deep learning and other machine intelligence approaches to help improve the radiology value proposition. This session will attempt to provide a "reality check" on how these potentially promising technologies might be used by radiology and the significant challenges involved. Topics that will be covered include: • How can we best apply deep learning/machine intelligence to add "true value?" • How do we confidently validate the performance of these technologies? • How can our existing IT systems "feed and consume" these technologies efficiently and at scale? • How can we best harmonize the human radiologist with these machine agents?

RC353C Deep Learning: How to Get Started

Participants
Abdul Hamid Halabi, Santa Clara, CA (*Presenter*) Developer, NVIDIA Corporation; Spouse, Employee, Covenant Pathology

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RC354

How Did I Miss That? Perceptual and Attentional Roots of Medical Errors

Tuesday, Nov. 27 8:30AM - 10:00AM Room: N226

IN SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Jeremy M. Wolfe, PhD, Cambridge, MA (*Presenter*) Research collaboration, Koninklijke Philips NV;

For information about this presentation, contact:

jwolfe@bwh.harvard.edu

LEARNING OBJECTIVES

1) Learn basic perceptual limitations on the analysis of medical images and potential solutions. 2) Understand attentional limits on visual search (having seen a series of examples) and how these limits can impact search in radiologic images. 3) Learn about current research in medical image perception. 4) Learn how perceptual & cognitive factors will impact the deployment of AI (e.g. deep learning) in radiology.

ABSTRACT

Perceptual decisions can be hard. Images are often ambiguous, but we still need to make a diagnostic decision (e.g., is this cell abnormal or not?). We cannot simultaneously recognize every object in our field of view. As a result, even if a breast mass or a lung nodule might be clear enough when you find it, the process of finding it involves deploying attention from object to object or place to place, searching for the target. This is true whether we are looking for the cat in the bedroom or those nodules in a stack of CT images. Becoming an expert does not cause you to develop a new search engine. You become an expert on using the standard human search engine on a specific set of stimuli. Unfortunately, our search engine does not work perfectly and we sometimes fail to find what we seek. At other times, we find things that are not really there. I will give a quick tour of the basics of perceptual decision making and then we will illustrate and discuss three classes of error that occur in medical image perception: - Search errors in which the observer never looks in the right spot. - Recognition errors where the observer looks at the target but fails to code it as potentially significant. - Decision errors where the target is scrutinized but the wrong conclusion is reached. This last class of errors can be subdivided into Perceptual decision errors and Cognitive decision errors in which the observer thinks about the problem in a way that leads to the wrong answer. In some cases, these errors arise from 'cognitive heuristics', mental shortcuts can be very useful, but can sometimes lead to errors, medical and other.

Active Handout:Jeremy Michael Wolfe

http://abstract.rsna.org/uploads/2018/17001001/Handout for Wolfe CourseRC354.pdf

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RCB31

RSNA Diagnosis Live Interactive and Mobile Device Integrated Audience Response: Tips, Tricks, and How to Get Started (Hands-on)

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S401CD

ED IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Christopher G. Roth, MD,MS, Philadelphia, PA (*Moderator*) Nothing to Disclose
Christopher G. Roth, MD,MS, Philadelphia, PA (*Presenter*) Nothing to Disclose
Sandeep P. Deshmukh, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

sandeep.deshmukh@jefferson.edu

christopher.roth@jefferson.edu

LEARNING OBJECTIVES

1) Appreciate the higher receptiveness of interactive content by adult learners compared with traditional didactic techniques. 2) Understand the basic operational features of the Diagnosis Live audience participation authoring tool, including the types of questions offered and how to embed them into PowerPoint presentations. 3) Learn how to manage the Diagnosis Live administrator portal and launch and run interactive games and review analytics regarding student performance.

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RCC31

Interoperability: Imaging and Beyond - IHE, Standards, and the RSNA Image Share

Tuesday, Nov. 27 8:30AM - 10:00AM Room: S501ABC

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
David S. Mendelson, MD, Larchmont, NY (*Moderator*) Spouse, Employee, Novartis AG; Advisory Board, Nuance Communications, Inc; Advisory Board, General Electric Company; Advisory Board, Canon Medical Systems Corporation; Advisory Board, Bayer AG; Advisory Board, Nines
David S. Mendelson, MD, Larchmont, NY (*Presenter*) Spouse, Employee, Novartis AG; Advisory Board, Nuance Communications, Inc; Advisory Board, General Electric Company; Advisory Board, Canon Medical Systems Corporation; Advisory Board, Bayer AG; Advisory Board, Nines
Didi Davis, Knoxville, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ddavis@sequoiaproject.org

LEARNING OBJECTIVES

1) Understand the importance of interoperability throughout healthcare; imaging and beyond. 2) Understand the importance of standards to ensure interoperability. 3) Understand the role of IHE profiles in defining workflows and the applicable standards including IHE XDS-I and XCA-I. 4) Learn about real world implementations including Health Information Exchanges and Networks (The Sequoia Project, eHealth Exchange. Carequality and other national and international projects) and image enabled Personal Health Records (The RSNA Image Share). 5) Learn the status of the RSNA Image Share and the RSNA Image Share Validation Program.

ABSTRACT

This course will focuson HIT inteoperability and its importance in providing for the optimal care of patients. Interoperability has become a major focus of ONC in the United States as well as part of many international regulatory bodies. The evolution and current state of imaging interoperability will be discussed. The session will review the standards employed in delivering healthcare interoperability and the role of IHE nationally and internationally. The discussion will initially focus on imaging interoperability and progress to a broader discussion of healthcare interoperability. In addition to describing the RSNA Image Share Validation program and its recent enhancements, interoperability solutions such s PHRs and other efforts of The Sequoia Project will be presented including a review of nationwide health information networks, such as the eHealth Exchange, and interoperability frameworks, such as Carequality.

MSAS32

Understanding the Critical Relationships of Quality, Experience, and Performance for Effective Imaging Services (Sponsored by the Associated Sciences Consortium) (Interactive Session)

Tuesday, Nov. 27 10:30AM - 12:00PM Room: S105AB

IN SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Morris A. Stein, BArch, Phoenix, AZ (*Moderator*) Nothing to Disclose
William A. Undie, PhD, RT, Houston, TX (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

mstein@hksinc.com

Sub-Events

MSAS32A Planning and Physical Implications through Data, Modeling, and Vision

Participants
Carlos L. Amato, Los Angeles, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

camato@cannondesign.com

LEARNING OBJECTIVES

1) Understand the current status of Appropriate Use Criteria (AUC) consultation requirements. 2) Review workflow considerations for AUC consultations requirements for all process flow scenarios including employed and non-employed referring providers. 3) Understand how recent technological advances and discoveries will impact imaging space planning, and how to incorporate FDI guidelines in imaging department designs. 4) Understand how to adjust facility design(s) to align with the latest consumer expectations and trends affecting the patient experience. 5) Recognize the pitfalls and accomplishments of Clinical Decision Support Mechanism (CDSM) early adoption. 6) Explain the common barriers of CDSM interoperability with hospital electronic health record (EHR), standardization of operational flow of information, and key performance indicators (KPI) development.

MSAS32B The Changing World of How Clinical Support Systems Impact Quality and Delivery of Care

Participants
Melody W. Mulaik, Powder Springs, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

melody.mulaik@codingstrategies.com

LEARNING OBJECTIVES

1) Understand the current status of Appropriate Use Criteria (AUC) consultation requirements. 2) Review workflow considerations for AUC consultations requirements for all process flow scenarios including employed and non-employed referring providers. 3) Understand how recent technological advances and discoveries will impact imaging space planning, and how to incorporate FDI guidelines in imaging department designs. 4) Understand how to adjust facility design(s) to align with the latest consumer expectations and trends affecting the patient experience. 5) Recognize the pitfalls and accomplishments of Clinical Decision Support Mechanism (CDSM) early adoption. 6) Explain the common barriers of CDSM interoperability with hospital electronic health record (EHR), standardization of operational flow of information, and key performance indicators (KPI) development.

MSAS32C Lessons Learned in Adopting Clinical Decision Support Systems

Participants
Ernesto A. Cerdena, PhD, Atlantic City, NJ (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ernesto.cerdena@atlanticare.org

LEARNING OBJECTIVES

1) Recognize the pitfalls and accomplishments of Clinical Decision Support Mechanism (CDSM) early adoption. 2) Identify and explain the common barriers of CDSM interoperability with the hospital electronic health record (EHR) and standardization of flow of information. 3) Develop an understanding of the key performance indicators available within the CDSM system.

MSCC32

Case-based Review of Nuclear Medicine: PET/CT Workshop-Chest and Musculoskeletal PET/CT (In Conjunction with SNMMI) (Interactive Session)

Tuesday, Nov. 27 10:30AM - 12:00PM Room: E450B

CH CT MK NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Samuel E. Almodovar-Reteguis, MD, Orlando, FL (*Director*) Nothing to Disclose
Katherine A. Zukotynski, MD, Ancaster, ON (*Director*) Nothing to Disclose
Delphine L. Chen, MD, Saint Louis, MO (*Moderator*) Nothing to Disclose

Sub-Events

MSCC32A Chest

Participants
David M. Naeger, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

david.naeger@ucsf.edu

LEARNING OBJECTIVES

1) Describe the classic PET/CT appearance of various types of lung cancer. 2) Compare the imaging features that are similar between different types of lung cancer.

ABSTRACT

The classic PET/CT appearance of various types of lung cancers will be reviewed. Similaries and differences between different types of lung cancer will be presented in an effort to help attendees interpret thoracic imaging with more confidence and be more helpful in interdisciplinary settings.

MSCC32B Musculoskeletal

Participants
Gary A. Ulaner, MD, PhD, New York, NY (*Presenter*) Research support, General Electric Company; Research support, F. Hoffmann-La Roche Ltd; Research support, Novartis AG

For information about this presentation, contact:

ulanerg@mskcc.org

LEARNING OBJECTIVES

1) Demonstrate how to integrate the FDG PET and CT components of an FDG PET/CT exam to distinguish benign and malignant osseous lesions. 2) Identify common benign causes of FDG-avidity in the musculoskeletal system.

MSES32

Essentials of Non-interpretative Skills

Tuesday, Nov. 27 10:30AM - 12:00PM Room: N226

PR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

MSES32A Ethics and Code of Conduct

Participants
David M. Yousem, MD, Baltimore, MD (*Presenter*) Royalties, Reed Elsevier; Speaker, American College of Radiology; Employee, Medicolegal Consultation; ; ;

For information about this presentation, contact:

dyousem1@jhu.edu

LEARNING OBJECTIVES

1) To familiarize the attendees with the obligations and commitments inherent in the ACR and AMA Code of Ethics. 2) To present some scenarios where one's values and ethics may be challenged. 3) To assess the prevalence of sexual harassment in the Radiology field. 4) To suggest ideas for incorporating more explicit ethics education in our training.

ABSTRACT

Most physicians are unfamiliar with the Code of Conduct adopted by the AMA and most radiologists have not studied the ACR Article XI on Ethics and Discipline. Nonetheless moral issues frequently arise whether in the care of patients or in the treatment of colleagues and trainees throughout our career. Radiology also is not immune to the '#MeToo' / sexual harassment issues that are now being recognized (if not addressed) in the public sphere. This presentation will present an overview of our Code of Ethics, provide some intriguing scenarios where one's frame of values may be challenged, provide guides for navigating through moral dilemmas, and underscore some differences between LEGAL requirements versus code of conduct guidelines.

MSES32B Customer Service in Radiology

Participants
Alex Towbin, MD, Cincinnati, OH (*Presenter*) Author, Reed Elsevier; Grant, Guerbet SA; Grant, Siemens AG; Grant, Cystic Fibrosis Foundation; Consultant, Anderson Publishing, Ltd; Advisory Board, IBM Corporation; Advisory Board, KLAS Enterprises LLC;

For information about this presentation, contact:

alexander.towbin@cchmc.org

LEARNING OBJECTIVES

1) Define customer service. 2) List the 5 dimensions of service quality. 3) Provide examples of customer service in radiology.

ABSTRACT

Radiology is a service-oriented specialty. While physicians in other specialties have direct interaction with patients, radiologist's interactions with patients are often indirect and occur after another provider has placed an order. As a result, radiology practices have had to focus on two groups, patients and ordering providers to grow their business. The purpose of this lecture is to define customer service and introduce the five dimensions of service quality. The dimensions will be highlighted through illustrative examples.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Alex Towbin, MD - 2014 Honored Educator

MSES32C How to Give a PowerPoint Presentation

Participants
Eric J. Stern, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn there is no 'right way' to prepare and present educational Powerpoint lectures. 2) Learn the many simple ways to improve the effectiveness of transmitting information from the teacher to the learner. 3) Learn to enhance cognition and learning while decreasing cognitive overload and thereby becoming a memorable rather than forgettable presenter.

MSES32D Error Disclosure in Radiology

Participants
Stephen D. Brown, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

stephen.brown@childrens.harvard.edu

LEARNING OBJECTIVES

1) Explain the rationale for direct disclosure of medical errors to patients. 2) Describe recent developments in practices around disclosure and apology. 3) Appraise the relevance of these rationales and developments specifically for radiology.

ABSTRACT

Momentum has been increasing within medicine towards wider acceptance of open and transparent disclosure to patients about errors. Patients increasingly expect to be informed directly when errors occur. Normative, legal, legislative, and institutional developments have accelerated beyond the pace of dialogue and preparation within radiology for managing disclosures and apologies effectively. The purpose of this lecture to to review the rationale for disclosure of errors to patients, describe recent developments, and explain their relevance to radiology.

MSQI32

Quality Improvement Symposium: Value in Imaging 2: The Business Case for Quality

Tuesday, Nov. 27 10:30AM - 12:00PM Room: S402AB

SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.00

Participants
Matthew S. Davenport, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

matdaven@med.umich.edu

Additional Information

RSNA will award Quality Essentials Certificates of Completion to RSNA 2018 attendees who successfully participate. Participants who achieve a score of 80% or higher on the SAM test questions will be eligible to receive the certificates.

Sub-Events

MSQI32A Why in Healthcare Do We Ignore Quality?

Participants
Matthew S. Davenport, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

matdaven@med.umich.edu

LEARNING OBJECTIVES

1) Understand why quality in healthcare has historically been ignored in the United States. 2) Learn common and unique forces in academic and community practices that help explain the current state of quality healthcare in the United States. 3) Highlight macro trends that may alter the future of healthcare in the United States.

MSQI32B Accounting and Costing Related to Quality

Participants
Lane F. Donnelly, MD, Palo Alto , CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand principles of costing estimates in medicine and the industrial approach to thinking about the costs of quality and safety. 2) To understand the differences between costs of control and costs of failure of control, also know as the hidden costs of poor quality and develop a mindset that takes the factors into consideration when budgeting.

ABSTRACT

Understanding the costs of quality are important to creating an accounting and budgeting process that reflects the total cost of quality. Adopting a total cost of quality approach tath takes into account the costs of control, or the costs to ensure high quality, as well as considering the costs of non-control, or the hidden costs of poor quality , wil lbe essentail for successful healthcare organizations in the future.

MSQI32C MACRA and the Quality Payment Program

Participants
Andrew B. Rosenkrantz, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand how the Medicare Quality Payment Program (QPP) seeks to measure the quality of physician performance. 2) To understand how the QPP relates quality to physician payments. 3) To explore strategies for radiologists to succeed under the QPP.

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MSRO32

BOOST: Genitourinary Prostate (Interactive Session)

Tuesday, Nov. 27 10:30AM - 12:00PM Room: S103AB

GU OI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Daniel A. Hamstra, MD, PhD, Dearborn, MI (*Presenter*) Consultant, Augmenix, Inc
Jonathan M. Willatt, MBChB, Ann Arbor, MI (*Moderator*) Nothing to Disclose
Tristan Barrett, MBBS, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose
Brian J. Davis, MD, PhD, Rochester, MN (*Presenter*) Stockholder, Pfizer Inc; Speaker, Augenix Inc
Arvin K. George, MD , Ann Arbor, MI (*Presenter*) Nothing to Disclose
Nicole Curci, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To develop an understanding of the multidisciplinary interactions involved in the selection of patients who should undergo multiparametric prostate MRI. 2) To define the imaging features of high grade prostate cancer on MRI. 3) To describe the process whereby patients are selected for active surveillance or treatment for high grade prostate cancer. 4) To appraise a selection of lesions for categorization under the PIRADS criteria and determine how they should be followed or treated.

ABSTRACT

Multiparametric MRI for prostate cancer is now the standard of care for patients with suspected prostate cancer. The introduction of the PIRADS 2 system has enabled us to standardise the care of prostate cancer patients. Diagnosis, active surveillance, biopsy and choice of either radical prostatectomy, radiation or locoregional therapy are included in the diagnostic and treatment alogrithms. We describe the imaging features on prostate MRI which determine whether a patient is suspected of having high grade prostate cancer. We define the treatment choices and, through a cased based presentation, present a selection of cases for decision making in a tumour board scenario.

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MSRO36

BOOST: Mediastinum and Pleura-Oncology Anatomy (Interactive Session)

Tuesday, Nov. 27 10:30AM - 12:00PM Room: S103CD

CH OI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Meng X. Welliver, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Mizuki Nishino, MD, MPH, Newton, MA (*Presenter*) Institutional Research Grant, Merck & Co, Inc; Institutional Research Grant, Canon Medical Systems Corporation; Institutional Research Grant, AstraZeneca PLC; Speaker, F. Hoffmann-La Roche Ltd; Consultant, DAIICHI SANKYO Group
Alexander Louie, MD, FRCPC, London, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mizuki_nishino@dfci.harvard.edu

alexander.louie@sunnybrook.ca

meng.welliver@osumc.edu

LEARNING OBJECTIVES

1) Describe the mediastinal and pleural anatomy on imaging for treatment planning and monitoring for thoracic malignancy with a focus on thymic tumors and mesothelioma. 2) Discuss the cutting-edge strategies and pitfalls for treatment planning and disease surveillance for thymic tumors and mesothelioma. 3) Understand the importance of multidisciplinary approaches to thoracic malignancy involving the mediastinum and pleura.

ABSTRACT

The purpose of this course is to provide attendees with a practical knowledge of the mediastinal and pleural anatomy and the understanding of the treatment planning strategies and pitfalls for thoracic malignancy with a focus on thymic tumors and mesothelioma, highlighting the importance of multidisciplinary approaches to these tumors.

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RCA32

3D/VR/AR Imaging: Staying on the Cutting Edge of Brain Anatomy/Pathology (Hands-on)

Tuesday, Nov. 27 10:30AM - 12:00PM Room: S401AB

IN NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Komal B. Shah, MD, Houston, TX (*Presenter*) Nothing to Disclose
Maria Gule-Monroe, MD, Houston, TX (*Presenter*) Nothing to Disclose
Melissa M. Chen, MD, Houston, TX (*Presenter*) Nothing to Disclose
Jill V. Hunter, MD, Houston, TX (*Presenter*) Author with royalties, Wolters Kluwer nv
Halyna Pokhylevych, MD, Lviv, Ukraine (*Presenter*) Nothing to Disclose
Donald F. Schomer, MD, Fountain Hills, AZ (*Presenter*) Stockholder, Vertos Medical, Inc Stockholder, Sinopsys Surgical, Inc
Vinodh A. Kumar, MD, Houston, TX (*Presenter*) Nothing to Disclose

ABSTRACT

Brain Atlas/VR/AR imaging: Staying on the Cutting Edge of Brain Anatomy/Pathology This hands-on workshop will demonstrate an advanced brain atlas which fuses with a patient's MR brain imaging. Attendees will be able to navigate a patient's brain with 3D googles using Virtual Reality (VR) technology. Augmented Reality (AR) technology will also be presented. The atlas presented has extensive data related to brain anatomy, vasculature and function. It can map white fiber tracts when conventional DTI cannot be generated as a result of tumor or vasogenic edema. The atlas also takes into account tumor mass effect by deforming adjacent anatomical structures. Given its 3D capability, this tool has been used in neurosurgical pre-operative planning cases. Intraoperatively, the atlas has been successfully fused to neuronavigation systems to aid in real time surgical guidance. The atlas also has been very useful for radiation treatment planning. It supports individualized medicine, through the generation of videos related to the patient's brain tumor assisting patient education.

RCC32

RadLex: Semantics for Smart Workflows and Enterprises

Tuesday, Nov. 27 10:30AM - 12:00PM Room: S501ABC

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Kenneth C. Wang, MD, PhD, Ellicott City, MD (*Moderator*) Co-founder, DexNote, LLC; Software support, 3D Systems, Inc

LEARNING OBJECTIVES

1) Describe the RadLex system of standard terms for radiology. 2) Access RadLex content through interactive and programmatic interfaces. 3) Identify the role of standard terminology in radiology reporting, analytics and workflows, including the use of RadLex terms in a regional lung cancer screening project. 4) Explain and utilize the RadLex Playbook and the LOINC-RSNA Radiology Playbook systems for naming and coding radiology exams.

Sub-Events

RCC32A Standard Codes for Reporting, Analytics, and Workflow

Participants
Kenneth C. Wang, MD, PhD, Ellicott City, MD (*Presenter*) Co-founder, DexNote, LLC; Software support, 3D Systems, Inc

LEARNING OBJECTIVES

1) Define the purpose of the RadLex terminology system. 2) Characterize the scope and organization of RadLex terms. 3) Access RadLex content through interactive and programmatic interfaces. 4) Explain the use of RadLex terms in radiology reporting, analytics and workflows. 5) Introduce the role of RadLex terms in standardized radiology exam codes.

RCC32B Cancer Care Ontario, Thyroid Nodule Ultrasound and LDCT Lung Cancer Screening: The Role of Terminology and Radiology Structured Reporting

Participants
David M. Kwan, BSC, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

David.Kwan@cancercare.on.ca

LEARNING OBJECTIVES

1) Understand the motivation for using RadLex for: defining clinical elements in standardizing radiology reporting templates; facilitating clinical data retrieval for population-based research; and for integrating radiology results for cancer patients. 2) Understand the challenge associated with implementing synoptic (highly structured and coded) radiology reporting templates for radiologists. 3) Understand the use case for applying RadLex in Cancer Care Ontario Synoptic Radiology Reporting Templates for Thyroid Nodule Ultrasounds and Low Dose CT Lung Cancer Screening.

RCC32C Using RadLex for Intelligent Radiologic-pathologic Correlation

Participants
Ross W. Filice, MD, Chevy Chase, MD (*Presenter*) Co-founder, DexNote, LLC; Research Grant, NVIDIA Corporation; Advisor, BunkerHill Health, Inc

For information about this presentation, contact:

ross.w.filice@gunet.georgetown.edu

LEARNING OBJECTIVES

1) Learn why radiology-pathology correlation is important. 2) Learn about the different techniques to correlate radiology and pathology reports. 3) Understand why RadLex can be helpful in this task. 3) Learn about how deep learning and language modeling may help refine this objective.

RCC32D The LOINC/RSNA Radiology Playbook: A Unified Terminology for Radiology Procedures

Participants
Daniel J. Vreeman, MS, Indianapolis, IN (*Presenter*) Researcher, bioMerieux SA; President, Blue Sky Premise, LLC

LEARNING OBJECTIVES

1) Explain the purpose and scope of the LOINC terminology standard. 2) Identify and select the key tools for implementing codes from the LOINC/RSNA Radiology Playbook. 3) Apply best practices for using LOINC. 4) Understand the development process for the LOINC/RSNA Radiology Playbook.

Active Handout:Daniel J. Vreeman

http://abstract.rsna.org/uploads/2018/17002189/2018 11 - LOINC RSNA Radiology Playbook RCC32D.pdf

SPCP31

The Nordic Countries Present: Radiology the Scandinavian Way, Future Potentials

Tuesday, Nov. 27 10:30AM - 12:00PM Room: E353C

ED HP OT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Sub-Events

SPCP31A Opening Remarks

SPCP31B Healthcare and Radiology in the Nordic Countries

Participants
Marianna Gardarsdottir, MD, Reykjavik, Iceland (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

marianna@landspitali.is

LEARNING OBJECTIVES

1) Understanding the form of medical education, training and health care in the Nordic Countries.

ABSTRACT

An introduction to the Nordic countries, healthcare systems and medical education will be provided. Similarities between the countries, differences and comparison with the US.

SPCP31C Mammography Screening in Denmark: Implementation of a Population Based Service Cancer Screening Program, Quality Assurance, Results, and Future Potentials

Participants
Ilse Vejborg, Copenhagen, Denmark (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To improve basic knowledge on how to implement and quality assure a population based screening programme. 2) To apply principles of critical thinking in the debate about pros and cons of mammography screening. 3) To debate future potentials in breast cancer screening.

ABSTRACT

Mammography screening aims at detecting breast cancer in its early stages and thereby to reduce breast cancer mortality. The main benefit of screening is reduction in breast cancer mortality. The main harm is overdiagnosis. In order to achieve a substantial reduction in disease specific morbidity and mortality with as few negative side effects as possible, it is necessary to build up and maintain a high standard on a professional and organizational level, not only in the screening programme as such but even concerning the ensuring diagnostic work up and treatment. In a population based screening programme every member of the target population must be known to the programme. A high participation rate and a high detection rate are necessary. Unnecessary work up should be minimized. Multidisciplinary team working, high volume readers, training and audits are essential. A continuous monitoring of the quality using target and performance indicators on variours aspects of the screening programme as well as its derived interventions is essential to obtain and maintain a high standard, as is an open mind towards new evidence based screening possibilities.

SPCP31D Education of Future Radiologists with Simulation-Based Training: Is this the way to go?

Participants
Michael Bachmann Nielsen, MD, Copenhagen, Denmark (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn about how a needs assessment in radiology identified and prioritized technical procedures to include in a simulation-based curriculum. 2) To learn about the present status of simulation training in ultrasound. 3) To learn about how an ultrasound-based curriculum in ultrasound could be structured and implemented.

ABSTRACT

In a recent needs assessment in radiology in Denmark ultrasound training including biopsy came on the top of the list. The value of an ultrasound examination depends on the skill of the examiner. Mastery learning ensures that trainees all achieve the same competence level but not necessarily at the same pace. Some have seen ultrasound simulation training as a solution but a review of the literature showed the previous studies were heterogeneous in the choice of simulator, study design, participants, and outcome measures, and the level of evidence for effect was inadequate. Only recently have a standardized test of competency in abdominal ultrasound with solid validity evidence been suggested. The presentation will look at this test which is based on the EFSUMB recommendations for abdominal US and offers a pass/fail standard to facilitate mastery learning. Simulation training could be used at different levels in the specialist training, most likely the greatest benefit would be training to pass the test even before the first patient is examined. Simulation training could also be used at basic levels in medical students including hand eye

coordination if included in the medical curriculum.

URL

None

SPCP31E Future Challenges in Nordic Education in Emergency Radiology

Participants
Seppo K. Koskinen, MD, PhD, Stockholm, Sweden (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the current status and future challenges in emergency radiology training in Nordic countries.

ABSTRACT

The five Nordic countries, with a combined population of 27 million people, are a relatively homogeneous geographic region, Iceland excluded. The medical education as well as postgraduate training and health care systems resemble to a large extent each other. However, the subspecialty training varies and there is as yet no official consensus regarding the emergency radiology training. The Nordic Society of Emergency Radiology has tried to spread the best practises in emergency radiology. On the other hand, Finland has establishes a two-year subspecialty training program in three university hospitals.In thin talk, I'll briefly go thru the current status and future challenges in emergency radiology training in Nordic countries.

SPCP31F Short Presentation of the Next Nordic Congress in Radiology May 22-24, 2019 in Copenhagen, Denmark

Participants
Birthe H. Bech, MD, Copenhagen , Denmark (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

birthe.h.bech@gmail.com

LEARNING OBJECTIVES

1) To learn about upcoming Nordic Congress of Radiology 2019.

ABSTRACT

The Nordic Society of Medical Radiology welcomes you to the next Nordic congress of Radiology in Copenhagen 2019. The meeting and the venue is presented, giving an appetizer to Wonderful Copenhagen and to Nordic radiology.

URL

www.ncr2019.dk www.nordicradiology.eu

SPCP31G Closing Remarks

Participants
Vijay M. Rao, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RCA33

Case Review: Introduction to LI-RADS - Bring Your Own Device (Hands-on)

Tuesday, Nov. 27 12:30PM - 2:00PM Room: S404CD

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Ania Z. Kielar, MD, Shanty Bay, ON (*Moderator*) Research Grant, General Electric Company
Kathryn J. Fowler, MD, San Diego, CA (*Presenter*) Nothing to Disclose
Robert M. Marks, MD, San Diego, CA (*Presenter*) Nothing to Disclose
James T. Lee, MD, Lexington, KY (*Presenter*) Nothing to Disclose
Venkateswar R. Surabhi, MD, Houston, TX (*Presenter*) Nothing to Disclose
Cynthia S. Santillan, MD, San Diego, CA (*Presenter*) Consultant, Robarts Clinical Trials, Inc
Aya Kamaya, MD, Stanford, CA (*Presenter*) Nothing to Disclose
Yuko Kono, MD, PhD, San Diego, CA (*Presenter*) Equipment support, Canon Medical Systems Corporation; Equipment support, General Electric Company; Contrast agent support, Lantheus Medical Imaging, Inc; Contrast agent support, Bracco Group
Alice W. Fung, MD, Portland, OR (*Presenter*) Nothing to Disclose
Eleanor L. Ormsby, MD, Davis, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

funga@ohsu.edu

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jtlee3@uky.edu

csantillan@ucsd.edu

eormsby@gmail.com

LEARNING OBJECTIVES

1) Implement newest LI-RADS categories when assessing liver observations in patients at risk for developing hepatocellular carcinoma (HCC). 2) Review LI-RADS major and ancillary features and apply them in a hands on interactive environment. 3) Demonstrate proficiency with assigning LI-RADS categories for assessing response of observations to locoregional treatment. 4) Present newest LI-RADS and concurrent AASLD updates.

ABSTRACT

Participants will review cases on their own devices and answer questions. The cases will then be reviewed by the presenters. Note: this activity is best done on a laptop or tablet. Although phones will work, their small size limits optimal image view. In this 1.5-hour Hands-On Workshop, participants will have the opportunity to review up to 15 cases of patients at risk for HCC across multiple modalities (e.g. MRI, CT and ultrasound). Participants will be asked to characterize observations based upon the most current version of LI-RADS. The workshop will be led by world-renown experts in the field, all of them members of the LI-RADS steering committee and/or members of a LI-RADS working group. The course will begin with a short 20-minute didactic lecture, highlighting key concepts of LI-RADS and updating attendees on the most current version. Thereafter, workshop attendees will have time to evaluate each case independently, with support faculty available throughout the room to answer individual questions. At set intervals, cases will be reviewed, highlighting pearls for accurate use of LI-RADS. Throughout the workshop, focus will be placed upon the correct assignment of LI-RADS categories based upon 1) recognition of major imaging features, 2) working through the diagnostic algorithm and 3) appropriately applying ancillary imaging features. Attendees will be given tips and tools to help with integration of LI-RADS into daily practice.

Active Handout:James T. Lee

http://abstract.rsna.org/uploads/2018/17002587/2018 RSNA LI-RADS Hands-On Workshop RCA33.pdf

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RCB33

Case Review: Lung-RADS - Bring Your Own Device (Hands-on)

Tuesday, Nov. 27 12:30PM - 2:00PM Room: S503AB

CH OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Ella A. Kazerooni, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Elizabeth Lee, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Jared D. Christensen, MD, Durham, NC (*Presenter*) Advisory Board, Riverain Technologies, LLC
Maria D. Martin, MD, Madison, WI (*Presenter*) Nothing to Disclose
Brett M. Elicker, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe patient risk factors for lung cancer and current requirements for patients to be eligible for lung cancer screening based on the coverage decision outlined by the Centers for Medicare and Medicaid Services. 2) Explain the rational for each category used in Lung-RADS. 3) Apply Lung-RADS to case examples and recommend appropriate follow up.

ABSTRACT

Participants will review cases on their own devices and answer questions. The cases will then be reviewed by the presenters. Note: this activity is best done on a laptop or tablet. Although phones will work, their small size limits optimal image view. Lung-RADS was established in 2014 as a means to standardized reporting and management in high-risk patients undergoing screening for lung cancer with low dose CT. This workshop will begin with an approximately 20 minute review of the National Lung Screening Trial (NLST) and other supporting evidence for the efficacy of screening, recommendations for screening as per the U.S. Preventative Services Task Force and the coverage decision by the Centers for Medicare and Medicaid Services. Additionally, concepts regarding the structure and rational for Lung-RADS will be highlighted. After a didactic portion, participants will review cases independently on their own devices. Faculty support will be available throughout the room to answer individual questions. Following this, cases will be reviewed by the presenters in order to highlight key concepts in the use of Lung-RADS. This session will focus on the application of Lung-RADS including: recognizing important imaging features and applying findings to assign the correct Lung-RADS category. Attendees will be given tips and tools to help with use of Lung-RADS and requirements for establishments of a lung cancer screening program.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Ella A. Kazerooni, MD - 2014 Honored Educator

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RCC33

Secure Image Sharing for Education and Patient Care in Radiology

Tuesday, Nov. 27 12:30PM - 2:00PM Room: S501ABC

ED IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Erik R. Ranschaert, MD,PhD, Tilburg, Netherlands (*Moderator*) Officer, Diagnose.me; Medical Advisory Board, MedicalPHIT;
Erik R. Ranschaert, MD,PhD, Tilburg, Netherlands (*Presenter*) Officer, Diagnose.me; Medical Advisory Board, MedicalPHIT;
Saad Ranginwala, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Peter M. Van Ooijen, MSc, PhD, Groningen, Netherlands (*Presenter*) Advisory Board, MedicalPHIT

For information about this presentation, contact:

p.m.a.van.ooijen@umcg.nl

erik.ranschaert@gmail.com

LEARNING OBJECTIVES

1) Learn about the advantages of using mobile devices for sharing radiological images, both for education and patient care. 2) Know about the risks involved in sharing personal data when using public messaging services like WhatsApp. 3) Learn about the strategies and techniques to share medical images safely and securely. 4) Know about the existing regulations for protection of privacy and personal data.

MSRP31

RSNA Resident and Fellow Symposium 2018: Transition to Early Career (Interactive Session)

Tuesday, Nov. 27 1:00PM - 4:00PM Room: E451A

ED PR

AMA PRA Category 1 Credits ™: 3.00
ARRT Category A+ Credit: 0

Sub-Events

MSRP31A Welcome: Membership Benefits for Trainees

Tuesday, Nov. 27 1:00PM - 1:10PM Room: E451A

Participants
Courtney M. Tomblinson, MD, Nashville, TN (*Presenter*) Nothing to Disclose
David C. Gimarc, MD, Madison, WI (*Presenter*) Nothing to Disclose

MSRP31B Job Market Update

Tuesday, Nov. 27 1:15PM - 1:35PM Room: E451A

Participants
David C. Gimarc, MD, Madison, WI (*Presenter*) Nothing to Disclose
Jay R. Parikh, MD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To present an overview of the 2018 Human Resources Commission Report. 2) Systematic approach to help land a job after residency / fellowship. 3) Private practice positions - questions to consider. 4) Academic positions - questions to consider.

ABSTRACT

Landing a job after residency or fellowship can be challenging. The 2018 ACR Human Resources Commission Report will be reviewed to gain an overview of the current job market. A systematic approach to help residents and fellows land a job will be described. Considerations for both private practice and academic positions will be presented.

MSRP31C Changes in Radiology Marketplace

Tuesday, Nov. 27 1:40PM - 2:00PM Room: E451A

Participants
Eric R. Smith, MD, Milwaukee, WI (*Presenter*) Nothing to Disclose
Richard E. Heller III, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

richard.heller@radpartners.com

LEARNING OBJECTIVES

1) List the major factors contributing to consolidation across health care. 2) Identify the contributing factors to consolidation of radiology practices. 3) Describe the various practice ownership models.

MSRP31D Personal Finance for Radiology Residents

Tuesday, Nov. 27 2:05PM - 2:25PM Room: E451A

Participants
Casey Reed, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
Seetharam C. Chadalavada, MD,MS, Cincinnati, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Establishing your financial goals. 2) Risk Management. 3) Asset Management. 4) Professional versus Personal Advising. 5) Common mistakes.

ABSTRACT

Managing personal finances, we will focus on tips or advice for radiology residents as they transition to attendings.

MSRP31E Transition to Early Career

Tuesday, Nov. 27 2:30PM - 2:50PM Room: E451A

Participants
David H. Ballard, MD, Ballwin, MO (*Presenter*) Nothing to Disclose

Nisha Mehta, MD, Charlotte, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

davidballard@wustl.edu

LEARNING OBJECTIVES

1) Understand the various practice models, and analyze these based on changing physician demographics. 2) Identify evolving trends in radiology practices and examine the impact of consolidation and private equity on career options. 3) Establish the importance of self-care and work-life balance. 4) Define physician burnout and introduce the concept of career longevity. 5) Develop effective negotiation skills.

MSRP31F Q&A

Tuesday, Nov. 27 2:50PM - 3:00PM Room: E451A

MSRP31G Career Transition Panel

Tuesday, Nov. 27 3:00PM - 3:45PM Room: E451A

Participants
David M. Theriot, MD, Atlanta, GA (*Moderator*) Nothing to Disclose
Lauren P. Golding, MD, Winston Salem, NC (*Presenter*) Nothing to Disclose
Jordan S. Gross, MD, Nashville, TN (*Presenter*) Nothing to Disclose
Richard E. Heller III, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Lucy B. Spalluto, MD, Nashville, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

richard.heller@radpartners.com

LEARNING OBJECTIVES

1) Discuss advantages and disadvantages of different career pathways within radiology. 2) Specifically address the challenges and benefits associated with transitioning from one practice style to another. 3) Address questions and concerns of trainees pertaining to practice type and career transitions during question and answer session.

MSRP31H Q&A Closing Remarks

Tuesday, Nov. 27 3:45PM - 4:00PM Room: E451A

Participants
Courtney M. Tomblinson, MD, Nashville, TN (*Presenter*) Nothing to Disclose

MSAS33

Building the Management 'A Team' (Sponsored by the Associated Sciences Consortium) (Interactive Session)

Tuesday, Nov. 27 1:30PM - 3:00PM Room: S105AB

LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Patricia Kroken, Albuquerque, NM (*Moderator*) Nothing to Disclose

Sub-Events

MSAS33A Managing at the Tip of the Spear: Radiology Practices Face Turbulent Times

Participants
Robert Still, Fairfax, VA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bob.still@rbma.org

LEARNING OBJECTIVES

1) Identify the essential communication skills physician practice managers and physician leaders need to possess. 2) Examine several physician practice environments that foster a synergistic team: Radiologist/Practice Administrator/Hospital administrator. 3) Detect weaknesses in their radiology practices that may hinder positive management focus. 4) Develop new pathways to positive management initiatives within a rapidly changing radiology business model.

ABSTRACT

This session will provide an overview and specific strategies to create a synergistic leadership team between a radiologist, a radiology practice administrator or CEO and a hospital radiology department administrator. Participants will be able to return to their practice leadership positions with practical and time tested leadership strategies for success.

MSAS33B Partnering with Your Administrator to Lead Enterprise Initiatives: How to Be at the Table and Not on the Menu

Participants
Chris Tomlinson, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Christopher.tomlinson@jefferson.edu

LEARNING OBJECTIVES

1) Identify opportunities for radiology to lead initiatives across the healthcare enterprise. 2) Position radiology as an enabler for risk based payer contracts (appropriate use, utilization management). 3) Enable radiology to be at the table for enterprise decision making by enabling areas outside of radiology to be successful. 4) Provide examples of areas to show enterprise leadership.

MSCC33

Case-based Review of Nuclear Medicine: PET/CT Workshop-Abdomen/Pelvis & Pediatrics PET/CT (In Conjunction with SNMMI) (Interactive Session)

Tuesday, Nov. 27 1:30PM - 3:00PM Room: E450B

CT GI GU NM PD

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Samuel E. Almodovar-Reteguis, MD, Orlando, FL (*Director*) Nothing to Disclose
Katherine A. Zukotynski, MD, Ancaster, ON (*Director*) Nothing to Disclose
Terence Z. Wong, MD, PhD, Chapel Hill, NC (*Moderator*) Consultant, Lucerno Dynamics, LLC;

Sub-Events

MSCC33A Abdomen/Pelvis I

Participants
Don C. Yoo, MD, E Greenwich, RI (*Presenter*) Consultant, Endocyte, Inc

For information about this presentation, contact:

dyoo@lifespan.org

LEARNING OBJECTIVES

1) Review Challenging and Instructive cases which will help with interpretation of PET/CT scans in the abdomen and pelvis.

ABSTRACT

For oncologic studies, F18-FDG is an outstanding tracer with wide applications. However, there are many normal variants and pitfalls which can make interpretation challenging. Appropriate clinical history can help avoid mistakes. Having patients fill out a questionnaire form can provide helpful information and if possible directly interviewing the patients for relevant pertinent clinical information can also be valuable. Discussing a complicated PET/CT scan with the referring physician can also yield valuable information and improve interpretation. This review will discuss challenging cases, physiologic variants and pitfalls seen in the abdomen and pelvis when interpreting PET/CT scans concentrating on genitourinary and gastrointestinal cases.

MSCC33B Abdomen/Pelvis II

Participants
Esma A. Akin, MD, Washington, DC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

eakin@mfa.gwu.edu

LEARNING OBJECTIVES

1) Review the current applications of PET-CT in gynecologic disease and bladder cancer.

ABSTRACT

FDG PET-CT is an effective tool in initial assesment andtreatment follow up of various genitourinary and gynecological tumors. This session aims to highlight the utility of PET-CT in gynecological disroders as well as tumors of the bladder. An updated review of the current applications of PET-CT in gynecologic disease as well as bladder cancer will be presented.Pitfalls and variants that may challenge image interpretation will also be highlighted.

MSCC33C Pediatrics

Participants
Helen R. Nadel, MD, Palo Alto, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hnadel@stanford.edu

LEARNING OBJECTIVES

1) To be able to identify optimal PET/CT imaging parameters for children. 2) To be able to describe PET/CT patterns of disease in pediatrics. 3) To be able to compare PET/CT with PET/MR imaging in children.

MSES33

Essentials of Neuro Imaging

Tuesday, Nov. 27 1:30PM - 3:00PM Room: S100AB

MR NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

MSES33A WHO Classification of CNS Neoplasms: Update 2018

Participants
Anne G. Osborn, MD, Salt Lake Cty, UT (*Presenter*) Author, Reed Elsevier;

For information about this presentation, contact:

anne.osborn@hsc.utah.edu

LEARNING OBJECTIVES

1) Learn why and how molecular data is more important than morphology in glioma diagnosis and stratification of patients for different risk-based treatments. 2) Be able to list newly-canonized tumor entities and recognize the unique imaging pattern of a new ganglion cell tumor, MVNT.

ABSTRACT

The 2016 World Health Organization (WHO) '4-Plus' Classification of CNS Neoplasms represents a radical departure from prior editions, the most recent of which was published in 2007. Recently-published updates to the 2016 schema have resulted in additional significant interim changes that will be summarized. Molecular data is now more important for diagnosis and patient treatment than histopathologic features. 'Master' molecules such as isocitrate dehydrogenase (IDH) have been identified as the result of early 'driver' events in tumorigenesis. We will summarize why IDH status is the key to glioma diagnosis and prognosis. We will delineate what's new and what's out as of 2016, emphasizing that identical neoplasms in children and adults differ genetically even though they are morphologically indistinguishable. Finally, participants will learn to recognize the unique imaging pattern of a new ganglion cell tumor, multinodular and vacuolating neuronal tumor (MVNT) which has been recently defined as a benign-behaving clonal neoplasm defined by specific genetic alterations.

MSES33B Phakomatoses

Participants
James G. Smirniotopoulos, MD, Silver Spring, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

james.smirniotopoulos@nih.gov

LEARNING OBJECTIVES

1) Describe why NF-1 is truly 'Neurofibromatosis'. 2) Describe the three neoplasms caused by the chromosome 22 mutation of NF-2. 3) Explain why Tuberous Sclerosis is a disorder of neuronal migration. 4) Define the vascular malformation of Sturge-Weber Syndrome Describe the features of VHL.

ABSTRACT

Phakomatoses are complex multi-system disorders, originally described as 'neuro-cutaneous'. NF-1 mutation cause neurofibromas, pigmentation, and optic gliomas. NF-2 causes Schwannoma, meningioma, and ependymoma. Tuberou Sclerosis, a disorder of migration and maturation, causes cortical tubers and subependymal nodules. Sturge-Weber is a capillary-venous malformation of the brain and skin. VHL causes multiple hemangioblastomas and complex visceral lesions (cysts and neoplasms).

Active Handout:James G. Smirniotopoulos

http://abstract.rsna.org/uploads/2018/18000948/Phakomatoses Smirniotopoulos RSNA MSES33B.pdf

MSES33C Spectrum of Prenatal and Postnatal MRI Findings of Central Nervous System Malformations

Participants
Eduardo Portela de Oliveira, MD , Ottawa, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

eporteladeoliveira@toh.ca

LEARNING OBJECTIVES

1) Describe the normal CNS embryology. 2) Identify the main MRI findings of CNS malformations and the diagnostic imaging approach to these anomalies. 3) Apply a practical embryological classification of the main CNS malformations.

ABSTRACT

Prenatal magnetic resonance imaging (MRI) is a complementary tool in the presence of an abnormal screening prenatal ultrasound (US) or in fetuses at increased risk for underlying central nervous system (CNS) malformations. There are, in many cases, overlap and presence of multiple neuronal malformations simultaneously. Knowledge of normal CNS embryology facilitates the classification and the diagnostic imaging approach to these anomalies. After reviewing thispresentation, radiologists should be able to recognize the prenatal and postnatal MRI features of the major CNS malformations as well as their embryological origin.

MSES33D Metastatic CNS Disease

Participants
Spyros S. Kollias, MD, Zurich, Switzerland (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Spyros.Kollias@usz.ch

LEARNING OBJECTIVES

1) Describe the various imaging manifestations of metastatic CNS disease. 2) Familiarization with the spectrum of differential diagnosis. 3) Apply a systematic work up for reaching the correct diagnosis. 4) Appraise the most appropriate advanced MR techniques for the differential diagnosis.

ABSTRACT

Metastases are among the most common mass lesions in the brain. 20%-25% of systemic malignancies show metastases in the CNS, and 15% of them present with neurological symptoms before the diagnosis of the systemic cancer. Chest radiography should be included in the work-up of any brain mass lesion (40%-60% have an abnormal chest x-Ray suggestive of bronchogenic primary or other metastases to the lung). Additional imaging modalities such as CT, PET, and bone scanning are used to stage the systemic disease. Metastases to the brain, skull, dura, and leptomeninges may have variable, and often nonspecific, apperance. In the absence of typical tumefactive lesions, mimics in neuroimaging may include MS, pyogenic abscess, toxoplasmosis, cysticercosis, sarcoidosis, tuberculosis, fungal infections, and others. CT underestimates the number of brain lesions even when contrast is used. Magnetization transfer, perfusion and diffusion imaging and MR spectroscopym can potentially ddifferentiate between metastatic lesion from multifocal glioma or lymphoma. When the diagnosis of brain metastasis is raised a thorough assessment of history, physical examination, and a minimal work-up can provide important clues on the nature of the lesion (i.e., neoplastic, vascular, inflammatory, or infectious). Decisions should be based on adequat clinical judjment, a high index of suspicion for alternative diagnoses, and concordance among diffeent examinations. Biopsy or surgical resection is indicated when the diagnosis of brain neoplasm is not confidently excluded.

Active Handout:Spyros Sotirios Kollias

http://abstract.rsna.org/uploads/2018/18000950/METS Chicago handout MSES33D.pdf

MSQI33

Quality Improvement Symposium: Value in Imaging 3: The Importance of Effective Communication

Tuesday, Nov. 27 1:30PM - 3:00PM Room: S402AB

LM SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
David B. Larson, MD, MBA, Stanford, CA (*Moderator*) Grant, Siemens AG ; Grant, Koninklijke Philips NV

Additional Information

RSNA will award Quality Essentials Certificates of Completion to RSNA 2018 attendees who successfully participate. Participants who achieve a score of 80% or higher on the SAM test questions will be eligible to receive the certificates.

Sub-Events

MSQI33A Creating a Culture that Fosters Communication

Participants
Amber L. Liles, MD , Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the relationship between communication and culture. 2) Identify frequent communication barriers in the workplace. 3) Describe how effective communication can improve engagement, alignment, and productivity. 4) Apply principles of effective communication to further develop your culture of communication.

MSQI33B Communication Across Authority Gradients

Participants
Bettina Siewert, MD, Boston, MA (*Presenter*) Reviewer, Wolters Kluwer nv

For information about this presentation, contact:

bsiewert@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Describe human factor barriers to safety event reporting. 2) Apply specific techniques to facilitate communication across barriers. 3) Identify opportunities for cultural change.

Active Handout:Bettina Siewert

http://abstract.rsna.org/uploads/2018/18000363/Hand-out Communication across authority gradients MSQI33B.pdf

MSQI33C Optimizing Communication with Referring Providers

Participants
David B. Larson, MD, MBA, Stanford, CA (*Presenter*) Grant, Siemens AG ; Grant, Koninklijke Philips NV

LEARNING OBJECTIVES

1) Understand the concept of media richness in communication, including both conveyance and convergence. 2) Recognize aspects of radiology in which effective communication is critical. 3) Become familiar with key principles of effective communication in the diagnostic process.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ David B. Larson, MD - 2014 Honored EducatorDavid B. Larson, MD - 2018 Honored Educator

MSQI33D Optimizing Communication with Patients

Participants
Olga R. Brook, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

obrook@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Learn about strategies that improve communication between radiologists and patients.

VSIO31

Interventional Oncology Series: Basic Science and Imaging

Tuesday, Nov. 27 1:30PM - 6:00PM Room: S405AB

IR

ARRT Category A+ Credits: 5.00
AMA PRA Category 1 Credits ™: 4.25

FDA Discussions may include off-label uses.

Participants
S. Nahum Goldberg, MD, Ein Kerem, Israel (*Moderator*) Consultant, AngioDynamics, Inc; Consultant, Cosman Medical, Inc; Consultant, XACT Robotics;
Muneeb Ahmed, MD, Boston, MA (*Moderator*) Research Grant, General Electric Company; Stockholder, Agile Devices, Inc; Scientific Advisory Board, Agile Devices, Inc

For information about this presentation, contact:

sgoldber@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Characterize the most important cutting-edge advances of interventional oncologic techniques. 2) Gain a better understanding of the intraprocedural and follow-up imaging techniques that facilitate successful state of the art interventional oncologic practice. 3) Gain awareness of the extent of potentially beneficial and harmful systemic effects of "focal" interventional oncologic therapy. 4) Learn how immuno-oncologic techniques can be combined with both percutaneous and transcatheter interventional oncologic therapies to potentially achieve better clinical outcomes.

ABSTRACT

The first half of the session will has been organized into a thematic unit entitled: ""Interventional Oncology: Progress, Challenges and Opportunities" and will provide a series of seven lectures by leaders in the field each dedicated to discussing advances in the key aspects that comprise interventional oncologic practice. These include lectures on ablation devices, transcatheter therapies, and combination therapy, as well as the latest methods of using imaging for both guidance and navigation, and follow up. Additionally, there will be dedicated lectures addressing the ever expanding role of bio-markers for stratification and prognosis and the potential roles that IO may serve in the future oncologic platforms. This portion of the program will be concluded with a panel discussion entitled: "Which factors will most drive future progress ?". The second half of the session has been organized into a thematic unit entitled: "Immuno-oncology and IO - the next frontier ?" and will be dedicated to gaining an appreciation of how interventional oncologic practice can be further stimulated by leveraging advances from the rapidly growing discipline of immuno-oncology. First, a tailored overview will be provided as a "Practical primer of immuno-oncology for the radiologic community". This will be followed by two lectures highlighting how these advances can be best used in clinical practice with both percutaneous ablation and transcatheter chemo- and radio- embolic therapies - including the potential role of IO therapies for inducing abscopal effects. Finally, the potentially negative systemic effects of IO therapies including hypoxia and inflammation that can lead to tumorigenesis and proposed solutions to reduce these unwanted effects will be discussed.The session will further include selected complementary abstract presentations that highlight innovative research in these thematic areas.

Sub-Events

VSIO31-01 Ablation Devices

Tuesday, Nov. 27 1:30PM - 1:50PM Room: S405AB

Participants
Alison R. Gillams, MBChB, London, United Kingdom (*Presenter*) Speaker, Endocare, Inc

For information about this presentation, contact:

alliesorting@gmail.com

LEARNING OBJECTIVES

1) To learn the distinct features of the commonly used ablation technologies. 2) To consider the advantages and disadvantages of the different devices. 3) To consider some examples of the optimal choice of device in certain clinical situations.

VSIO31-02 Hepatic Radiofrequency Ablation: Are Periablational Hepatocytes Bystanders or Active Participants in Post-Ablation Tumorigenesis?

Tuesday, Nov. 27 1:50PM - 2:00PM Room: S405AB

Participants
Aurelia Markezana, MSc, Jerusalem, Israel (*Presenter*) Nothing to Disclose
Elina Zorde Khvalevsky, PhD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Muneeb Ahmed, MD, Boston, MA (*Abstract Co-Author*) Research Grant, General Electric Company; Stockholder, Agile Devices, Inc; Scientific Advisory Board, Agile Devices, Inc
Svetlana Gourovich, BSC, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose

Eithan Galun, MD, PhD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
S. Nahum Goldberg, MD, Ein Kerem, Israel (*Abstract Co-Author*) Consultant, AngioDynamics, Inc; Consultant, Cosman Medical, Inc; Consultant, XACT Robotics;

For information about this presentation, contact:

aureliahakoune@gmail.com

PURPOSE

To identify whether heated hepatocytes play a role in the activation of pro-tumorigenic pathways induced post-radiofrequency ablation (RFA).

METHOD AND MATERIALS

Primary hepatocytes isolated from 8 C57BL/6 mice were subject to moderate hyperthermic doses routinely achieved in the periablational rim. Purified hepatocytes were heated in-vitro to 45°C for 5min in a water bath and incubated thereafter at 37°C for 3hr. R3230 (rat breast carcinoma), CT26 and MC38 (Mouse colon carcinoma) and Bnl.CL2 (mouse HCC) cell lines (n=1.5x104) were incubated in cell culture wells with 50% heated hepatocyte medium or unheated hepatocyte medium as control. Tumor cells were stained with crystal violet 24-72hr after 37°C incubation to assess the extent of cell proliferation. Tumor cell growth was also assessed with an adjuvant c-Met kinase inhibitor (PHA-665752) (n=8). Next, identification of upregulated proteins secreted by heated and unheated hepatocytes were assessed by protein microarray (SomaLogic, INC) and compared. Finally, mRNA expression profile of IL-6, STAT3, HGF, and VEGF (i.e. factors implicated in RF-induced tumorigenesis) were evaluated by qRT-PCR in the heated hepatocytes, with HSP70 and TNFa used as thermal and inflammation controls.

RESULTS

Medium of mouse primary hepatocytes heated to 45C°x5min induced accelerated cell growth of all four tumor cell lines studied compared to non-heated cell media ($p<0.05$). Addition of PHA to the heated medium reduced proliferation rates to control levels in R3230 and MC38 ($p<0.03$). Protein microarray of heated hepatocytes medium, indicated >50% increased expression in 137 proteins compared to unheated cells - many of which are implicated in pathways involved in tumor progression and immune system activation including multiple members of the fibroblast growth factors family, VEGFC, and CSF-1. Significant upregulation in mRNA expression of HSP70, IL-6, STAT3 and HGF (147.2±47.1, 12.8±0.8, 4.4±1.17 and 181.5±29.1 fold induction, respectively, $p<0.01$) were detected in the heated hepatocytes.

CONCLUSION

RFA of normal liver parenchymal cells may induce sufficient secretion of proliferative factors to induce tumor growth.

CLINICAL RELEVANCE/APPLICATION

Elucidation of mechanisms that induces post RFA tumorigenesis will allow us to determine the most efficient treatment to suppress these pro-tumorigenic effects.

VSIO31-03 Transcatheter Therapies

Tuesday, Nov. 27 2:00PM - 2:20PM Room: S405AB

Participants
Stephen J. Hunt, MD,PhD, Philadelphia, PA (*Presenter*) Consultant, Amgen Inc; Consultant, BTG International Ltd

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO31-04 IO and Combined Therapies

Tuesday, Nov. 27 2:20PM - 2:40PM Room: S405AB

Participants
Philippe L. Pereira, MD, Heilbronn, Germany (*Presenter*) Research Consultant, Terumo Corporation; Speaker, AngioDynamics, Inc; Speaker, Terumo Corporation; Advisory Board, Siemens AG; Advisory Board, Terumo Corporation; Board, Bayer AG; Advisory Board, Medtronic plc; Support, Bracco Group; Support, PharmaCept GmbH; Support, Terumo Corporation; Support, Siemens AG; Support, Novartis AG; Support, Cook Group Incorporated; Research Grant, Biocompatibles International plc; Research Grant, Siemens AG; Research Grant, Terumo Corporation; Research Grant, BTG International Ltd; Research Grant, CIRSE; Speaker, Medtronic plc

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO31-05 A Novel Biodegradable Radiopaque in Situ Forming Embolic Material Customizable to Desired Depth of Vascular Occlusion

Tuesday, Nov. 27 2:40PM - 2:50PM Room: S405AB

Participants
Selva Jeganathan, Cleveland, OH (*Presenter*) Nothing to Disclose
Emily G. Budziszewski, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Hanping Wu, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Sidhartha Tavri, MBBS, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Agata A. Exner, PhD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

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PURPOSE

Current transarterial embolization strategies in the treatment of intermediate stage hepatocellular carcinoma (HCC) are limited by suboptimal microvascular penetration of delivery agents and drugs. Development of an embolic material that is radiopaque, biodegradable and customizable to occlude different size target vessels will have advantages over current bead embolization strategies. We have developed an easily-customizable biodegradable radiopaque in situ forming implant (BRISFI) that can be loaded into a syringe as a liquid solution. Upon intra-vascular injection, the BRISFI phase-inverts into a solid embolic depot occluding the vasculature. In this study, we altered the solvent polarity of our BRISFI to control at what vessel diameter the occlusion occurs.

METHOD AND MATERIALS

BRISFIs were formulated by co-dissolving poly(lactic-co-glycolic acid) with an iodinated contrast agent (Ioversol) in a solvent comprised of a mixture of N-methyl-2-pyrrolidinone (NMP) and benzyl benzoate (BB) The amount of BB used are as followed: 0, 26.8, and 33.5 wt.%. Direct portal vein injection of BRISFI was performed in Sprague Dawley rats (n=3/group). Doppler ultrasound on the liver was performed pre and post embolization to validate vascular occlusion from the BRISFIs. Livers were explanted 2 hours after embolization and imaged with microCT to determine minimum vessel diameter occluded.

RESULTS

MicroCT images of explanted livers show a negative linear regression of vessel diameter with respect to increasing BB wt.%. The 0 wt.% BB formulation shows complete occlusion of larger central portal vein branches with an average occlusion diameter of 863.06 ± 94.08 µm. The 33.5 wt.% BB formulation occluded significantly smaller peripheral portal vein branches ($p<0.0001$) compared to the 0 wt.% BB with an average occlusion diameter of 174.03 ± 23.16 µm. Doppler ultrasound images show complete portal vein occlusion for all formulations.

CONCLUSION

This study shows the successful capability of controlling the BRISFI phase-inversion to occlude desired vascular depths. Intra-arterial embolization in a HCC rat model will be performed in the future to determine treatment efficacy.

CLINICAL RELEVANCE/APPLICATION

Current transarterial embolization strategies for HCC are suboptimal due to poor heterogeneous drug penetration into tumor vessels. By controlling the solvent polarity, our BRISFI will have a more homogeneous and deeper penetration in tumor vasculature.

VSIO31-06 Procedural Image Guidance and Navigation

Tuesday, Nov. 27 2:50PM - 3:10PM Room: S405AB

Participants
Bradford J. Wood, MD, Bethesda, MD (*Presenter*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, Siemens AG; Researcher, XAct Robotics; Researcher, NVIDIA Corporation; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; Royalties, Invivo Corporation; Royalties, Koninklijke Philips NV; ; ;

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO31-07 Imaging Follow Up After Intervention

Tuesday, Nov. 27 3:10PM - 3:30PM Room: S405AB

Participants
Laura Crocetti, MD, Pisa, Italy (*Presenter*) Speaker, General Electric Company

LEARNING OBJECTIVES

1) To describe criteria for tumor response assessment and learn about their limitations after interverventional therapies. 2) To examine common findings after ablative and intra-arterial therapies. 3) To debate about new trends and applications for tumor response evaluation.

VSIO31-08 Sublethal Heat Stress Induces PI3K/MTOR/AKT-dependent Increased Cell Survival and Decreased Cell Death Protein Networks in Hepatocellular Carcinoma: A Quantitative Phosphoproteomic Study

Tuesday, Nov. 27 3:30PM - 3:40PM Room: S405AB

Awards
Student Travel Stipend Award

Participants
Scott M. Thompson, MD, PhD, Rochester, MN (*Presenter*) Nothing to Disclose
Danielle Jondal, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Kim Butters, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Matthew R. Callstrom, MD,PhD, Rochester, MN (*Abstract Co-Author*) Research Grant, EDDA Technology, Inc; Research Grant, Galil Medical Ltd; Consultant, Medtronic plc; Consultant, Endocare, Inc; Consultant, Johnson & Johnson; Consultant, Thermedical, Inc
David A. Woodrum, MD,PhD, Rochester, MN (*Abstract Co-Author*) Consultant, Galil Medical Ltd; Consultant, Clinical Laserthermia Systems AB

For information about this presentation, contact:

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PURPOSE

To examine the effects of sublethal heat stress on PI3K/mTOR/AKT-dependent cell survival, growth, proliferation, invasion and cell death protein networks in hepatocellular carcinoma *in vitro*.

METHOD AND MATERIALS

N1S1 HCC cells pre-treated with a dual PI3K/mTOR inhibitor BEZ235 or vehicle control and subjected to sublethal heat stress (45°C x 10 minutes) or control (37°C x 10 minutes) were analyzed using immunoaffinity peptide enrichment followed by liquid chromatography-tandem mass spectrometry (LC-MS/MS). Protein interaction networks were derived from Ingenuity Pathway Analysis. Cellular function activation state (z-score) and fold-change in isoform-specific AKT phosphorylation (p-AKT) were compared between treatment groups. $p<0.05$ was considered statistically significant.

RESULTS

Sublethal heat stress induced AKT signaling (z-score 1.9, p= -log (24.7) and isoform specific AKT phosphorylation compared to vehicle control (p-AKT1 6.4 to 82.6-fold; p-AKT2 9.3 to 52.2-fold; p-AKT3 6.9 to 10.0-fold), findings that were prevented with PI3K/mTOR inhibition (z-score -0.23; p= -log (16.8)). Sublethal heat stress induced increased cell survival/viability (z-score 4.7 to 4.8; p=1e-19 to 1.7e-20), transcription/translation (z-score 2.2 to 2.3 p=3.7e-27 to 1.6e-28), proliferation/invasion (z-score= 3.0 to 5.2; p=1.9e-15 to 5.5e-49) and decreased cell death/apoptosis (z-score -2.1 to -4.0; p=7.1e-25 to 3.4e-29). However, adjuvant PI3K/mTOR inhibition decreased cell survival and viability (z-score -2.9 to -3.2; p=1.4e-10 to 1.5e-10), transcription and translation (z-score 0.3 to -2.0 p=5.5e-7 to 5.5e-10), proliferation and invasion (z-score -0.2 to -1.6; p=5.1e-8 to 1.5e-11) and increased cell death/apoptosis (z-score 0.4 to 1.1; p=1.0e-8 to 7.7e-12).

CONCLUSION

Sublethal heat stress activates PI3K/mTOR/AKT-dependent pro-survival, growth, and proliferation protein networks and inhibits cell death and apoptosis protein networks in hepatocellular carcinoma.

CLINICAL RELEVANCE/APPLICATION

Sublethal heat stress during thermal ablation may not only induce HCC cell survival but also activate cell growth, proliferation and invasion pathways. Adjuvant PI3K/mTOR/AKT inhibition in combination with thermal ablation represents a candidate therapeutic strategy to decrease HCC cell survival to thermal ablation induced heat stress.

VSIO31-09 Biomarkers for Stratification and Prognostication

Tuesday, Nov. 27 3:40PM - 4:00PM Room: S405AB

Participants
Etay Ziv, MD,PhD, New York, NY (*Presenter*) Research Grant, Johnson & Johnson; Research Grant, Cycle for Survival ; Research Grant, Functional Genomics Initiative

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO31-10 Future Directions for Interventional Oncology

Tuesday, Nov. 27 4:00PM - 4:20PM Room: S405AB

Participants
S. Nahum Goldberg, MD, Ein Kerem, Israel (*Presenter*) Consultant, AngioDynamics, Inc; Consultant, Cosman Medical, Inc; Consultant, XACT Robotics;

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LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO31-11 Interventional Oncology Series: Basic Science and Imaging

Participants
Muneeb Ahmed, MD, Boston, MA (*Moderator*) Research Grant, General Electric Company; Stockholder, Agile Devices, Inc; Scientific Advisory Board, Agile Devices, Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO31-12 Practical Primer of Immuno-Oncology for the Radiologist

Tuesday, Nov. 27 4:30PM - 4:50PM Room: S405AB

Participants
Lei Zheng, MD, Baltimore, MD (*Presenter*) Research Grant, Bristol-Myers Squibb Company; Research Grant, Merck & Co, Inc; Research Grant, iTeos Therapeutics SA; Research Grant, Gradalis, Inc; Research Grant, Amgen Inc; Research Grant, Halozyme Therapeutics, Inc; Royalties, Aduro BioTech, Inc; Advisory Board, Merck & Co, Inc; Consultant, Percan; Consultant, Biosynergics Inc; Consultant, AstraZeneca PLC; Consultant, Novarockbio

LEARNING OBJECTIVES

1) Understand the landscape of the immuno-oncologylandscape. 2) Understand the potential synergy between the fields of radiology and immno-oncology. 3) Discuss how interventional radiology approaches can be applied to the development of immuno-oncology treatments.

VSIO31-13 Effects of Idarubicin-Eluting Oncozene Microspheres on Pre-Clinical Tumor Microenvironment in Liver Cancer

Tuesday, Nov. 27 4:50PM - 5:00PM Room: S405AB

Participants
Tabea Borde, New Haven, CT (*Presenter*) Research Grant, Boston Scientific Corporation
Johanna M. van Breugel, MSc, Utrecht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Tsa Shelton, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Lynn J. Savic, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Ming De Lin, PhD, New Haven, CT (*Abstract Co-Author*) Employee, Pro Medicus Limited
Fabian Laage-Gaupp, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Lucas C. Adam, MS, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Dana C. Peters, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Daniel Coman, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Milena A. Miszczuk, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Irvin Rexha, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Quirina d. Ruiter, MSc, Utrecht, Netherlands (*Abstract Co-Author*) Institutional Research Grant, Koninklijke Philips NV
Steffen Huber, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Fahmeed Hyder, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
James S. Duncan, PhD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Consultant, Koninklijke Philips NV Consultant, Terumo Corporation Consultant, Bayer AG Consultant, Boston Scientific Corporation Consultant, BTG International Ltd Consultant, Bristol-Myers Squibb Company Consultant, Johnson & Johnson Consultant, Guerbet SA Consultant, Merck & Co, Inc Research Grant, Boston Scientific Corporation Research Grant, BTG International Ltd Research Grant, Guerbet SA Research Grant, Koninklijke Philips NV Research Grant, PreScience Labs, LLC Founder and CEO, PreScience Labs, LLC
Todd Schlachter, MD, Farmington, CT (*Abstract Co-Author*) Nothing to Disclose
Julius Chapiro, MD, New Haven, CT (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV; Research Grant, Guerbet SA; Consultant, Guerbet SA; Consultant, Eisai Co, Ltd

PURPOSE

The main purpose of this study was to evaluate the effect of Oncozene drug-eluting beads with 40 and 100 µm diameters loaded with idarubicin in a rabbit VX2 liver tumor model. Magnetic resonance imaging (MRI) was performed to investigate embolization effects on the tumor and tumor microenvironment by assessing physiological markers, e.g. extracellular pH (pHe), hypoxia, and vasculature.

METHOD AND MATERIALS

VX2 tumor chunks were implanted into the left liver lobe of 12 New Zealand White rabbits subjected to transarterial chemoembolization (TACE) with either 40 (n=5) or 100 µm (n=4) Oncozene microspheres (Boston Scientific, Maple Grove, MN, USA) or assigned as control (untreated, n=3). Multiparametric MRI was performed post-TACE including dynamic contrast enhanced (DCE), diffusion weighted imaging (DWI), and biosensor imaging of redundant deviation in shifts (BIRDS) for pHe assessment. Ex vivo analyses included fluorescence imaging to evaluate idarubicin penetration and immunohistochemistry stainings.

RESULTS

DCE showed devascularization of embolized tumors as compared to controls ($p=0.07$). Specifically, the outer tumor rim was less enhanced in treated animals. In controls, DWI revealed significantly lower levels of cellularity in the tumor core than in the tumor rim ($p=0.006$). Post-TACE, DWI results suggest loss of tumor cell integrity when compared to healthy liver parenchyma ($p<0.0001$). Regarding pHe, BIRDS showed that tumors were significantly more acidic than liver parenchyma both prior to ($p=0.02$) and post-TACE ($p<0.01$). On fluorescence imaging and histopathology, 40 µm and 100 µm microspheres caused matching tumor cell death and complete inhibition of tumor cell proliferation. 100 µm beads caused more peritumoral vascular occlusion and no non-target deposition.

CONCLUSION

The study revealed strengths and weaknesses for 40 and 100 µm Oncozene microspheres that need to be further investigated. mpMRI combining DCE, DWI, and BIRDS revealed could become an important tool in assessing changes within the tumor microenvironment. Thus, it could be used for advanced tumor detection, differentiation, and improved treatment response prediction.

CLINICAL RELEVANCE/APPLICATION

MpMRI combining DCE, DWI, and BIRDS revealed high significance and could become an important tool in assessing changes within the tumor microenvironment. Thus, it could be used for advanced tumor detection, differentiation, and improved treatment response prediction.

VSIO31-14 Combining Immuno-Oncology with Ablation

Tuesday, Nov. 27 5:00PM - 5:20PM Room: S405AB

Participants
Joseph P. Erinjeri, MD, PhD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO31-15 Immuno-Oncology and Arterially Directed Therapies

Tuesday, Nov. 27 5:20PM - 5:40PM Room: S405AB

Participants
Jens Ricke, MD,PhD, Munich, Germany (*Presenter*) Research Grant, Sirtex Medical Ltd Research Grant, Bayer AG

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO31-16 Is All This Activation Beneficial? IO and Tumorigenesis

Tuesday, Nov. 27 5:40PM - 6:00PM Room: S405AB

Participants
Muneeb Ahmed, MD, Boston, MA (*Presenter*) Research Grant, General Electric Company; Stockholder, Agile Devices, Inc; Scientific Advisory Board, Agile Devices, Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RCA34

Leveraging Machine Learning Techniques and Predictive Analytics for Knowledge Discovery in Radiology (Hands-on)

Tuesday, Nov. 27 2:30PM - 4:00PM Room: S401AB

AI IN RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Kevin Mader, DPhil,MSc, Basel, Switzerland (*Moderator*) Employee, 4Quant Ltd; Shareholder, 4Quant Ltd
Kevin Mader, DPhil,MSc, Basel, Switzerland (*Presenter*) Employee, 4Quant Ltd; Shareholder, 4Quant Ltd
Barbaros S. Erdal, PhD, Columbus, OH (*Presenter*) Nothing to Disclose
Joshy Cyriac, Basel, Switzerland (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the basic principles of predictive analytics. 2) Be exposed to some of the existing validation methodologies to test predictive models. 3) Understand how to incorporate radiology data sources (PACS, RIS, etc) into predictive modeling. 4) Learn how to interpret results and make visualizations.

ABSTRACT

During this course, an introduction to machine learning and predictive analytics will be provided through hands on examples on imaging metadata (scan settings, configuration, timestamps, etc). Participants will use open source as well as freely available commercial platforms in order to achieve tasks such as image metadata and feature extraction, statistical analysis, building models, and validating them. Imaging samples will include datasets from a variety of modalities (CT, PET, MR) and scanners. The course will begin with a brief overview of important concepts and links to more detailed references. The concepts will then be directly applied in visual, easily understood workflows where the participants will see how the data are processed, features are selected, and models are built.

RCC34

3D Medical Printing Technologies, Regulations and Education

Tuesday, Nov. 27 2:30PM - 4:00PM Room: S501ABC

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Peter C. Liacouras, PhD, Bethesda, MD (*Moderator*) Nothing to Disclose
Andy Christensen, BS, Littleton, CO (*Moderator*) Consultant, Integrum AB; Board Member, Integrum AB; Stockholder, Somaden LLC

LEARNING OBJECTIVES

1) Understand the basic concepts of 3D printing. 2) Know the basic procedures for producing 3D medical models from radiographic images. 3) Differentiate between 3D printing technologies. 4) Be able to identify the best 3D printing technology to use for different medical applications.

Sub-Events

RCC34A 3D Medical Printing Technologies

Participants
Peter C. Liacouras, PhD, Bethesda, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the Clincal Apllications of 3D printing in Craniomaxillofacial Reconstruction. 2) Discuss Simulation of Rare Events utilizing 3D printing. 3) Become familiar with the concept of biocompatibility and sterilization techniques as they relate to 3D printed parts. 4) Become aware of the varied types of 3D printing technology including benfetis and limitations.

ABSTRACT

3D printing in medicine has been growing at an exponential rate. One of the leading uses of this technology is in the care of craniomaxillofacial patients with oncologic and non oncologic needs. This talk will discuss the benefits and limitations of the varied 3D printing technologies as the relate to CMF patients. We will discuss the clinical benefits of patient specific models for oncologic planning and reconstruction as well as the simulation of rare possible complications using 3D printed models. In addition the audience will gain a brief understanding of the terms surrounding 3D printing/additive manufacturing of biocompatible materials and sterilization techniques.

RCC34B Technical and Quality Considerations for 3D Printed Medical Devices

Participants
James Coburn, MSc, Silver Spring, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Become familiar with a variety of indications for the production of 3D Models that may be of benefit to the Urologic surgeon prior to renal surgery to remove a renal mass or tumor. 2) Understand the many benefits the urologic surgeon can obtain from pre-operative production of renal 3D models in patients undergoing renal surgery to remove a renal mass. 3) Become familiar with the unique complexities of developing a renal 3D model prior to a planned renal surgery for renal tumor removal. 4) Become familiar with the appropriate CT and MR acquisition parameters that are required for optimal 3D Models of kidneys conatining a renal mass.

ABSTRACT

This presentation will discuss the various renal applications of 3D Models in patients with renal tumors undergoing nephron sparing surgery. Certain indications for 3D Modeling prior to nephron sparing surgery include: Masses in kidneys with congenital anomalies, kidneys with multiple renal masses, large renal masses, and renal masses in the hilum area of the kidneys

RCC34C Regulatory Compliance in Medical 3D Printing

Participants
Andy Christensen, BS, Littleton, CO (*Presenter*) Consultant, Integrum AB; Board Member, Integrum AB; Stockholder, Somaden LLC

LEARNING OBJECTIVES

1) Define methods that can be used to generate three-dimensional maps of aortic strain/growth to better characterize disease progression among patients with thoracic aortic aneurysm. 2) Describe techniques to generate color 3D printed maps of aortic strain/growth. 3) Apply color 3D printing techniques of three-dimensional aortic strain/growth maps to improve communication with and education of patients undergoing aortic surgical procedures.

RCC34D 3D Printing Education for Residents

Participants
Summer J. Decker, PhD, Tampa, FL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand why training in computer technologies such as 3D modeling and 3D printing is increasingly critical to resident training. 2) Learn how to develop methods for instruction in 3D technologies. 3) Identify potential opportunities and resources for resident training.

RCC34E Aortic Growth/Strain Mapping Pre-surgical and Patient Education

Participants
Nicholas S. Burris, MD, San Francisco, CA (*Presenter*) Entitled to royalties from liscensure of intellectual property to Imbio LLC

MSRO34

BOOST: Gastrointestinal-Case-based Multidisciplinary Review (Interactive Session)

Tuesday, Nov. 27 3:00PM - 4:15PM Room: S103AB

GI OI RO

AMA PRA Category 1 Credits ™: 1.25
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

Smith Apisarnthanarax, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Jeff L. Weinstein, MD, Boston, MA (*Presenter*) Nothing to Disclose
James O. Park, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Tobias R. Chapman, MD, Boston, MA (*Presenter*) Consultant, Medtronic plc;

LEARNING OBJECTIVES

1) Differentiate between the various local treatment modalities (surgical, transarterial, thermal ablation, SBRT, proton beam therapy) used in the treatment of liver tumors (HCC, cholangiocarcinoma, metastasis) 2) Describe various advantages and disadvantages/limitations of each locoregional therapeutic modality 3) Appraise different clinical scenarios and select appropriate local therapy options based on specific technical and patient related factors

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

MSRO38

BOOST: Lung-Case-based Multidisciplinary Review (Interactive Session)

Tuesday, Nov. 27 3:00PM - 4:15PM Room: S103CD

CH OI RO

AMA PRA Category 1 Credits ™: 1.25
ARRT Category A+ Credits: 1.50

Participants
Simon S. Lo, MD, Seattle, WA (*Presenter*) Editor, Springer Nature;
Subba R. Digumarthy, MD, Boston, MA (*Presenter*) Nothing to Disclose
Feng-Ming Kong, MD,PhD, Cleveland, OH (*Presenter*) Speakers Bureau, Varian Medical Systems, Inc
Jyoti D. Patel, MD, Chicago, IL (*Presenter*) Nothing to Disclose
David W. Johnstone, Milwaukee, WI (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Discuss the appropriate management of non-small cell lung cancer. 2) Discuss the appropriate management of small cell lung cancer.

ABSTRACT

Modern management of lung cancer typically involves interdisciplinary evaluation by radiologists, thoracic surgeons, medical oncologists, and radiation oncologists. This session reviews the most up-to-date multidisciplinary management of both non-small cell and small cell lung cancer through clinical cases.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Subba R. Digumarthy, MD - 2013 Honored Educator

RC413

Pediatric Series: Gastrointestinal/Genitourinary

Tuesday, Nov. 27 3:00PM - 6:00PM Room: N228

GI GU PD US

AMA PRA Category 1 Credits ™: 2.75
ARRT Category A+ Credits: 3.25

FDA Discussions may include off-label uses.

Participants
Andrea S. Doria, MD, Toronto, ON (*Moderator*) Nothing to Disclose
Lynn A. Fordham, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose
Ting Y. Tao, MD, PhD, Saint Louis, MO (*Moderator*) Nothing to Disclose
Jonathan R. Dillman, MD, Cincinnati, OH (*Moderator*) Research Grant, Siemens AG; Research Grant, Guerbet SA; Travel support, Koninklijke Philips NV; Research Grant, Canon Medical Systems Corporation; Research Grant, Bracco Group
Sara M. O'Hara, MD, Cincinnati, OH (*Moderator*) Author, Reed Elsevier; Speakers Bureau, Canon Medical Systems Corporation; Medical Advisory Board, Canon Medical Systems Corporation

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LEARNING OBJECTIVES

-The participants should be able to obtain new knowledge in the field. -The participants should be able to clarify their questions during the alloted time for questions & answers. -The participants should be able to apply in their clinical practice knowledge gathered through the scientific papers presented. -The participants should be able to generate new ideas for research based on the topics presented.

Sub-Events

RC413-01 Pediatric Scrotal Sonography

Tuesday, Nov. 27 3:00PM - 3:15PM Room: N228

Participants
Lynn A. Fordham, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review technique of scrotal sonography. 2) Discuss key diagnostic findings. 3) Review common and uncommon pathologies and mimics of disease in the pediatric scrotum and other challenging pediatric cases.

RC413-02 A "Self-Driving Car" to Track Clinical Image Quality? Comparison between an Automated Image Analysis Program and Human Readers for Detectability of Subtle Liver Lesions in Pediatric Abdominopelvic CT

Tuesday, Nov. 27 3:15PM - 3:25PM Room: N228

Participants
Justin B. Solomon, PhD, Durham, NC (*Presenter*) License agreement, Sun Nuclear Corporation; License agreement, 12 Sigma Technologies
Taylor Smith, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Taylor Richards, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Jennifer S. Ngo, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Donald P. Frush, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

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PURPOSE

To develop a program to automatically analyze image quality directly from CT images and compare this program to radiologist-based detectability of subtle pediatric liver lesions.

METHOD AND MATERIALS

A detectability index (d') based on mathematical observer models and statistical decision theory was measured directly from patient's abdominopelvic (AP) CT images. This method consisted of automatically estimating the image noise magnitude (HU STD)

and noise texture (noise power spectrum) based on a published technique. The estimated noise was combined with both an a priori phantom-based measurement of resolution (task-transfer function) and an assumed imaging detection task (low-contrast 5 mm liver lesion) to compute d' for a non-prewhitening matched filter observer model. This patient-specific d' was compared to results from an IRB approved human reader study in which nine radiologists were asked to detect virtually inserted subtle hypoattenuating liver lesions (~-25 HU contrast, <= 6 mm) in 90 pediatric AP CT cases (0-3 lesions per case) representing one baseline radiation dose level (100%) and two reduced dose levels (75% and 50% compared to baseline). The median CTDIvol [25th-75th percentiles] was 4.81 [4.35-6.26], 3.61 [3.27-4.70], and 2.41 [2.18-3.13] mGy for each dose level, respectively. The d' was measured on all the CT images and compared to the radiologist-based detection outcomes using a generalized linear mixed effects model (probit link function, random term for readers).

RESULTS

On average, the lesion detection sensitivities were 54±2%, 37±2%, and 28±2% for radiation dose levels of 100%, 75%, and 50%, respectively, for radiologists. The predicted detection sensitivities based on d' were 51±2%, 45±2%, and 38±2% for radiation dose levels of 100%, 75%, and 50%, respectively. Based on the multivariate statistical model, d' was strongly correlated to radiologists' detection rates (P<0.001).

CONCLUSION

The proposed detectability index measured directly from patient's CT images was representative of trained radiologists' detection sensitivities of subtle liver lesions in pediatric abdominal CT.

CLINICAL RELEVANCE/APPLICATION

An automated method for assessing CT image quality could allow for efficient and effective institution-wide monitoring of CT performance, improved reference levels based on both quality and dose, and improved AI-based investigations of image quality.

RC413-03 What Does the Echogenic Debris of the Bladder Mean in Pediatric Urinary Tract Infection?

Tuesday, Nov. 27 3:25PM - 3:35PM Room: N228

Participants
Hye Ji, MD, Daejeon, Korea, Republic Of (*Presenter*) Nothing to Disclose
Sun Kyoung You, MD, Daejeon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the clinical significance of echogenic debris in the bladder of children with a first episode of febrile urinary tract infection (UTI).

METHOD AND MATERIALS

We retrospectively reviewed the data of children under 2 years of age with first febrile UTI admitted to our hospital, from March 2017 to February 2018. Blood test, urinalysis and urine culture were performed before initiation of antibiotics. All renal US procedures were performed within 3 days of admission. We recorded presence of echogenic debris in bladder, renal parenchymal change, renal pelvic wall thickening, and dilatation of renal collection system on renal ultrasonorphy. Patients were divided into D(debri)-group and non-D group. Student's t-test and Pearson Chi-Square (or Fisher's exact test) were used statistical analysis. We also used multiple logistic regression analysis to evaluate the association between echogenic debris in bladder on renal US and other data.

RESULTS

Of the 135 patients of our study (boys:girls=84:51, mean age=5.6±4.2 months, range; 1.1-23.9 months), 26 (19.3%) cases showed echogenic debris in bladder. Twenty one patients in D group (21/26, 80.8 %) were boys (Odds ratio = 3.06, 95% CI= 1.077 - 8.735, p=0.04). The level of CRP and BUN was significantly higher in D-group (6.1±4.2 vs. 4.3±3.7 mg/dL, p=0.03; 10.3±3.4 vs. 8.6±3.0 mg/dL, p=0.017). Twenty three patients in D group (23/26, 88.5%) showed hematuria (Odds ratio = 4.44, 95% CI= 1.255-15.741, p=0.01). The renal parenchymal changes and wall thickening of the renal collecting system were statistically significant different between two groups (p=0.02, <0.001, respectively). There was no significant difference in result of urine culture between two groups (p=0.59). According to the multiple logistic regression, there were significant association between presence of echogenic debris in bladder on renal US and male, presence of renal pelvic wall thickening, and elevated CRP (P= 0.025, 0.003, and 0.014; ORs = 0.26, 4.63, and 1.12, respectively).

CONCLUSION

The echogenic debris of bladder on renal US is not an uncommon finding in the first febrile UTI patients younger than 2 years of age. Presence of echogenic debris in bladder on renal US was related to the sex, CRP, and renal pelvic wall thickening.

CLINICAL RELEVANCE/APPLICATION

The echogenic debris of bladder on renal ultrasonography is more common in boys and is associated with CRP and renal pelvic wall thickening.

RC413-04 B-Flow Sonography for Assessment of Vascularity of Kidney Transplants in Children

Tuesday, Nov. 27 3:35PM - 3:45PM Room: N228

Participants
Elena Dammann, Hamburg, Germany (*Presenter*) Nothing to Disclose
Jochen Herrmann, MD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Groth, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To compare B-flow Sonography (BFS) with Color Doppler Sonography (CDS) for assessment of vascularity in kidney transplants

To compare B-flow Sonography (BFS) with Color Doppler Sonography (CDS) for assessment of vascularity in kidney transplants (NTX) in children.

METHOD AND MATERIALS

All children after kidney transplantation who received a protocol based ultrasound examination (Loqiq 9, GE Medical Systems, Milwaukee, WI, USA) with corresponding images in BFS and CDS technique between January 2013 and January 2016 were retrospectively assessed. The obtained data sets of BFS and CDS were graded visually according to following criteria: (I) Delineation of the complete renal vascular tree, (II) delineation of cortical vessel density in ventral, lateral and dorsal part of NTX, (III) minimal distance of detectable vessels to renal capsule and (IV) best cortical vessel count on 1 cm. Statistics included t-test and Fisher´s exact test.

RESULTS

Forty children (mean age 11 ± 4 years, range 1-18 years; 24 male, 16 female) were analyzed using corresponding curved and linear transducer images (C1-6 and ML6-15). With a curved transducer, BFS compared with CDS showed superior delineation of the renal vascular tree ($p<0.001$), a lower vessel-capsule distance ($p<0.001$), and a higher vessel count ($p<0.001$). Regarding cortical vasculature, BFS demonstrated higher cortical density in the superficial cortex than CDS ($p=0.005$), but lower values in the dorsal and lateral aspects of the transplant (both $p<0.001$). With a linear high-resolution transducer, no significant differences were found.

CONCLUSION

BFS yields superior results than CDS for evaluating the vasculature of transplanted kidneys in children. Improved vessel delineation with a higher vascular density including the peripheral subcapsular renal cortex was noted on curved array images.

CLINICAL RELEVANCE/APPLICATION

The B-flow sonography technique may improve monitoring of transplant viability in children.

RC413-05 Risk Factors for Development of Perirenal Subcapsular Fluid Collections in Extremely Preterm Infants with Acute Kidney Injury

Tuesday, Nov. 27 3:45PM - 3:55PM Room: N228

Participants
Haewon Kim, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Saelin Oh, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Tae Yeon Jeon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
So-Young Yoo, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Se In Sung, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yun Sil Chang, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Won Soon Park, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ji Hye Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To investigate the incidence, risk factors and clinical outcome of perirenal subcapsular fluid collections in extremely preterm infants with acute kidney injury (AKI).

METHOD AND MATERIALS

Extremely preterm infants (n=56) with AKI who underwent renal ultrasound during Neonatal Intensive Care Unit stay were classified into two groups according to the presence of perirenal subcapsular fluid collections at US. Relevant data including demographics and comorbidities of the infants as well as maternal demographics were analyzed and risk factors for the development of perirenal subcapsular fluid collection in infants with AKI were identified with multivariate logistic regression analysis.

RESULTS

The perirenal subcapsular fluid collection developed in 7 of 56 extremely preterm infants (13%) with AKI (male-female ratio, 5:2; mean gestational age, 23 ± 2 weeks). The mortality rate was 86% (6/7) and only one infant survived in infants with perirenal subcapsular fluid collection and AKI. Infants with perirenal subcapsular fluid collections and AKI were lower gestational age, and showed episodes of necrotizing enterocolitis, intestinal perforation, use of nephrotoxic medication, and a history of maternal chorioamnionitis more frequently ($P<.05$). In the multivariate analysis, the risk factor of perirenal subcapsular fluid collection was significantly higher in extremely preterm infants who treated by antifungal agents (OR, 13.2 [95% CI: 1.5, 119.4]; $P=0.02$).

CONCLUSION

A considerable proportion of extremely preterm infants with AKI developed perirenal subcapsular fluid collections. Careful follow-up is mandatory, especially for infants treated by antifungal agents.

CLINICAL RELEVANCE/APPLICATION

Perirenal subcapsular fluid collection may develop in critically ill extremely preterm infants as a sign of acute renal injury and it has a grave prognostic implication in these infants.

RC413-06 MR Depiction of Plicae Palmatae of the Uterine Cervix in Infants

Tuesday, Nov. 27 3:55PM - 4:05PM Room: N228

Participants
Yasuyuki Yamahana, MD, Kyoto, Japan (*Presenter*) Nothing to Disclose
Akiko Takahata, MD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose

Hiroshi Miura, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Sachimi Yamada, MD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Kei Yamada, MD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Plicae palmatae are normal endocerivcal folds of the uterus. They are often observed as a low signal protrusion of cervical stroma on axial T2 weighted images (T2WI) in fertile females. There are, however, only few reports describing plicae palmatae in infants. We aimed to evaluate the incidence of depicting this normal structure on pelvic MR of infants.

METHOD AND MATERIALS

We retrospectively evaluated 65 female infants under 24 months of age, who underwent pelvic MRI for various purposes in our institution between January 2008 and December 2017. Nine cases were excluded because of uterine aplasia, uterine neoplasm, or chemotherapy for neoplasms. After exclusion of these cases, 56 cases were enrolled in this study. The average age was 8.3 months (median; 7.0 months, range; 0-23 months).We defined the plicae palmatae as the protrusions into the cervical canal from cervical stroma on axial T2WI. The frequencies of observing these structures were calculated in each month age. We also evaluated the number, size and locations of plicae palmatae. Clinically relevant cut-off points of frequency (6,7,8, or 11 months old) were also tested statistically.

RESULTS

Plicae palmatae were identified in 67.9% (38/56) of the population. The frequency in the neonates was 100% (9/9) and this decreased in the higher aged group with a statistically significant difference ($p = 0.0073$). The clinically relevant cut-off point was 8 months old; the frequency was 83.9% (26/31) in 0-8 months old group and 48.0% (12/25) in 9-23 months old group ($p = 0.0043$). The total and average numbers per patients of these structures were 86 and 1.54 (range; 0-4), respectively. These structures were thicker than one's cervical stroma in 65.8% (25/38) of the cases. The locations were on the anterior wall, posterior wall and both walls in 21.1% (8/38), 5.3% (2/38) and 73.7% (28/38), respectively.

CONCLUSION

Plicae palmatae were frequently observed on axial T2WI in infants and its prevalence declined with age during infancy. Recognizing the MR findings of plicae palmatae in infants can be helpful to prevent misdiagnosis of these structures as a tumor or anomaly.

CLINICAL RELEVANCE/APPLICATION

Plicae palmatae are uterine cervical folds described in adults, and can be also observed in infants on MRI. Recognizing these normal structures may help us avoiding misdiagnosis as a tumor or anomaly.

RC413-07 Adnexal Pathology in Children: Beyond Ovarian Masses

Tuesday, Nov. 27 4:05PM - 4:20PM Room: N228

Participants
Ting Y. Tao, MD, PhD, Saint Louis, MO (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Develop an imaging approach to adnexal pathology in children. 2) Expand differential diagnoses of pediatric adnexal pathology beyond neoplastic ovarian masses. 3) Identify clinical features of non-neoplastic adnexal pathology.

RC413-08 Quantitative Imaging of the Pediatric Liver

Tuesday, Nov. 27 4:30PM - 4:45PM Room: N228

Participants
Jonathan R. Dillman, MD, Cincinnati, OH (*Presenter*) Research Grant, Siemens AG; Research Grant, Guerbet SA; Travel support, Koninklijke Philips NV; Research Grant, Canon Medical Systems Corporation; Research Grant, Bracco Group

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LEARNING OBJECTIVES

1) To become familiar with the various causes of chronic liver disease in children. 2)To understand clinical and pre-clinical quantitative MRI methods available for evaluating pediatric chronic liver diseases. 3)To learn to apply quantaitive MRI techniques for evaluating chronic liver disease in clinical practice.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Jonathan R. Dillman, MD - 2016 Honored Educator

RC413-09 Comparison between T2 and T2* For Cardiac and Hepatic Iron Content Estimation in Children and Adolescents

Tuesday, Nov. 27 4:45PM - 4:55PM Room: N228

Participants
Christian A. Barrera, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

Hansel J. Otero, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Helge Hartung, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To assess the feasibility and performance of liver and cardiac T2* values measured on a single breath-hold acquisition for iron content estimation in children and adolescents.

METHOD AND MATERIALS

77 patients (mean age: 13.82 years) were included and 169 pairs of studies from these patients were analyzed. All liver and cardiac scans were performed using a 1.5T MRI scanner. T2 values in the liver were calculated by an external company for a fee per patient. Cardiac and liver T2* values were measured in a blinded manner by a single trained observer on the cardiac and liver MRIs. The relationship between liver T2* and T2 relationship was assessed. Cardiac bright-blood and dark-blood T2* sequences were also compared following the same analysis. Finally, liver T2* was measured on images from the dedicated cardiac and liver MRIs and were correlated and evaluated. Continuous variables were presented as mean ± standard deviation (SD). Paired t-test (2-tailed) was used to compare means. Correlation coefficient and Bland-Altman difference plot were used.

RESULTS

75.1% of the abdominal and chest MRI studies were performed on the same day and 4.1% one day later. 20.8% of our studies were performed between 4 - 74 days apart with a mean 26.71 ± 18.38 days apart .Mean liver T2 and T2* values measured in the dedicated liver MRI were 8.50 ± 5.25 ms (mean ± SD) and 4.43 ± 3.92 ms, respectively. Mean cardiac bright-blood and dark-blood T2* values were 26.44 ± 12.95 ms and 27.33 ± 11.90 ms, respectively. A strong correlation between liver T2 and T2* values was observed ($r = 0.95$, $p < 0.001$). Cardiac bright and dark-blood T2* values also showed a strong correlation ($r = 0.79$, $p < 0.001$). Mean liver T2* measured on cardiac MRI and dedicated liver MRI were 4.93 ± 4.06 ms and 4.66 ± 3.96 ms, respectively. A strong correlation between T2* values obtained from the cardiac and liver MRI was observed ($r = 0.97$, $p < 0.001$), Figure 1.

CONCLUSION

Cardiac and liver iron concentration measurements using the same single breath hold GRE sequences, on the same study and with the same field of view are feasible and accurate.

CLINICAL RELEVANCE/APPLICATION

MRI for cardiac iron concentration assessment includes a major portion of the liver in the field of view. Theoretically, it is possible to measure liver T2* values using a dedicated cardiac MRI only.

RC413-10 Shear Wave Ultrasound Elastography Positively Correlates with Severity of Sinusoidal Obstruction Syndrome (SOS)

Tuesday, Nov. 27 4:55PM - 5:05PM Room: N228

Participants
Amie L. Robinson, RT,BS, Kansas City, MO (*Presenter*) Nothing to Disclose
Sherwin S. Chan, MD, PhD, Kansas City, MO (*Abstract Co-Author*) Consultant, Jazz Pharmaceuticals plc;
Matthew Goette, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Robert Krance, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Rakesh Goyal, MD, Kansas City, MO (*Abstract Co-Author*) Nothing to Disclose
Rajesh Krishnamurthy, MD, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose
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Prakash M. Masand, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Severe and very severe SOS is associated with multi-organ failure and has ~60% mortality. SOS is classified into mild, moderate, severe and very severe based on new European Society for Blood and Marrow Transplantation (EBMT) criteria. Treatment with defibrotide is recommended only for severe and very severe patients. Our hypothesis is that SOS severity based on EBMT criteria will correlate with liver stiffness measured by SWE.

METHOD AND MATERIALS

This is a multi-site prospective cohort study evaluating the use of SWE in pediatric patients (0-21 years) receiving conditioning therapy from 10/2015 to 3/2018 at 2 pediatric institutions. Site 1 subjects underwent 1 SWE within 10-days prior to start of conditioning regimen and at days +5 and +14 after BMT. Site 2 enrolled subjects at the time of clinical suspicion for SOS and subjects received SWE examinations every other day up to 10 exams during inpatient stay. All SWE exams were performed on GE Logiq E9 with a curved 1-6 MHZ transducer. Each SWE exam was summarized using the median SWE velocity, and the maximum value during the clinical course were analyzed. Subjects were divided into 3 groups using the EBMTC criteria: (1) no SOS, (2) mild to moderate SOS and (3) severe to very severe SOS. Due to unequal variances and non-normal distribution, non-parametric tests were used for statistical analysis.

RESULTS

55 subjects were enrolled. Majority of patients were male (n=33, 60%) and the median age was 8 (range 0-20) years. 21 (38%) patients developed SOS, 15 (27%) had severe to very severe disease by EBMT criteria. The median days from max SWE velocity assessment and diagnosis of initial SOS severity grading was 2 (-12 to +16) days. SWE velocities were higher in SOS (2.23 + 0.38) versus non-SOS (1.5 + 0.04) patients ($p<0.001$). Mann-Whitney U demonstrated significant difference in median SWE values between groups 1 and 2 ($p<0.001$), but not groups 2 and 3 ($p=.104$). A linear trend test was performed that showed positive

correlation between EBMT grade and SWE velocity (r=.701, p<0.001).

CONCLUSION

Maximum liver stiffness during post-conditioning course as measured by SWE correlates with severity of SOS as graded using EMBT criteria.

CLINICAL RELEVANCE/APPLICATION

Imaging has no current role in sinusoidal obstruction syndrome grading. Shear wave elastography could play a future role because liver stiffness correlates to disease severity.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Rajesh Krishnamurthy, MD - 2017 Honored Educator

RC413-11 Comparative Study of Contrast Enhanced Voiding Uro-Sonography versus Fluoroscopic Micturating Cystourethrography in Pediatric Vesico-Ureteric Reflux

Tuesday, Nov. 27 5:05PM - 5:15PM Room: N228

Participants
Amit Katyan, MBBS, New Delhi, India (*Presenter*) Nothing to Disclose
Shabnam B. Grover, MD,DMRD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Pooja Jain, MBBS, Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Saurabh Suman, MBBS, Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Hemal Grover, MBBS, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Neha Antil, MBBS,MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Dharmendra K. Singh, MD,FRCR, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Deepak Bagga, MS, MChir, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Vesicoureteric reflux is an important etiology of pediatric urological morbidity, which if uncorrected, leads to renal scarring, hypertension and culminates in renal failure. Currently evaluated under fluoroscopic guidance, the development of alternate radiation free methods for vesico-ureteric reflux (VUR) assessment is pivotal. The present study is aimed to evaluate the diagnostic performances of contrast enhanced voiding uro-sonography (CE-VUS) versus fluoroscopic micturating cystourethrography (MCU) in children.

METHOD AND MATERIALS

After obtaining Institutional Review Board approval, forty consecutive children (below five years) of consenting parents, were evaluated for VUR by both contrast enhanced VUS and fluoroscopic MCU in the same catheterization visit. Bladder capacity was estimated by using formula: Bladder capacity volume (ml) = [age (years) + 2] x 30ml. One percent sulphur hexafluoride solution was used for contrast enhanced voiding uro-sonography. Fluroscopic MCU was performed as per standard protocol. Positive VUR was defined as: presence of contrast microbbles or radiographic contrast in the ureter or pelvis, on CE-VUS and MCU respectively. Diagnostic accuracies of CE-VUS and MCU were compared using Mc Nemar test.

RESULTS

Forty patients consisting of eighty pelvi-ureter units (PUU) were evaluated. VUR was demonstrated in twenty two PUU. Of these, CE-VUS documented VUR in fourteen PUU whereas fluroscopic MCU identified VUR only in eight PUU. CE-VUS and fluoroscopic MCU had a concordance rate of 78.75% in detecting both presence and absence of VUR. CE-VUS has a significantly higher detection rate of VUR as compared to fluoroscopic MCU (p value <0.05).

CONCLUSION

CE-VUS has a better diagnostic performance than fluoroscopy MCU for the detection of VUR in pediatric population.

CLINICAL RELEVANCE/APPLICATION

Contrast enhanced Voiding urosonography is a radiation free modality for VUR assessment and has the potential to replace fluoroscopic MCU in the diagnostic workup of VUR in children.

RC413-12 Diagnostic Accuracy of Non-contrast MR Enterography in Detecting Active Bowel Inflammation in Pediatric Patients with Diagnosed or Suspected Inflammatory Bowel Disease to Determine Necessity of Gadolinium-based Contrast Agents

Tuesday, Nov. 27 5:15PM - 5:25PM Room: N228

Awards
Student Travel Stipend Award

Participants
Stacy J. Kim, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Thomas L. Ratchford JR, MD, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Paula Buchanan, MPH,PhD, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Dhiren Patel, MD, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Ting Y. Tao, MD, PhD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose

Jeffrey Teckman, MD, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Jeffrey J. Brown, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Shannon Farmakis, MD, Saint Louis, MO (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Guerbet SA

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PURPOSE

To determine whether administration of gadolinium-based contrast agents are necessary in the assessment of bowel inflammation on magnetic resonance enterography (MRE) in pediatric patients with diagnosed or suspected inflammatory bowel disease (IBD).

METHOD AND MATERIALS

A retrospective study of 79 patients (7-19 years; 67.1% M) with known (60) or suspected (19) IBD that underwent endoscopy within 30 days of an MRE without and with contrast was performed evaluating bowel and non-bowel findings. Two blinded radiologists reviewed pre-, post-, and pre/post-contrast MRE images in 3 joint visual analysis sessions spaced 4 weeks apart. A third blinded radiologist performed an independent visual analysis of 28 randomly selected studies to assess inter-reader reliability. Cohen's kappa (K) was used to compare pre- and pre/post-contrast session results and to assess inter-rater agreement of the pre/post-contrast MRE reading to the endoscopy/histopathology results. Pre- and pre/post-contrast assessments of inflammation were compared to endoscopy results using sensitivity and specificity. McNemar's test examined differences between pre- and pre/post contrast features of inflammation.

RESULTS

There was moderate agreement (87.3%) between the pre- and pre/post-contrast MRE and endoscopy results (K 0.746, $p<0.001$; McNemar's P-value 0.344). Pre-contrast to endoscopy vs. pre/post-contrast to endoscopy sensitivity (61%, CI 0.48-0.73 vs. 66%, CI 0.53-0.77) and specificity (88%, CI 0.62-0.98 vs. 82%, CI 0.56-0.95) varied little with K of 0.34 and 0.35, respectively ($p<0.001$ for both). Moderate agreement was seen among the joint readers and independent reader with 82.1% agreement (K 0.632, p 0.001; McNemar's P-value 1.00). Sensitivity and specificity of pre- vs. post-contrast readings were 75% (CI 0.57-0.87) and 70% (CI 0.54-0.82), respectively with $p=0.001$ (K 0.44; CI 0.25-0.64). Contrast identified more penetrating complications than pre-contrast (McNemar's P-value 0.05).

CONCLUSION

Use of contrast does not improve the detection of active bowel inflammation compared to noncontrast MRE, although contrast does appear to aid in the detection of penetrating disease.

CLINICAL RELEVANCE/APPLICATION

Concerns over gadolinium deposition in patients continue to grow, and pediatric patients with IBD are at increased risk given the need for multiple contrast-enhanced MREs over their life.

RC413-13 Sedated Ultrasound Guided Saline Reduction (SUR) of Ileocolic Intussusception: 17 Year Experience

Tuesday, Nov. 27 5:25PM - 5:35PM Room: N228

Participants
Robert Sacks, Beer Sheva, Israel (*Presenter*) Nothing to Disclose
Reut Anconina, MD, Beer Sheva, Israel (*Abstract Co-Author*) Nothing to Disclose
Evelyn Farkas, Beer Sheva, Israel (*Abstract Co-Author*) Nothing to Disclose
Vadim Tsodikov, Beer Sheva, Israel (*Abstract Co-Author*) Nothing to Disclose
Ilan Shelef, MD, Beer-Sheva, Israel (*Abstract Co-Author*) Nothing to Disclose
Benjamin Taragin, MD, Beit Shemesh, Israel (*Abstract Co-Author*) Medical Advisory Board, Carestream Health, Inc

For information about this presentation, contact:

sacks@post.bgu.ac.il

PURPOSE

Ultrasound guided saline enema is an established technique for reducing ileocolic intussusception in children. However, there is debate as to how anesthesia affects reduction rates. The purpose of the study is to present our 17 years' experience of SUR in ileocolic intussusception. Its success/failure/complication rate relative to non-SUR and other methods of reduction will be reviewed.

METHOD AND MATERIALS

This is a retrospective study of patients presenting to a tertiary care hospital. A search through the EMR identified patients who underwent SUR during the years 2000-17. All patients received Propofol in the operating room followed by rectal tube placement and repeat ultrasound. If ileocolic intussusception was still present, saline solution was hung 1.2 meters above the bed and infused into the colon in a retrograde fashion under ultrasound supervision until filling of the cecum was visualized. If reduction did not occur initially, it was maintained for 0.5 minutes until reduction or passive decompression. After a 1 minute break, repeat hydrostatic reduction was attempted up to 2 additional times in the same session. Success was confirmed by direct ultrasound confirmation of resolution of ileocolic intussusception. Failure rates of SUR were calculated and compared to non-sedated methods.

RESULTS

Out of 274 total episodes of ileocolic intussusception, 246 (197 primary and 39 recurrences) began the SUR protocol. 21 spontaneously reduced prior to or after anesthesia. Of the 225 who proceeded to SUR, 201 were successfully reduced. Our protocol success rate was 90.2% ((201+21)/246) and there were no instances of perforation. Success rates were 83.8% (165/197) for primary intussusceptions and 92.3% (36/39) for recurrences. 42 non reduced intussusceptions proceeded to successful surgical management.

CONCLUSION

SUR is a safe and effective way to reduce ileocolic intussusception. Sedation improves the reduction rate overall without increasing

SUR is a safe and effective way to reduce ileocolic intussusception. Sedation improves the reduction rate overall without increasing complications.

CLINICAL RELEVANCE/APPLICATION

The method of SUR is an excellent technique to reduce ileocolic intussusception without unnecessary patient or parent distress.

RC413-14 Diagnostic Performance of CT for Pediatric Patients with Suspected Appendicitis in Various Clinical Settings: A Systematic Review and Meta-Analysis

Tuesday, Nov. 27 5:35PM - 5:45PM Room: N228

Participants
Dong Wook Kim, MD, Chungcheongnam-do, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hee Mang Yoon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ah Young Jung, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Seong Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young Ah Cho, MD,PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the diagnostic performance of CT for pediatric patients with suspected appendicitis in various clinical settings and proportion of acute appendicitis on final diagnosis among equivocal CT findings.

METHOD AND MATERIALS

MEDLINE and EMBASE databases were searched till October 21st, 2017, for studies investigating diagnostic performance of CT for acute appendicitis in pediatric patients confirmed by histopathologic findings and/or clinical follow-up. Pooled estimates of sensitivity and specificity were calculated using a hierarchical logistic regression modeling. The proportion of true appendicitis among patients with inconclusive CT results was obtained using fixed and random effects meta-analyses.

RESULTS

Twenty-two articles with 3,396 patients were included. The pooled sensitivity and specificity were 95% (95% CI, 93%-97%) and 94% (95% CI, 90%-96%), respectively, and the area under the HSROC curve was 0.98 (95% CI, 0.96-0.99). Subgroup analyses revealed a comparable diagnostic performance in the low-dose CT group (sensitivity: 97%, specificity: 96%) and the unenhanced group (sensitivity: 95%, specificity: 95%). Other subgroups (publication year, study design, enrolled population, true appendicitis proportion, CT channel number and slice thickness) also showed good diagnostic performance. Six studies reporting the true appendicitis proportion among patients with equivocal CT findings had pooled proportion of 17% (95% CI, 9%-29%).

CONCLUSION

CT showed good performance for suspected appendicitis in pediatric patients under various clinical settings, including in cases with dose reduction or absence of IV contrast. The prevalence of true appendicitis among patients with equivocal appendicitis results on CTs was not low.

CLINICAL RELEVANCE/APPLICATION

Our result of the good sensitivity and specificity of CT supports the current ACR guidelines, which recommend CT when US results are equivocal. However, the diagnosis of acute appendicitis can still be missed even though CTs offer a superior diagnostic performance than USs; therefore, clinical attention should not be disregarded in this population.

RC413-15 Pediatric Liver Doppler

Tuesday, Nov. 27 5:45PM - 6:00PM Room: N228

Participants
Sara M. O'Hara, MD, Cincinnati, OH (*Presenter*) Author, Reed Elsevier; Speakers Bureau, Canon Medical Systems Corporation; Medical Advisory Board, Canon Medical Systems Corporation

LEARNING OBJECTIVES

1) Develop a search pattern for performing/interpreting pediatric liver Doppler. 2) Become familiar with normal Doppler findings in healthy pediatric livers. 3) Identify abnormal Doppler findings in pediatric livers and recognize their associated causes/disease states.

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MSAS34

The Importance of Radiographer Led Research: Growing the Evidence Base (Sponsored by the Associated Sciences Consortium) (Interactive Session)

Tuesday, Nov. 27 3:30PM - 5:00PM Room: S105AB

RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Charlotte Beardmore, MBA, London, United Kingdom (*Moderator*) Nothing to Disclose
Dimitris Katsifarakis, MSc, London, United Kingdom (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

charlotte@sor.org

Sub-Events

MSAS34A The Impact of Radiographer Led Research: A Case Study from the UK

Participants
Richard Evans, London, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the value of 'radiographer led' research within clinical imaging services. 2) To understand the steps required in developing a local research strategy. 3) To understand how to examine opportunities and barriers within your clinical environment to help support effective research.

ABSTRACT

As Health Care Professionals, radiographers and technologists are encouraged to put the patient at the centre of everything we do. In the UK, the Society and College of Radiographers (SCoR) state that this level of care should be based on up to date evidence that is of a high quality, using research to meet the needs of the patient. This drive to encourage research is also mirrored by the Allied Health Professions Federation (AHPF), who have published a strategy with one of its key goals focussed on the impact of research methods and evaluation on population outcome. Historically, research undertaken by radiographers in the UK has been minimal. In 2015, a review of contributors to the journal for The European Federation of Radiographer Societies found that of 239 contributing author affiliations, only 22 were represented by UK hospitals. Factors restricting engagement with research could be due to a lack of research experience and confidence among radiography practitioners and technologists, and a culture where research is not seen as a priority. In busy departments; time, lack of role models, difficulties in back filling roles and resistance to change, along with ever increasing imaging demands, have led to further barriers in undertaking research. The question remains as to how we bridge the gap between embedding research in all levels of radiographic practice and current clinical research activity? The purpose of this presentation will be to focus on our research journey within a UK radiography department. We will share how we overcame barriers through collaboration and establishing a local research strategy to facilitate our research ideas. As a result, we will demonstrate how this led to achieving successes regarding the positive impact of research, both on our patients and staff.

MSAS34B Shifting the Paradigm of Medical Imaging: How Imaging Can Drive Innovations in Patient Care (A Canadian Experience)

Participants
Paul Cornacchione, BSC, Toronto, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the benefits of an integrated project management team within medical imaging. 2) Share the impact that a medical imaging department and extended practice roles can have in driving patient care. 3) Highlight the use of data in developing and monitoring initiative outcomes.

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MSCC34

Case-based Review of Nuclear Medicine: PET/CT Workshop-Advances in PET (In Conjunction with SNMMI) (Interactive Session)

Tuesday, Nov. 27 3:30PM - 5:00PM Room: E450B

BQ CT NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Samuel E. Almodovar-Reteguis, MD, Orlando, FL (*Director*) Nothing to Disclose
Katherine A. Zukotynski, MD, Ancaster, ON (*Director*) Nothing to Disclose
Chadwick L. Wright, MD,PhD, Lewis Center, OH (*Moderator*) Nothing to Disclose

Sub-Events

MSCC34A Somatostatin Receptor PET & Therapy

Participants
Thomas A. Hope, MD, San Francisco, CA (*Presenter*) Research support, General Electric Company

For information about this presentation, contact:

thomas.hope@ucsf.edu

LEARNING OBJECTIVES

1) Define the role of somatostatin receptor (SSTR) PET in patients with neuroendocrine tumors (NETs). 2) Compare the use of conventional imaging and SSTR PET in staging NETs. 3) Explain the mechanism of SSTR based peptide receptor radionuclide therapy (PRRT).

ABSTRACT

Neuroendocrine tumors (NET) are unique in that they overexposes the somatostatin receptor (SSTR). This can be leveraged in imaging by labelling somatostatin analogs with radiation to image the location of tumors. DOTATATE is a SSTR analog, that when labeled with Gallium-68 can be used to image neuroendocrine tumors with very high sensitivity and specificity. It is important to remember that although SSTR PET using Ga68 DOTATATE is very effective, conventional imaging using either CT or MRI will remain the most common imaging modality for NET patients over time. Beyond imaging, SSTR analogs can be labeled with beta emitters than can be used therapeutically. Most commonly DOTATATE is labeled with Lutetium-177. This was studied prospectively in a randomized controlled trial (NETTER-1 trial), which demonstrated significant improvement in radiographic progression free survival. These results led to the FDA approval of this therapy in 2018.

MSCC34B Fluciclovine/PSMA PET

Participants
Andrei Iagaru, MD, Emerald Hills, CA (*Presenter*) Research Grant, General Electric Company

LEARNING OBJECTIVES

1) List some of the molecular imaging targets that are used in prostate cancer. 2) Understand underlying biology and mechanism of action for some of the new PET radiopharmaceuticals in prostate cancer. 3) Discuss patterns of prostate cancer appearance when using some of the new PET radiopharmaceuticals.

ABSTRACT

Data from the American Cancer Society suggests that prostate cancer will continue to be the leading cancer diagnosis in men with 164,690 estimated new cases and will have the second highest mortality (after lung cancer) with 29,430 estimated deaths for 2018 in the United States. Initial and subsequent treatment of prostate cancer may involve surgery, radiation therapy, hormonal therapy, chemotherapy, or a combination of these. Additional molecular pathways in prostate cancer lead to the identification of new targets that may be amenable to diagnostic and therapeutic intervention with novel agents. Areas of interest for the Nuclear Medicine and Molecular Imaging community include mainly aminoacid analogues (Fluciclovine) and the prostate specific membrane antigen (PSMA), but also gastrin releasing peptide receptors (GRPR).

MSCC34C Response Assessment

Participants
David A. Mankoff, MD, PhD, Philadelphia, PA (*Presenter*) Speaker, Koninklijke Philips NV; Consultant, General Electric Company; Advisory Board, RefleXion Medical Inc; Consultant, Blue Earth Diagnostics Ltd; Research Funded, Siemens AG; Advisory Board, ImaginAb, Inc; Spouse, Owner, Trevarx

For information about this presentation, contact:

david.mankoff@uphs.upenn.edu

LEARNING OBJECTIVES

1) List applications of molecular imaging as a cancer biomarker. 2) Describe clinical setting for which molecular imaging response approaches are applicable. 3) Discuss investigational agents being investigated for response assessment and early results.

ABSTRACT

This talk will review molecular imaigng approaches for cancer, considering molecular imaging as a cancer biomarker to guide treatment decisions and evaluate therpaeutic repsonse. Examples form recent or ongoing multi-center trials will be presented as exmaples of possible future clinical role for molecular imaigng cancer biomarkers.

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MSES34

Essentials of Musculoskeletal

Tuesday, Nov. 27 3:30PM - 5:00PM Room: S100AB

MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

MSES34A Identifying Lyme and Scurvy

Participants
Bethany U. Casagranda, DO, Pittsburgh, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the history of Lyme disease and scurvy. 2) Identify MSK manifestations of Lyme disease and scurvy utilizing multiple modalities. 3) Explain the appropriate clinical scenarios for adding Lyme disease and scurvy to the differential diagnosis.

ABSTRACT

as above

MSES34B Commonly Missed Fractures

Participants
Leon Lenchik, MD, Winston-Salem, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

llenchik@wakehealth.edu

LEARNING OBJECTIVES

1) Develop an approach for detecting commonly missed fractures.

MSES34C Imaging of the Diabetic Foot

Participants
William B. Morrison, MD, Philadelphia, PA (*Presenter*) Consultant, AprioMed AB; Patent agreement, AprioMed AB; Consultant, Zimmer Biomet Holdings, Inc; Consultant, Samsung Electronics Co, Ltd; Consultant, Medical Metrics, Inc

For information about this presentation, contact:

william.morrison@jefferson.eduandTwitter:@morrisonMSK

LEARNING OBJECTIVES

1) Understand the pathoetiology of diabetic foot ulceration and infection. 2) Know the imaging findings associated with diabetic pedal infection. 3) Be aware of imaging pitfalls and the mimickers of infection in the diabetic foot.

ABSTRACT

Imaging of the foot in patients with diabetes can be challenging. Modalities and imaging protocol will be discussed in addition to use of MRI contrast agents. Imaging findings will be reviewed, particularly geared toward diagnosis of osteomyelitis in patients with ulceration. Imaging pitfalls and mimickers of infection will also be discussed. Differentiation from Charcot arthropathy will be reviewed. New research will be presented with suggested guidelines and tips for accurate ddiganosis. .

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MSRO39

BOOST: Gastrointestinal-eContouring

Tuesday, Nov. 27 4:30PM - 5:30PM Room: S104B

GI OI RO

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Edward Y. Kim, MD, Seattle, WA (*Coordinator*) Nothing to Disclose
Mary U. Feng, MD, San Francisco, CA (*Presenter*) Self: Consultant, Varian, Inc and RefleXion Medical Inc; Spouse (Felix Feng, MD), Advisory Boards Dendreon, Janssen, Bayer, Sanofi, Ferring, EMD Serono, Medivation/Astellas, Blue Earth Diagnostics, Progenics; Spouse, honorarium Clovis
Smith Apisarnthanarax, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Ryan O'Malley, MD, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

apisarn@uw.edu

Mary.feng@ucsf.edu

LEARNING OBJECTIVES

1) Review radiotherapy contouring and treatment planning techniques for liver tumors. 2) Discuss challenges in radiotherapy target definition across multiple imaging modalities. 3) Highlight important aspects of radiologic anatomy applied to treatment of liver tumors.

RC401

Occupational Lung Disease (Interactive Session)

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E450A

CH CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Cristopher A. Meyer, MD, Madison, WI (*Moderator*) Investor, Elucent Medical; Consultant, NIOSH Certified B-reader

For information about this presentation, contact:

cmeyer2@uwhealth.org

LEARNING OBJECTIVES

1) State the radiographic and CT findings of silicosis, CWP, and asbestos-related lung disease. 2) Always consider beryllium exposure when faced with an interstitial lung disease with features of sarcoidosis. 3) Describe the importance of expiratory imaging in the identification of small airway disease. 4) Identify clues to exposure history when interpreting HRCTs for interstitial lung disease.

ABSTRACT

Despite increased safety measures, workers remain at risk for occupational exposures. Silicosis, coal workers' pneumoconiosis, and asbestos-related lung disease continue to affect workers because of ongoing exposures in the workplace, long latency between exposure and disease, and changes in mining techniques. Immune-mediated diseases such as chronic hypersensitivity pneumonitis and chronic beryllium disease may also result from workplace exposure. Airway-centered occupational lung diseases are often the subtlest and may required expiratory imaging for recognition. This session will review these categories of occupational lung disease and conclude with a case-based session that emphasizes specific findings that may alert the interpreting radiologist to the possibility of occupational lung disease when faced with an unknown HRCT for interstitial lung disease.

Sub-Events

RC401A Classic Dusts: Asbestos, Silica, and Coal

Participants
Jeffrey P. Kanne, MD, Madison, WI (*Presenter*) Research Consultant, PAREXEL International Corporation;

For information about this presentation, contact:

jkanne@uwhealth.org

LEARNING OBJECTIVES

View learning objectives under main course title.

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RC401B Occupational Lung Disease: The Other Guys (Beryllium, Hard Metal, Aluminum, Siderosis)

Participants
Sudhakar N. Pipavath, MD, Mercer Island, WA (*Presenter*) Adjudicator, Gilead Sciences, Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

Honored Educators

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RC401C Airway Related Interstitial Lung Disease and Emerging Occupational Lung Disease

Participants
Christian W. Cox, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC401D HRCT Patterns of Occupational Lung Disease: Case-Based

Participants
Cristopher A. Meyer, MD, Madison, WI (*Presenter*) Investor, Elucent Medical; Consultant, NIOSH Certified B-reader

LEARNING OBJECTIVES

View learning objectives under main course title.

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RC402

What's New from the Radiology Residency Review Committee

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S503AB

ED

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Felicia Davis, Chicago, IL (*Presenter*) Nothing to Disclose
James C. Anderson, MD, Portland, OR (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To provide updates from the Review Committee for Diagnostic Radiology. 2) To provide updates from ACGME. 3) To provide updates on the Interventional Radiology Residency.

RC403

Nonischemic Cardiomyopathies: New Role of Cardiac MRI

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E350

CA MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Charles S. White, MD, Baltimore, MD (*Moderator*) Consultant, Koninklijke Philips NV

LEARNING OBJECTIVES

1) To recognize MRI appearance of the most common right ventricular cardiomyopathies.2) To describe the phenotypic spectrum of morpho-funcitional and tissue abnormalities of hypertrophic cardiomyopathy. 3) To review different faces and phases of the disease reflecting its natural history. 4) To analyze critical role of CMR tissue characterization of the differential diagnoses of hypertrophic CMPs, from phenotype to genotype. 5) To review T1 and T2 tissue mapping variations in different clinical scenarios. 6) To analyze prognostic implications of CMR in HCM. 7) Describe the relevant clinical findings of patients with restrictive cardiomyopathy. 8) Define the role of cardiac MR (CMR) in the evaluation of patients with restrictive cardiomyopathy. 9) Discuss the different patterns of myocardial enhancement and other ancillary imaging findings as they relate to narrowing the differential diagnosis in patients with restrictive cardiomyopathy. 10) Identify the different forms of Dilated Cardiomyopathies (DCM). 11) Apply the most common Cardiac Magnetic Resonance (CMR) techniques to differentiate between the various DCM etiologies. 12) Assess the Pros & Cons of different CMR techniques for the DCM evaluation.

Sub-Events

RC403A Arrhythmogenic and other Right Ventricular Cardiomyopathies

Participants
Karen G. Ordovas, MD, San Francisco, CA (*Presenter*) Advisor, Arterys Inc

For information about this presentation, contact:

karen.ordovas@ucsf.edu

LEARNING OBJECTIVES

1) To recognize MRI appearance of the most common right ventricular cardiomyopathies.

RC403B Role of MRI in Hypertrophic Cardiomyopathy

Participants
Marco Francone, MD,PhD, Rome, Italy (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

marco.francone@uniroma1.it

LEARNING OBJECTIVES

1) To describe the phenotypic spectrum of morpho-funcitional and tissue abnormalities of hypertrophic cardiomyopathy. 2) To review different faces and phases of the disease reflecting its natural history. 3) To analyze critical role of CMR tissue characterization of the differential diagnoses of hypertrophic CMPs, from phenotype to genotype. 4) To review T1 and T2 tissue mapping variations in different clinical scenarios. 5) To analyze prognostic implications of CMR in HCM.

RC403C Restrictive Cardiomyopathy and Amyloidosis

Participants
Daniel Vargas, MD, Aurora, CO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

daniel.vargas@ucdenver.edu

LEARNING OBJECTIVES

1) Describe the relevant clinical findings of patients with restrictive cardiomyopathy. 2) Define the role of cardiac MR (CMR) in the evaluation of patients with restrictive cardiomyopathy. 3) Discuss the different patterns of myocardial enhancement and other ancillary imaging findings as they relate to narrowing the differential diagnosis in patients with restrictive cardiomyopathy.

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RC403D Role of MRI in Dilated Cardiomyopathies

Participants
Matthias Gutberlet, MD, PhD, Leipzig, Germany (*Presenter*) Speaker, Siemens AG; Speaker, Koninklijke Philips NV; Speaker, Bayer AG; Speaker, Bracco Group; Author, Thieme Medical Publishers, Inc

LEARNING OBJECTIVES

1) Identify the different forms of Dilated Cardiomyopathies (DCM). 2) Apply the most common Cardiac Magnetic Resonance (CMR) techniques to differentiate between the various DCM etiologies. 3) Assess the Pros & Cons of different CMR techniques for the DCM evaluation.

RC404

Interpretation of Musculoskeletal Radiographs: A Forgotten Art

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E353C

MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Mini N. Pathria, MD, San Diego, CA (*Director*) Nothing to Disclose

For information about this presentation, contact:

llenchik@wakehealth.edu

LEARNING OBJECTIVES

1) Obtain appropriate radiographs, AP, lateral and obliques. Oblique views are essential as certain fractures may be visible only on this projection. 2) Certain fractures and dislocations are notorious for being overlooked. Know these injuries and be certain to identify or exclude them. 3) Be aware of the potential for satisfaction of search and the potential of diagnostic oversights in certain injuries. Once such an injury is noted look closely for the commonly associated injury. 4) When the clinical diagnosis is not apparent or uncertain on the initial radiographs, do not hesitate to obtain CT or MRI to confirm or exclude an injury. 5) Understand that the location and pattern of pelvic injury varies with patient demographics and injury mechanism. 6) Recognize subtle radiographic findings indicating pelvic injuries that are easily overlooked. 7) Understand the role of advanced cross-sectional imaging in occult fractures, complex bony injury, and soft tissue trauma. 8) Familiarize the radiologist with radiographic imaging pitfalls in the lower extremity and subtle radiographic findings indicating disease. 9) Provide advanced cross-sectional imaging correlation of the radiographic findings. 10) Provide a logical framework in radiologic evaluation of bone tumors. 11) To recognize the importance and use of radiographs in evaluation of bone tumors in differential diagnosis. 12) To recognize various pattern of bone destruction and matrix mineralization.

Sub-Events

RC404A Upper Extremity

Participants
Lee F. Rogers, MD, Tucson, AZ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Obtain appropriate radiographs, AP, lateral and obliques. Oblique views are essential as certain fractures may be visible only on this projection. 2) Certain fractures and dislocations are notorious for being overlooked. Know these injuries and be certain to identify or exclude them. 3) Be aware of the potential for satisfaction of search and the potential of diagnostic oversights in certain injuries. Once such an injury is noted look closely for the commonly associated injury. 4) When the clinical diagnosis is not apparent or uncertain on the initial radiographs, do not hesitate to obtain CT or MRI to confirm or exclude an injury.

Active Handout:Lee Frank Rogers

http://abstract.rsna.org/uploads/2018/18000815/Handouts Upper ExtremityRC404A.pdf

RC404B Pelvis and Hip

Participants
Mini N. Pathria, MD, San Diego, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand that the location and pattern of pelvic injury varies with patient demographics and injury mechanism. 2) Recognize subtle radiographic findings indicating pelvic injuries that are easily overlooked. 3) Understand the role of advanced cross-sectional imaging in occult fractures, complex bony injury, and soft tissue trauma.

Active Handout:Mini Nutan Pathria

http://abstract.rsna.org/uploads/2018/18000816/Pelvis and Hip Xrays Forgotten Art RC404B.pdf

RC404C Lower Extremity

Participants
Zehava S. Rosenberg, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Familiarize the radiologist with radiographic imaging pitfalls in the lower extremity and subtle radiographic findings indicating disease. 2) Provide advanced cross-sectional imaging correlation of the radiographic findings.

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RC404D Bone Tumors

Participants
Mark D. Murphey, MD, Silver Spring, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Provide a logical framework in radiologic evaluation of bone tumors. 2) To recognize the importance and use of radiographs in evaluation of bone tumors in differential diagnosis. 3) To recognize various pattern of bone destruction and matrix mineralization.

ABSTRACT

This discussion focuses on the radiologic assessment of solitary and polyostotic lesions of bone with pathologic correlation. Recognition of the patterns of bone destruction on radiographs and their implication on differential diagnosis is emphasized. Identifying the patterns of matrix mineralization either chondroid or osteoid and the impact on diagnostic considerations is also discussed. Take Home Message 1. The radiographic appearance of bone lesions allows an appropriate differential diagnosis by reflecting the biologic activity of the underlying pathologic process. 2. Radiographic assessment of the solitary bone lesion is imperative to direct appropriate patient management. 3. Recognition of 'don't touch' lesions is an important role for the radiologist.

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RC405

Neuroradiology: Small Tricks to Avoid Big Misses (Interactive Session)

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E451A

NR PD

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
James G. Smirniotopoulos, MD, Silver Spring, MD (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

james.smirniotopoulos@nih.gov

Sub-Events

RC405A Newborn and Pediatric Brain

Participants
Bruno P. Soares, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bruno.soares@jhmi.edu

LEARNING OBJECTIVES

1) Develop an evaluation pattern for brain MRI in neonatal encephalopathy. 2) Identify clinical and imaging findings suggestive of an inherited neurometabolic disorder. 3) Apply practical imaging criteria to classify pediatric cystic posterior fossa anomalies.

RC405B Postoperative Spine

Participants
Falgun H. Chokshi, MD, Marietta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the imaging appearance of the post operative spine hardware and soft tissues. 2) Understand the consequences of various post-operative complications seen in imaging. 3) Know modality specific limitations of post-operative spine imaging.

RC405C Acute Hemorrhage

Participants
Michael Iv, MD, Stanford, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

miv@stanford.edu

LEARNING OBJECTIVES

1) Recognize causes and mimics of acute subarachnoid hemorrhage. 2) Differentiate between etiologies of acute parenchymal hemorrhage. 3) Describe the importance of specific imaging features in predicting clinical outcome in various settings of acute hemorrhage.

RC405D Disorders of CSF Circulation

Participants
Timothy J. Amrhein, MD, Cary, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To describe the characteristic brain and spine imaging findings in spontaneous intracranial hypotension. 2) To describe the characteristic brain imaging findings in Chiari 1 malformation. 3) To describe the characteristic brain imaging findings in idiopathic intracranial hypertension. 4) To identify key imaging features allowing one to differentiate between these different CSF-related pathologies.

RC406

Do You Know Your Head & Neck Anatomy? (Interactive Session)

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S402AB

HN NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

For information about this presentation, contact:

shatzkes@hotmail.com

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC406A Temporal Bone Anatomy

Participants
Richard H. Wiggins III, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Richard.Wiggins@hsc.utah.edu

LEARNING OBJECTIVES

1) Understand best imaging modalities and practices for temporal bone imaging. 2) Recognize important temporal bone anatomy. 3) Describe important temporal bone imaging critical points.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Richard H. Wiggins III, MD - 2012 Honored Educator

RC406B Skull Base Anatomy

Participants
C. Douglas Phillips, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dphillips@med.cornell.edu

LEARNING OBJECTIVES

At the conclusion of this session, the attendee will be able to view the skull base with improved confidence. It is expected the attendee will be able to:1. Understand the normal anatomy of the skull base2. Recognize and identify normal skull base foramina on CT and MR3. Gain confidence in differentiating pathologies of the skull base

ABSTRACT

As a part of this interactive session, the attendee will be presented normal anatomy of the skull base and will have the opportunity to respond to questions regarding the bone, soft tissues, vascular and neural structures at the skull base.

RC406C Larynx/Hypopharynx Anatomy

Participants
Hugh D. Curtin, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Hugh_Curtin@meei.harvard.edu

LEARNING OBJECTIVES

1) The participant will be able to idenify the ventricle on axial and coronal images. 2) The participant will be able to identify the structures of the hypopharynx on CT. 3) The participant will be able to describe the contents and tissues of the paraglottic space.

ABSTRACT

The session will discuss the anatomy of the larynx and hypopharynx with particular emphasis on structures and landmarks that are key assessing lesions of the larynx. Particularly important are identifying the level of the ventricle in axial and coronal planes as well

as describing the structure and contents of the paraglottic space. The supraglottis is above the ventricle and contains mostly fat laterally and anteriorly. The thyroarytenoid muscle fills much of the paraglottic space at the level of the true cord. The fat to muscle transition indicates the level of the ventricle. The subglottis has very little tissue separating the airway from the inner cortex of the cricoid. Distinguishing ossified and non-ossified cartilage is important as it bears on separating cancer from normal cartilage The hypopharynx can be separated into sublites that include the pyriform sinuses, posterior wall and post-cricoid area.

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RC407

Use of Iodinated and Gadolinium-based Contrast Media 2018: Is Your Clinical Practice Up to Date?

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E351

GU SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Richard H. Cohan, MD, Ann Arbor, MI (*Moderator*) Co-author, Wolters Kluwer nv
Richard H. Cohan, MD, Ann Arbor, MI (*Presenter*) Co-author, Wolters Kluwer nv
Benjamin Mervak, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose
Matthew S. Davenport, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Jay K. Pahade, MD, New Haven, CT (*Presenter*) Consultant, General Electric Company
Robert J. McDonald, MD,PhD, Rochester, MN (*Presenter*) Consultant, General Electric Company; Research Grant, General Electric Company; Consultant, Bracco Group

For information about this presentation, contact:

matdaven@med.umich.edu

rcohan@umich.edu

LEARNING OBJECTIVES

1) To review current management recommendations regarding contrast material administration, including what to do in patients who have had allergic-like reactions and who require reinjection, current thoughts concerning the risks of contrast induced nephrotoxicity, safety profiles of the various gadolinium-based contrast agents, and the most recent observations of long-term gadolinium retention in the body.

ABSTRACT

1. Premedication: Is it worthwhile? (Benjamin Mervak - University of North Carolina) During this talk, the attendee will learn the common indications for premedication and premedication regimens; the degree to which premedication reduces the incidence of subsequent reactions, the likelihood of breakthrough reactions, and the costs of premedication. 2. CIN: Does it exist? If not, why are we trying so hard to prevent it (Matthew Davenport - University of Michigan) During this talk, the literature calling into question the existence of CIN will be reviewed and the necessity of prophylaxis in patients who are more likely to develop acute kidney injury will be discussed. 3. Choosing an MRI contrast agent: Differences among gadolinium-based MR contrast agents with updates on nephrogenic systemic fibrosis (NSF) and renal function screening recommendations (Jay Pahade - Yale University) During this talk the learner will become familiar with various properties of the different available gadolinium based contrast agents, and advantages/disadvantages of their use with respect to patient safety. An update on NSF and renal function screening prior to gadolinium based contrast agent administration will also be provided. 4. Gadolinium Deposition in the Brain: What does this mean and what should we do about it ? (Robert McDonald - Mayo Clinic). During this talk, results of recent research demonstrating gadolinium retention in the body, including the brain will be reviewed. The potential clinical implications of such retention will be discussed, along with a description of future research that needs to be performed in this area.

RC408

Emergency Ultrasound Pitfalls

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S102CD

ER GU OB US VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Leslie M. Scoutt, MD, New Haven, CT (*Moderator*) Speaker, Koninklijke Philips NV

For information about this presentation, contact:

leslie.scoutt@yale.edu

LEARNING OBJECTIVES

1) Describe the role of US and how to avoid common pitfalls in the diagnosis of patients presenting with acute scrotal and adnexal pain. 2) Discuss common US pitfalls in the evaluation of patients presenting with abdominal and RUQ pain. 3) Discuss how to recognize and avoid common pitfalls in US diagnosis of acute vascular pathology. 4) Describe the optimal US approach to the evaluation of emergent pathology presenting in the second trimester of pregnancy.

ABSTRACT

This course will review common pitfalls in US evaluation of patients presenting for emergent care. Emphasis will be placed on recognizing and avoiding common technical errors and errors in scanning technique that could effect image interpretation and cause pitfalls in diagnosis. The session will specifically focus on the role of US in the evaluation of testicular, ovarian, RUQ, vascular and second trimester OB pathology that is commonly encountered in the emergency setting.

Sub-Events

RC408A Testicular and Ovarian Ultrasound Pitfalls

Participants
Leslie M. Scoutt, MD, New Haven, CT (*Presenter*) Speaker, Koninklijke Philips NV

For information about this presentation, contact:

leslie.scoutt@yale.edu

LEARNING OBJECTIVES

1) Discuss the diagnostic US criteria and common pitfalls as well as how to avoid them in the US diagnosis of testicular torsion, epididymitis and testicular rupture. 2) Describe the ultrasound features and common pitfalls in the US diagnosis of ovarian torsion, hemorrhagic cysts and pelvic inflammatory disease.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Leslie M. Scoutt, MD - 2014 Honored Educator

RC408B Ultrasound Pitfalls in the RUQ and Abdomen

Participants
Oksana H. Baltarowich, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

oksana.baltarowich@jefferson.edu

LEARNING OBJECTIVES

1) Improve diagnostic images by paying attention to sonographic technique. 2) Improve awareness how to avoid technical pitfalls in the emergency setting.

RC408C Vascular Ultrasound Pitfalls

Participants
John S. Pellerito, MD, Manhasset, NY (*Presenter*) Research Grant, General Electric Company

LEARNING OBJECTIVES

1) Recognize important technical errors that impact diagnosis. 2) Identify common errors in interpretation that will improve diagnosis. 3) Gain insights to improve the quality and accuracy of vascular examinations.

RC408D Second Trimester Ultrasound Pitfalls

Participants
Mariam Moshiri, MD, Bellevue, WA (*Presenter*) Grant, Koninklijke Philips NV; Author with royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Learn requirements for an accurate second trimester ultrasound survey. 2) Learn how to Q/A the images obtained to avoid missing abnormalities. 3) Learn how to avoid common pitfalls while evaluating images and avoid over-call or under-call of abnormalities.

Honored Educators

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RC409

Imaging of the Colorectum

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E352

CT GI MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Judy Yee, MD, Bronx, NY (*Moderator*) Research Grant, EchoPixel, Inc; Research Grant, Koninklijke Philips NV;

LEARNING OBJECTIVES

1) Apply the results of recent research to the performance of CT colonography. 2) Improve basic knowledge and skills relative to the performance of CT colonography. 3) Assess the potential of technical advancements to improve the performance of CT colonography. 4) To understand the target lesion for colorectal cancer screening using CT Colonography and what should be reported. 5) To identify common and uncommon pitfalls on 2D and 3D CT Colonography images. 6) To review the serrated pathway to the development of colorectal cancer and how the use of oral contrast can help to identify sessile serrated polyps on CT Colonography. 7) Review briefly MRI Technique and Anatomy. 8) Highlight Structured Reporting Template for MRI of rectal cancer. 9) Discuss essential features to be included in MRI report. 9) Review briefly MRI Technique and Anatomy. 10) Highlight Structured Reporting Template for MRI of anorectal fistula. 11) Discuss essential features to be included in MRI report.

Sub-Events

RC409A CT Colonography Technique Update

Participants
Courtney C. Moreno, MD, Suwanee, GA (*Presenter*) Researcher, General Electric Company;

For information about this presentation, contact:

courtney.moreno@emoryhealthcare.org

LEARNING OBJECTIVES

1) Apply the results of recent research to the performance of CT colonography. 2) Improve basic knowledge and skills relative to the performance of CT colonography. 3) Assess the potential of technical advancements to improve the performance of CT colonography.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Courtney C. Moreno, MD - 2016 Honored Educator

RC409B CT Colonography: Strategies for Success

Participants
Judy Yee, MD, Bronx, NY (*Presenter*) Research Grant, EchoPixel, Inc; Research Grant, Koninklijke Philips NV;

LEARNING OBJECTIVES

1) To understand the target lesion for colorectal cancer screening using CT Colonography and what should be reported. 2) To identify common and uncommon pitfalls on 2D and 3D CT Colonography images. 3) To review the serrated pathway to the development of colorectal cancer and how the use of oral contrast can help to identify sessile serrated polyps on CT Colonography.

RC409C MRI Rectal Cancer Including Structured Reporting

Participants
Kartik S. Jhaveri, MD, Toronto, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review briefly MRI Technique and Anatomy. 2) Highlight Structured Reporting Template for MRI of rectal cancer. 3) Discuss essential features to be included in MRI report.

RC409D MRI Anorectal Fistulas Including Structured Reporting

Participants
Mukesh G. Harisinghani, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review briefly MRI Technique and Anatomy. 2) Highlight Structured Reporting Template for MRI of anorectal fistula. 3) Discuss essential features to be included in MRI report.

RC410

Neck Sonography: TI-RADS, Parathyroids, and Other Masses

Tuesday, Nov. 27 4:30PM - 6:00PM Room: N227B

HN NR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

RC410A Implementing ACR TI-RADS: A Practical Guide

Participants
Franklin N. Tessler, MD, Birmingham, AL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ftessler@uabmc.edu

LEARNING OBJECTIVES

1) Explain the background, rationale, and structure of the ACR TI-RADS risk stratification system for thyroid nodules. 2) Understand how to implement ACR TI-RADS in their practice.

ABSTRACT

ACR TI-RADS is a points-based risk stratification system for thyroid nodules based on their ultrasound appearance in five categories. In this presentation, I will provide the background and rationale for the development of ACR TI-RADS and review its approach and structure. I will also provide tips and pitfalls for implementing the system in a radiology practice.

RC410B Performance Characteristics of ACR TI-RADS with Illustrative Cases

Participants
William D. Middleton, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To use the ACR TI-RADS to guide management of thyroid nodules that are being evaluated with ultrasound.

RC410C Parathyroid Imaging: Techniques and Controversies

Participants
Mitchell E. Tublin, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define both the rationale for preoperative imaging of patients with primary hyperparathyroidism and recent controversies in treatment. 2) List the strengths and weaknesses of current imaging methods employed for parathyroid localization. 3) Optimize ultrasound technique to increase imaging accuracy.

RC410D Other Neck Masses

Participants
Mary C. Frates, MD, Sharon, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mfrates@bwh.harvard.edu

LEARNING OBJECTIVES

1) Recognize the various sonographic appearance of masses that occur in the neck, not related to the thyroid or parathyroid glands. 2) Understand how to use the clinical and sonographic features of a neck mass to narrow the differential diagnosis.

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RC411

PET/CT and SPECT/CT in Movement Disorders, Epilepsy, and Dementia

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S504CD

NR CT NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Sub-Events

RC411A Dopamine Transporter Scans and Movement Disorders

Participants
Vani Vijayakumar, MD, Ridgeland, MS (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

vvijayakumar@umc.edu

LEARNING OBJECTIVES

1) Apply basic knowledge and skills relevant to clinical practice of Movement Disorders. 2) Assess the potential of emerging technological innovations and advances to enhance clinical practice and problem-solving. 3) Develop new ideas from experts and peers in the nuclear imaging sciences. 4) Differentiate Essential Tremor and Presynaptic Parkinson Diseases on DATscans. 5) Compare different image findings for interpretation of Movement Disorders.

ABSTRACT

Introduction: Parkinson Disease (PD) is the most common movement disorder affecting 1-2 % of the general population over the age of 65 years and the second most common neurodegenerative disorder after Alzheimer´s disease (AD) PD presents with 3 most common symptoms. 1. Resting tremor: Most common first symptom, usually asymmetric and most evident in one hand with the arm at rest. 2.Bradykinesia: Difficulty with daily activities such as writing, shaving, using a knife and fork, and opening buttons; decreased blinking, masked facies, slowed chewing and swallowing. 3.Rigidity: Muscle tone increased in both flexor and extensor muscles providing a constant resistance to passive movements of the joints; stooped posture, anteroflexed head, and flexed knees and elbows. Nuclear Imaging Diagnosis: Datscan: (123I-ioflupane) Patient preparation: Thyroid blockade with Lugols- 3 drops one hour before Stop medicines that bind to the dopamine transporter 7 days prior to study, e.g. SSRIs, amphetamine, benzotropine, cocaine, mazindol,methylphenidate and phentermine and sertraline Radiopharmaceutical: (123I-ioflupane) is a molecular imaging agent 3-5 mCi IV and Brain SPECT in 3 hours Used to demonstrate the location and concentration of dopamine transporters (DaTs) in the synapses of striatal dopaminergic neurons. Interpretation: Normal: comma shaped striatum Abnormal: dot, asymmetric caudate or putamen, high background Summary: A highly sensitive marker for accurate assessment of striatal dopaminergic function to differentiate EssentialTremor from PD Early diagnosis of presynaptic Parkinsonian syndromes Differentiation of presynaptic Parkinsonian syndromes from parkinsonism without presynaptic dopaminergic loss, such as drug-induced parkinsonism or psychogenic parkinsonism A straightforward one-day protocol An objective adjunct to the differentiation of PD syndromes from ET in clinically uncertain patients A diagnostic tool helping differentiate between probable DLB and AD Visualizing DaT distribution is useful as a novel diagnostic adjunct in movement disorders and dementia

RC411B Imaging for Epilepsy

Participants
Anson L. Thaggard, MD, Jackson, MS (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

athaggard@umc.edu

LEARNING OBJECTIVES

1) Define the components of a multidisciplinary evaluation for the surgical treatment of epilepsy. 2) Compare brain SPECT with FDG PET for evaluation of an epileptogenic focus. 3) Discuss barriers to the use of ictal SPECT imaging and functional MRI. 4) Appraise the added value of fusion imaging in epilepsy evaluation.

ABSTRACT

Medically refractory epilepsy is now often treated surgically. A holistic multidisciplinary review of the patient preoperatively helps to optimize outcome. FDG PET and perfusion SPECT imaging are an integral part of the evaluation. Both imaging techniques are reviewed in context of the multidisciplinary evaluation. Imaging findings, pearls, and pitfalls of each are reviewed using case examples.

URL

http://abstract.rsna.org/uploads/2018/16002150/RC411B%20Imaging%20for%20Epilepsy%20Thaggard.pdf

Active Handout:Anson Lee Thaggard

http://abstract.rsna.org/uploads/2018/16002150/RC411B Imaging for Epilepsy Thaggard.pdf

RC411C PET Imaging for Dementia

Participants
Phillip Kuo, MD,PhD, Tucson, AZ (*Presenter*) Author, MD Training at Home; Research Grant, Astellas Group; Consultant, Endocyte, Inc; Consultant, General Electric Company; Education Grant, General Electric Company; Speakers Bureau, Eli Lilly and Company; Consultant, inviCRO, LLC; Consultant, Imaging Endpoints; Consultant, Progenics Pharmaceuticals, Inc

LEARNING OBJECTIVES

1) Understand the basic pathophysiology of Alzheimer's dementia. 2) Distinguish the different roles of PET imaging with FDG, amyloid, and tau tracers for evaluating dementia.

ABSTRACT

Alzheimer's disease is the most common form of dementia affecting the aging population, and is currently the 6th leading cause of death. Clinical diagnosis is difficult, and there is currently no cure. Functional imaging biomarkers may detect early stages of disease prior to the onset of symptoms, and may improve diagnostic accuracy. This in turn may improve evaluation of therapeutic interventions and provide a roadmap toward developing a cure.

RC412

Peripheral Artery Disease: CTA and MRA

Tuesday, Nov. 27 4:30PM - 6:00PM Room: N230B

CT MR VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Constantino S. Pena, MD, Miami, FL (*Moderator*) Speakers Bureau, Cook Group Incorporated; Speakers Bureau, Medtronic plc ; Speakers Bureau, W. L. Gore & Associates, Inc; Speakers Bureau, Penumbra, Inc; Speakers Bureau, Terumo Corporation; Speakers Bureau, Merit Medical Systems, Inc; Advisory Board, C. R. Bard, Inc; Advisory Board, Boston Scientific Corporation;
Konstantin Nikolaou, MD, Tuebingen, Germany (*Moderator*) Advisory Panel, Siemens AG; Speakers Bureau, Siemens AG; Speaker Bureau, Bayer AG

For information about this presentation, contact:

konstantin.nikolaou@med.uni-tuebingen.de

Sub-Events

RC412A Interventional Procedure Planning: Role for CTA and MRA

Participants
Constantino S. Pena, MD, Miami, FL (*Presenter*) Speakers Bureau, Cook Group Incorporated; Speakers Bureau, Medtronic plc ; Speakers Bureau, W. L. Gore & Associates, Inc; Speakers Bureau, Penumbra, Inc; Speakers Bureau, Terumo Corporation; Speakers Bureau, Merit Medical Systems, Inc; Advisory Board, C. R. Bard, Inc; Advisory Board, Boston Scientific Corporation;

LEARNING OBJECTIVES

1) Understand the value of peripheral CTA and MRA. 2) Discuss the benefits of CTA in comparison to MRA in the treatment of PAD. 3) Comprehend the importance of MRA sequences to highlight particular details in peripheral MRA. 4) Understand the importance of image reconstruction for peripheral CTA and MRA.

RC412B Peripheral CTA

Participants
Konstantin Nikolaou, MD, Tuebingen, Germany (*Presenter*) Advisory Panel, Siemens AG; Speakers Bureau, Siemens AG; Speaker Bureau, Bayer AG

For information about this presentation, contact:

Konstantin.Nikolaou@med.uni-tuebingen.de

LEARNING OBJECTIVES

1) Describe techniques for acquisition, reconstruction, and image interpretation of peripheral CTA 2) Discuss available data and evidence-based results for peripheral CTA, and expected impact on patient care 3) Compare advantages and drawbacks of lower extremity CTA in comparison to other imaging modalities and diagnostic tools for arterial occlusive disease.

RC412C Peripheral MR Angiography

Participants
James C. Carr, MD, Chicago, IL (*Presenter*) Research Grant, Astellas Group; Research support, Siemens AG; Speaker, Siemens AG; Advisory Board, Guerbet SA

RC412D Interventional Complications: Role for CTA and MRA

Participants
Charles Y. Kim, MD, Durham, NC (*Presenter*) Consultant, Merit Medical Systems, Inc; Consultant, Cook Group Incorporated

For information about this presentation, contact:

charles.kim@duke.edu

LEARNING OBJECTIVES

1) Understand endovascular aneurysm repair with endografts 2) Describe types of endoleaks and associated implications 3) Discuss current methods for optimal detection endoleaks with CTA and MRA, with understanding of advantages and disadvantages

ABSTRACT

Imaging of endoleaks has evolved over the past two decades, to include a multitude of techniques with CTA and MRA. While national guidelines for post-EVAR surveillance are relatively unidimensional, it is important for the practicing radiologist to understand the spectrum of available CT and MR techniques for detection of endoleaks, along with the advantages and disadvantages to each approach.

RC414

Morbidity and Mortality

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E353A

IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Eric J. Hohenwalter, MD, Milwaukee, WI (*Moderator*) Nothing to Disclose
Brian S. Funaki, MD, Chicago, IL (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

eho@mcw.edu

Sub-Events

RC414A Oncologic M & M

Participants
Eric J. Hohenwalter, MD, Milwaukee, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To explain common errors leading to M&M in non-vascular intervention. 2) To develop a contingency plan for complications which occur in non vascular intervention.

RC414B Memorable M & M Cases

Participants
Alan H. Matsumoto, MD, Charlottesville, VA (*Presenter*) Grant, W. L. Gore & Associates, Inc; Grant, Medtronic plc; Grant, Cook Group Incorporated; Grant, IBM Corporation; Data Safety Monitoring Board, W. L. Gore & Associates, Inc; Data Safety Monitoring Board, Endologix, Inc; Data Safety Monitoring Board, Boston Scientific Corporation; Data Safety Monitoring Board, Penumbra, Inc; Data Safety Monitoring Board, Proteon Therapeutics, Inc; Data Safety Monitoring Board, Vascular Medcure; Stockholder, Koninklijke Philips NV; Stockholder, BrightWater Medical; Advisory Board, Boston Scientific Corporation; Advisory Board, Vascular Medcure; Advisory Board, Proteon Therapeutics, Inc; Advisory Board, BrightWater Medical;

LEARNING OBJECTIVES

1) Understand how errors in judgment can contribute to complications. 2) Understand how perception failures can contribute to complications. 3) Understand how to recognize serious complications. 4) Understand how to manage complications in IR.

RC414C Vascular M & M

Participants
John A. Kaufman, MD, Portland, OR (*Presenter*) Advisory Board, Argon Medical Devices, Inc; Medical Advisory Board and Owner, Bio2Medical; Consultant, Cook Group Incorporated; Consultant, NOvate Medical Technologies; Owner, Veniti, Inc;

LEARNING OBJECTIVES

1) Identify arterial and venous vascular complications. 2) Describe management of the complications. 3) Discuss strategies to avoid complications.

RC414D Nonvascular M & M

Participants
Brian S. Funaki, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To list common errors which lead to complications in non-vascular interventions.

RC415

The Neoadjuvant Patient

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E353B

BR MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jessica W. Leung, MD, Houston, TX (*Moderator*) Scientific Advisory Board, Hologic, Inc; Speakers Bureau, Hologic, Inc; Speakers Bureau, FUJIFILM Holdings Corporation

For information about this presentation, contact:

JWLeung@MDAnderson.org

zuleyml@upmc.edu

LEARNING OBJECTIVES

1) To discuss three clinically significant areas involving care of the breast cancer patient undergoing neoadjuvant therapy. 2) To apply in everyday clinical practice the principles and conclusions learned.

Sub-Events

RC415A Ongoing Trials

Participants
Jessica W. Leung, MD, Houston, TX (*Presenter*) Scientific Advisory Board, Hologic, Inc; Speakers Bureau, Hologic, Inc; Speakers Bureau, FUJIFILM Holdings Corporation

For information about this presentation, contact:

JWLeung@MDAnderson.org

LEARNING OBJECTIVES

1) To learn the design of some of the ongoing clinical trials involving care of the breast cancer patient receiving neoadjuvant therapy. 2) To describe the imaging components of these trials.

RC415B Evaluation of the Axilla

Participants
Steven P. Poplack, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the key US criteria that are predictive of axillary lymph node metastases. 2) Appraise the accuracy of axillary US. 3) Describe the role of axillary US in the surgical management of the axilla after neoadjuvant treatment.

RC415C Role of MR

Participants
Eric L. Rosen, MD, Denver, CO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the role of Breast MRI in identifying candidates for Neoadjuvant Chemotherapy. 2) Discuss published data regarding the ability of Breast MRI to assess response to Neoadjuvant Chemotherapy. 3) Identify and review both the predictive and prognostic ability of Breast MRI in patients receiving Neoadjuvant Chemotherapy. 4) Identify advances in MRI likely to enhance its already established role in evaluating breast cancer patients receiving neoadjuvant Chemotherapy.

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RC416

Developing Competency in Non-Clinical Professional Roles in Radiology and Medicine (Sponsored by the RSNA Professionalism Committee)

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S502AB

ED PR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Stephen Chan, MD, Closter, NJ (*Moderator*) Nothing to Disclose
Kyongtae T. Bae, MD, PhD, Pittsburgh, PA (*Presenter*) Patent agreement, Guerbet SA; Patent agreement, Nemoto Kyorindo Co, Ltd;
Ronald L. Eisenberg, MD, JD, Boston, MA (*Presenter*) Nothing to Disclose
Stephen Chan, MD, Closter, NJ (*Presenter*) Nothing to Disclose
Suresh K. Mukherji, MD, Northville, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

rleisenb@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Describe different non-clinical professional roles of the radiologist, and the various kinds of training and experience required to develop expertise in these roles. 2) Deepen their understanding of specific professional roles - such as study section reviewer and expert witness - where radiologists bring specific subspecialty expertise into non-clinical professional realms. 3) Develop their appreciation of the role of business and leadership skills in representing the radiology profession within various healthcare organizations, and within governmental bodies, panels and agencies both inside and outside the healthcare arena.

ABSTRACT

All radiologists have undergone many years of training in clinical radiology, with most individuals having also participated in research and educational activities during their postgraduate training and post-residency careers. By virtue of the importance of radiology in modern medicine, as well as of the clinical, academic, and scientific expertise that every radiologist develops as a result of years of training and experience, many individuals in the field of radiology are called upon to participate in professional activities for which they have not typically received formal training of similar intensity and duration. The performance of such non-clinical activities at a suitable professional level is important for promoting and enhancing the careers of individual radiologists. In the aggregate, pursuit of these non-clinical activities is also essential for enhancing the overall image of all radiologists as relevant, connected, and integral to the practice of modern medicine, and for demonstrating radiologists to be contributing, functional members of society. So, what are these important non-clinical professional roles, and how does a radiologist develop the acumen to act satisfactorily in a non-clinical professional role which requires a different type of expertise and brings a new set of expectations?

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Ronald L. Eisenberg, MD, JD - 2012 Honored EducatorRonald L. Eisenberg, MD, JD - 2014 Honored Educator

RC417

Emerging Technology: 3D Joint Imaging

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S505AB

MR MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Avneesh Chhabra, MD, Dallas, TX (*Moderator*) Consultant, ICON plc; Author with royalties, Wolters Kluwer nv; Author with royalties, Jaypee Brothers Medical Publishers Ltd

For information about this presentation, contact:

avneesh.chhabra@utsouthwestern.edu

LEARNING OBJECTIVES

1) Gain knowledge of 3D techniques and segmentation approaches in the domain of musculoskeletal MRI. 2) Assess the current role of 3D imaging in musculoskeletal pathologies. 3) Gain knowledge of emerging roles of 3D isotropic imaging in bone modeling and multiplanar evaluation of internal derangements.

Sub-Events

RC417A 3D MRI of Rotator Cuff and Shoulder Joint

Participants
Soterios Gyftopoulos, MD, Scarsdale, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Soterios.Gyftopoulos@nyumc.org

LEARNING OBJECTIVES

1) To describe how 3D imaging technology can better characterize and quantify anterior shoulder instability bone injuries and rotator cuff pathology.

RC417B 3D MRI of Knee Menisci and Bone Modeling

Participants
Avneesh Chhabra, MD, Dallas, TX (*Presenter*) Consultant, ICON plc; Author with royalties, Wolters Kluwer nv; Author with royalties, Jaypee Brothers Medical Publishers Ltd

For information about this presentation, contact:

avneesh.chhabra@utsouthwestern.edu

LEARNING OBJECTIVES

1) Gain knowledge of optimal 3D isotropic MRI technique for knee meniscus and bone evaluation. 2) Learn how to create meniscus and cruciate specific reconstructions using 3D MRI. 3) Learn how to evaluate meniscus tears and describe their longitudinal extent with arthroscopy correlations.

RC417C 3D MRI of Ankle and Foot

Participants
Jan Fritz, MD, Baltimore, MD (*Presenter*) Research Grant, Siemens AG; Scientific Advisor, Siemens AG; Scientific Advisor, Alexion Pharmaceuticals, Inc; Speaker, Siemens AG

For information about this presentation, contact:

jfritz9@jhmi.edu

LEARNING OBJECTIVES

1) To apply current techniques and acquisition strategies for isotropic 3D MRI of the ankle and foot. 2) To review the diagnostic performance and comparative accuracy of 3D MRI of the ankle and foot. 3) To illustrate strengths and limitations of 3D MRI of the ankle and foot.

RC417D 3D MRI of Hyaline Cartilage

Participants
Richard Kijowski, MD, Madison, WI (*Presenter*) Research support, General Electric Company; Consultant, Boston Imaging Core Lab,

LLC

For information about this presentation, contact:

rkijowski@uwhealth.org

LEARNING OBJECTIVES

1) To classify the different types of three-dimensional sequences currently available to evaluate articular cartilage. 2) To compare the advantages and disadvantages of two-dimensional and three-dimensional sequences for evaluating articular cartilage. 3) To discuss the literature comparing the diagnostic performance of two-dimensional and three-dimensional sequences for evaluating articular cartilage. 4) To discuss the literature comparing the diagnostic performance of different three-dimensional sequences for evaluating articular cartilage.

RC417E 3D Rheumatology MRI

Participants
Parham Pezeshk, MD, Dallas, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review spondyloarthropathies, the burden of disease and the importance of early diagnosis to initiate treatment to avoid irreversible complications. 2) Discuss the challenges of diagnosis and approach to interpret the MR imaging to narrow the differential diagnosis. 3) Review imaging findings of SpA such as enthesis, sacroiliitis, Romanus lesion, Anderson lesion, fatty metaplasia lesions, sacroiliitis, and ankyloses. 4) Discuss the utilization of specific MRI sequences and 3D imaging to improve the diagnostic yield of MR imaging in the diagnosis of SpA. 5) Case presentation of selected examples of pathologies showing incremental value of MR imaging over conventional imaging techniques.

RC418

Tips, Tricks and Pitfalls in Body Oncological Imaging: Experts Tell All

Tuesday, Nov. 27 4:30PM - 6:00PM Room: N229

CT MR OI US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Roya Sohaey, MD, Portland, OR (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify ultrasound features that differentiate between benign and malignant disease, particularly in the female pelvis. 2) Recommend specific scanning techniques and protocols for difficult cases, including use of ultrasound contrast. 3) Develop imaging strategies to enable the radiologist to make a diagnosis with ultrasound and ultrasound only. 4) To discuss newer MRI techniques that are now applied for body oncologic imaging that allows faster, better or more accurate disease diagnosis. 5) To highlight the applications and pitfalls of diffusion-weighted imaging for assessing upper abdominal cancers, peritoneal involvement, pelvic disease and bone marrow involvement (whole body MRI). 6) To survey the applications and limitations of motion insensitive radial-acquisition MR techniques for dynamic contrast enhanced imaging for cancer evaluation. 7) Review the statistics and incidence of common cancers in USA. 8) Discuss the role of CT in oncology practice and value of following optimal oral and IV contrast media protocols. 9) Offer pearls and solutions to overcome the limitations of CT and emerging role of new CT technology.

Sub-Events

RC418A US

Participants
Roya Sohaey, MD, Portland, OR (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify ultrasound features that differentiate between benign and malignant disease, particularly in the female pelvis. 2) Recommend specific scanning techniques and protocols for difficult cases, including the use of ultrasound contrast. 3) Develop imaging workup strategies for specific clinical situations in the abdomen and pelvis. 4) Review specific diagnosis strategies for imaging of non-obstetrical pathology in the pregnant patient.

ABSTRACT

The course will focus on benign and malignant masses that mimic each other, particularly in the area of gynecology but also involving the abdomen.Emphasis is placed on the importance of knowing patient history and using good ultrasound technique, including contrast, in order to make accurate diagnoses with ultrasound. However, at times, further imaging and tissue sampling is necessary. The participant will be encouraged to 'push the envelope' with ultrasound-guided diagnosis rather than use ultrasound as a 'screening tool', particularly in the female pelvis. In addition, we will review non-obstetrical diagnoses in pregnant patients. The radiologist is often called upon by maternal-fetal-medicine providers to guide imaging in this vulnerable population.

Active Handout:Roya Sohaey

http://abstract.rsna.org/uploads/2018/16000398/Body Onc 2018 Ultrasound RC418A.pdf

RC418B CT

Participants
Helen C. Addley, MRCP, FRCR, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

helenclareaddley@hotmail.co.uk

LEARNING OBJECTIVES

1) Explore the integral roles of CT in oncology from routine staging and follow up to problem solving tool. 2) Highlight the radiological reporting features that set apart a specialist report from a standard report. 3) Discuss challenging cases from the gynecological tumor board of cancer center.

Honored Educators

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RC418C MRI

Participants
Dow-Mu Koh, MD,FRCR, Sutton, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To discuss newer MRI techniques that are now applied for body oncologic imaging that allows faster, better or more accurate disease diagnosis. 2) To highlight the applications and pitfalls of diffusion-weighted imaging for assessing upper abdominal cancers, peritoneal involvement, pelvic disease and bone marrow involvement (whole body MRI). 3) To survey the applications and limitations of motion insensitive radial-acquisition MR techniques for dynamic contrast enhanced imaging for cancer evaluation.

RC420

The Role of Molecular and Functional Imaging in Radiation Oncology

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S403B

HN MI NR NM PD RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Nina A. Mayr, MD, Seattle, WA (*Moderator*) Nothing to Disclose

Sub-Events

RC420A The Role of Molecular/Functional Imaging for Radiotherapy in Lymphoma

Participants
Stephanie A. Terezakis, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the significance of molecular/functional imaging in guiding the management of both Hodgkin's and non-Hodgkin's lymphomas. 2) Interpret functional imaging as it relates to treatment response and radiation planning. 3) Determine how to Incorporate PET and CT imaging in delineating radiation treatment volumes utilizing ISRT principles.

RC420B The Role of Molecular/Functional Imaging for Radiotherapy in Pediatric Cancers

Participants
Ralph P. Ermoian, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List 3 non-central nervous system pediatric diseases in which functional imaging is standard of care for staging. 2) Describe how functional imaging plays a role in assessing response to therapy in two non-central nervous system disease. 3) List two emerging uses for functional imaging in pediatric tumor treatment and response assessment.

RC420C The Role of Molecular/Functional Imaging for Radiotherapy in Head and Neck Cancer

Participants
Minh T. Truong, MBBS, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Role of Molecular/Functional Imaging in the diagnosis and staging of Head and Neck Cancer (HNC). 2) Integrating Molecular/Functional Imaging into Radiotherapy Simulation and Planning. 3) Interpretation of Treatment Response to Chemoradiotherapy. 4) Molecular/Functional Imaging as a Biomarker for Patient Quality of Life and Survival.

RC420D The Role of Molecular/Functional Imaging for Radiotherapy in CNS Tumors

Participants
Anca L. Grosu, MD, Freiburg, Germany (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Amino-acids PET (AA-PET) for tumor detection and differentiation between tumor and treatment-related changes in brain gliomas. 2) Comparison between AA-PET and mpMRI for radiation treatment planning in brain tumors. 3) New concepts for target volume delineation in brain tumors.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC421

Advances in CT: Technologies, Applications, Operations - CT Performance

Tuesday, Nov. 27 4:30PM - 6:00PM Room: N226

CT PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants

Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc
Lifeng Yu, PhD, Chicago, IL (*Coordinator*) Nothing to Disclose

ABSTRACT

CT has become a leading medical imaging modality, thanks to its superb spatial and temporal resolution to depict anatomical details. New advances have enabled extending the technology to depict physiological information. This has enabled a wide and expanding range of clinical applications. These advances are highlighted in this multi-session course. The course offers a comprehensive and topical depiction of these advances with material covering CT system innovations, CT operation, CT performance characterization, functional and quantitative applications, and CT systems devised for specific anatomical applications. The sessions include advances in CT system hardware and software, CT performance optimization, CT practice management and monitoring, spectral CT techniques, quantitative CT techniques, functional CT methods, and special CT use in breast, musculoskeletal, and interventional applications.

Sub-Events

RC421A Image Quality Characterization

Participants
Guang-Hong Chen, PhD, Madison, WI (*Presenter*) Research funded, General Electric Company Research funded, Siemens AG

LEARNING OBJECTIVES

1. Understand how to evaluate signal properties in CT; 2. Understand how to evaluate noise properties in CT; 3. Understand how to evaluate image quality by combining signal and noise properties in CT.

RC421B Performance Evaluation

Participants
Yakun Zhang, MS, Durham, NC (*Presenter*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

For information about this presentation, contact:

yakun.zhang@duke.edu

LEARNING OBJECTIVES

1) Understand the current standard for CT performance evaluation oriented towards operational performance. 2) Understand the measurement methods for task-based assessment of CT including resolution, noise, and detectability. 3) Understand the use of operational characteristics to monitor and optimize CT performance.

RC421C Performance Optimization

Participants
Justin B. Solomon, PhD, Durham, NC (*Presenter*) License agreement, Sun Nuclear Corporation; License agreement, 12 Sigma Technologies
Ehsan Samei, PhD, Durham, NC (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) To understand the principle of optimization in targeting specific levels of quality while constraining the mitigating factors. 2) To understand how imaging science and physics enables prospective optimization of imaging exams using phantoms and models. 3) To understand how retrospective analysis of patient image quality and dose can affirm and inform the optimization quality and process.

RC422

Dual Energy CT for Radiotherapy Applications

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S104A

CT PH RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Kristy K. Brock, PhD, Houston, TX (*Moderator*) License agreement, RaySearch Laboratories AB

Sub-Events

RC422A Clinical Need for Dual Energy CT in Proton Radiotherapy

Participants
Jon J. Kruse, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn about calibration of Hounsfield Units for determination of relative stopping power for proton therapy planning. 2) Discuss potential sources of error in stopping power determination. 3) Describe treatment planning strategies to mitigate range uncertainties in proton therapy planning.

RC422B State of the Art in Dual Energy CT Technology

Participants
Jessica Miller, PhD, Madison, WI (*Presenter*) Research Grant, Siemens AG

LEARNING OBJECTIVES

1) Explain basic dual-energy CT principles. 2) Compare current dual-energy CT techniques and associated limitations.

ABSTRACT

With dual-energy computed tomography (DECT), an additional measurement is obtained, allowing for the reconstruction of supplementary information, such as relative electron density and effective atomic number information. The additional information gained through DECT has potential to aid in several aspects of the radiation therapy process, including improving dose calculation accuracy for proton therapy. This course will discuss the basic principles of DECT and compare different vendor solutions for acquisition of DECT images.

RC422C Technical Challenges in the Integration of Dual Energy CT into Radiotherapy Treatment Planning

Participants
Jon J. Kruse, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Compare range uncertainty to other sources of dosimetric error in proton therapy. 2) Observe clinical examples of range variation in proton therapy.

RC423

Making Patients and Staff Safer in Interventional Procedures

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S403A

IR PH SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
William F. Sensakovic, PhD, Scottsdale, AZ (*Coordinator*) Speaker, Bayer AG; Research Grant, Mazor Robotics Ltd; Founder, Telerad Physics Teaching, LLC
Thaddeus A. Wilson, PhD, Madison, WI (*Coordinator*) Nothing to Disclose

For information about this presentation, contact:

wfsensak@gmail.com

LEARNING OBJECTIVES

1) Describe cataract and cancer risks associated with typical interventional radiology procedures and workload. 2) Develop and assess institutional policies for implementing radiation dose tracking and auditing in the interventional setting.

Sub-Events

RC423A Patient Doses (in lab) and Patient Dose Management

Participants
Stephen Balter, PhD, New York, NY (*Presenter*) Speakers Bureau, MAVIG, GmbH

LEARNING OBJECTIVES

1) Understand how in-lab radiation displays and post-procedure radiation use data can be used to optimize patient safety.

RC423B Staff Protection: Cataract and Potential Cancers

Participants
Madan M. Rehani, PhD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain the results from the studies among interventionalists and support staff on eye lens opacities and comprehend the risks. 2) Identify the evidence or lack thereof of cancer risk among interventionalists. 3) Identify the protective measures for staff in interventional suites.

Active Handout:Madan M. Rehani

http://abstract.rsna.org/uploads/2018/18001938/Rehani _RSNA_Cataract _Cancers RC423B.pdf

RC423C Dose Tracking and Audits: Institution-wide Program

Participants
Pei-Jan P. Lin, PhD, Richmond, VA (*Presenter*) Nothing to Disclose
Shelia Regan, RT,BS, Richmond, VA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

pei-jan.lin@vcuhealth.org

LEARNING OBJECTIVES

1) Learn how the 'event-by-event' RDSR data exported from the patient radiation dose monitoring and tracking (PRDMT) systems may be employed to better estimate the peak skin dose (PSD) from fluoroscopy equipment. 2) The estimated PSD is then classified into three 'alert level' which leads to a better patient care through a follow up process which will be described in detail at the presentation. 3) Identify establishment of a Clinical Radiation Safety Office (CRSO) to handle the technical aspect of PRDMT and administrative processes of 'documentation' and 'patient follow up' is the key to a successful patient care. 4) It is necessary to establish CRSO as an enterprise wide office to govern the entire process and functions provided by the CRSO. It is essential to learn that successful PRDMT requires both the 'organization' must be setup and it must be properly staffed with qualified 'personnel'.

ABSTRACT

The internal organization structure is described in detail including the 'alert Levels' and what comes next upon receiving the alerts. The Clinical Radiation Safety Office (CRSO) established at VCU Medical Center plays major key rolls in (1) the patient radiation dose monitoring and tracking (PRDMT) and (2) follow up of patients who receved 'confirmed' peak skin dose that is required by the

Hospital Policy to follow post fluoroscopy examinations as part of VCU's patient care. The key is to establish a Clinical Radiation Safety Office which manage the technical aspect of PRDMT and follow up of patients process. In other words, an institutinal, enterprise wide organization must be created to handle the total patient care for patients who received high dose radiation which could result in deterministic injury.

Active Handout:Pei-Jan Paul Lin

http://abstract.rsna.org/uploads/2018/18001939/2018 RSNA Meeting RC423C.pdf

RC424

Paleoradiology: A Case Study Approach to Mummies of the World

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E260

OT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Sahar Saleem, MD, Cairo, Egypt (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

saharsaleem1@gmail.com

LEARNING OBJECTIVES

1) Identify paleoradiology as a radiology subspecialty where medical imaging methods are used to document and collect data about human remains (skeletons and mummies) and artefacts from antiquity. 2) Recognize the value of different clinical imaging modalities as non-invasive methods for investigating ancient mummies and objects. 3) Discuss the advantages of radiography in the field setting verses transporting the material to an imaging facility. 4) List the types of data that can be acquired in a field radiography study. 5) Describe how the advances in technology have facilitated paleoradiology. 6) Apply a schematic analysis for CT study of a mummy. 7) Differentiate Egyptian from Peruvian mummies and other world mummies. 8) Understand how differences in mummification practices can be revealed using radiology reflect cultural changes. 9) Recognize the value of paleoradiology in diseases detection and adding knowledge about the origin of diseases. 10) Appreciate how the desiccation of human tissue affects the applicability of imaging modalities, designing protocols, and the interpretation findings.11) Recognize that the data provided by CT studies of mummies and related objects in a museum can be used to complete the museum's data-base, support conservation processes, and arrange exhibitions. 12) Recognize the importance of interdisciplinary collaboration in paleoradiology, involving imaging technologists, radiologists, bioarchaeologists, imaging physicists, museologists, conservators and other experts with interests in this diverse field.

Sub-Events

RC424A Paleoradiology: Imaging of the Past

Participants
Sahar Saleem, MD, Cairo, Egypt (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

saharsaleem1@gmail.com

LEARNING OBJECTIVES

View learning objectives under main course title.

RC424B The Mummies of Ancient Egypt

Participants
Sahar Saleem, MD, Cairo, Egypt (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

saharsaleem1@gmail.com

LEARNING OBJECTIVES

View learning objectives under main course title.

RC424C The Mummies of Ancient Peru

Participants
Andrew J. Nelson, PhD, London, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

Active Handout:Andrew John Nelson

http://abstract.rsna.org/uploads/2018/18003133/Hand Out for - Paleoradiology RC424C.pdf

RC424D Mummies from Around the World

Participants
Gerald J. Conlogue, RT, Hamden, CT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC424E Multidisciplinary Practice in Paleoradiology

Participants
Andrew J. Nelson, PhD, London, ON (*Presenter*) Nothing to Disclose
Gerald J. Conlogue, RT, Hamden, CT (*Presenter*) Nothing to Disclose
Sahar Saleem, MD, Cairo, Egypt (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

saharsaleem1@gmail.com

LEARNING OBJECTIVES

View learning objectives under main course title.

RC425

Mini-course: Image Interpretation Science - Computational Perception

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S103AB

AI IN PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Coordinator*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

For information about this presentation, contact:

ekrupin@emory.edu

LEARNING OBJECTIVES

1) Provide an overview of the types and applications of CAD being developed and used today. 2) Summarize the evidence and controversies regarding clinical impact of CAD. 3) Describe future trends in CAD research.

ABSTRACT

Medical images constitute a core portion of the information physicians utilize to render diagnostic and treatment decisions. At a fundamental level, the diagnostic process involves two aspects - visually inspecting the image (perception) and rendering an interpretation (cognition). Key indications of expert interpretation of medical images are consistent, accurate and efficient diagnostic performance, but how do we know when someone has attained the level of training required to be considered an expert? How do we know the best way to present images to the clinician in order to optimize accuracy and efficiency? The advent of digital imaging in many clinical specialties, including radiology, pathology and dermatology, has dramatically changed the way that clinicians view images, how residents are trained, and thus potentially the way they interpret image information, emphasizing our need to understand how clinicians interact with the information in an image during the interpretation process. With improved understanding we can develop ways to further improve decision-making and thus improve patient care.

Sub-Events

RC425A AI in Clinical Radiology

Participants
Maryellen L. Giger, PhD, Chicago, IL (*Presenter*) Stockholder, Hologic, Inc; Shareholder, Quantitative Insights, Inc; Shareholder, QView Medical, Inc; Co-founder, Quantitative Insights, Inc; Royalties, Hologic, Inc; Royalties, General Electric Company; Royalties, MEDIAN Technologies; Royalties, Riverain Technologies, LLC; Royalties, Mitsubishi Corporation; Royalties, Canon Medical Systems Corporation

For information about this presentation, contact:

m-giger@uchicago.edu

LEARNING OBJECTIVES

1) Become familiar with AI, including machine learning and deep learning methods, for use in radiology. 2) Become aware of the potential challenges involved when developing and applying AI to radiological interpretations. 3) Become familiar with some of the future potentials and plans for AI In radiology.

RC425B Intersection of Imaging Informatics and Perception

Participants
Katherine P. Andriole, PhD, Dedham, MA (*Presenter*) Research Grant, NVIDIA Corporation; Research Grant, General Electric Company; Research Grant, Nuance Communications, Inc; Advisory Board, McKinsey & Company, Inc

For information about this presentation, contact:

kandriole@bwh.harvard.edu

LEARNING OBJECTIVES

1) Provide a basic overview of Medical Imaging Informatics. 2) Describe ways in which an understanding of visual perception informs the development and use of Imaging Informatics data visualization tools. 3) Assess ways Imaging Informatics can impact image interpretation.

RC425C Radiologist Interpretation in the Era of AI

Participants
Curtis P. Langlotz, MD,PhD, Menlo Park, CA (*Presenter*) Advisory Board, Nuance Communications, Inc; Shareholder, whiterabbit.ai; Advisory Board, whiterabbit.ai; Shareholder, Nines.ai; Consultant, Nines.ai; Shareholder, TowerView Health; Research Grant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, Alphabet Inc;

LEARNING OBJECTIVES

1) Review the history of radiology reporting. 2) Describe the common pitfalls and mistakes in today's radiology reports. 3) Learn to improve the quality of radiology reports. 4) Assess how the radiology report will evolve in the era of artificial intelligence.

RC427

Objection! Medicolegal Issues for Today's Radiologist

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S404AB

HP

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Jonathan Mezrich, MD, New Haven, CT (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

Jonathan.Mezrich@yale.edu

LEARNING OBJECTIVES

1) Be aware of common medico-legal issues involved in radiology. 2) Understand some issues involved in radiology related legal/employment contracts. 3) Have an awareness of tips to avoid malpractice exposure. 4) Understand the risks involved in failure to communicate unexpected findings. 5) Understand whether tort reform measures could reduce defensive medicine practices.

Sub-Events

RC427A Contract Law Basics: What a Radiologist Needs to Know When Signing His/Her First Employment Contract

Participants
H. Benjamin Harvey, MD, JD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand basic terms that are common to a radiology employment contract. 2) Describe potential pitfalls within a contract, i.e., non-compete, termination, compensation. 3) Discuss the leverage of a potential new hire in negotiating the terms of the contract.

RC427B Hiding in the Hedges: Tips to Minimize Your Malpractice Risk as a Radiologist

Participants
Jonathan Mezrich, MD, New Haven, CT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Jonathan.Mezrich@yale.edu

LEARNING OBJECTIVES

1) Better understand the risks of malpractice inherent in radiology practice. 2) Be aware of several tips to incorporate into their daily practice to limit malpractice exposure.

RC427C Failure to Communicate Significant Unexpected Findings: Still a Malpractice Trap

Participants
Leonard Berlin, MD, Wilmette, IL (*Presenter*) Nothing to Disclose

RC427D Will Tort Reform Reduce Defensive Medicine? A Review of Empirical Evidence

Participants
Saurabh Jha, MD, Philadelphia, PA (*Presenter*) Speakers Bureau, Canon Medical Systems Corporation

For information about this presentation, contact:

saurabh.jha@uphs.upenn.edu

LEARNING OBJECTIVES

1) Understand the various types of Tort reform. 2) Understand the methods behind the empirical evaluation of tort reform. 3) Understand the empirical arguments for and against tort reform. 4) Appreciate the theoretical arguments for and against tort reform.

ABSTRACT

Will tort reform reduce defensive medicine and healthcare costs?

RC429

Imaging Cancer in the Cirrhotic Liver: What We Need to Know (Interactive Session)

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S404CD

GI MR OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Hero K. Hussain, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

Sub-Events

RC429A Imaging Cancer in the Cirrhotic Liver: The Essentials

Participants
Claude B. Sirlin, MD, San Diego, CA (*Presenter*) Research Grant, Gilead Sciences, Inc; Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Bayer AG; Research Grant, ACR Innovation; Research Grant, Koninklijke Philips NV; Research Grant, Celgene Corporation; Consultant, General Electric Company; Consultant, Bayer AG; Consultant, Boehringer Ingelheim GmbH; Consultant, AMRA AB; Consultant, Fulcrum Therapeutics; Consultant, IBM Corporation; Consultant, Exact Sciences Corporation; Advisory Board, AMRA AB; Advisory Board, Guerbet SA; Advisory Board, VirtualScopics, Inc; Speakers Bureau, General Electric Company; Author, Medscape, LLC; Author, Resoundant, Inc; Lab service agreement, Gilead Sciences, Inc; Lab service agreement, ICON plc; Lab service agreement, Intercept Pharmaceuticals, Inc; Lab service agreement, Shire plc; Lab service agreement, Enanta; Lab service agreement, Virtualscopics, Inc; Lab service agreement, Alexion Pharmaceuticals, Inc; Lab service agreement, Takeda Pharmaceutical Company Limited; Lab service agreement, sanofi-aventis Group; Lab service agreement, Johnson & Johnson; Lab service agreement, NuSirt Biopharma, Inc ; Contract, Epigenomics; Contract, Arterys Inc

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) To understand the role of noninvasive imaging liver cancer screening, surveillance, diagnosis, staging, and treatment response assessment. 2) To review the process of carcinogenesis. 3) To understand that the differential diagnosis of malignant liver nodules includes HCC, cholangiocarcinoma, and hepatocholangiocarcinoma. 4) To understand the wide spectrum of lesions and pseudolesions that can be encountered in the cirrhotic liver.

RC429B Imaging Cancer in the Cirrhotic Liver: Diagnosis of Hepatocellular Carcinoma and Other Malignancies

Participants
An Tang, MD, Montreal, QC (*Presenter*) Research Consultant, Imagia Cybernetics Inc; Speaker, Siemens AG; Speaker, Eli Lilly and Company

For information about this presentation, contact:

an.tang@umontreal.ca

LEARNING OBJECTIVES

1) To review atypical forms of HCC in the cirrhotic liver. 2) To discuss malignancies other than HCC encountered in the cirrhotic liver. 3) To examine strategies to improve diagnosis in the cirrhotic liver.

ABSTRACT

Diagnosis of malignancy in the cirrhotic liver can be challenging, especially in the presence of architectural distorsion and innumerable cirrhotic (regenerative) nodules in the background liver. In this refresher course, we will review imaging features of atypical lesions in the cirrhotic liver, including mimickers of HCC, dysplastic nodules in transition to HCC, non-hypervascular HCC, infiltrative HCC, and other unusual forms. We will also discuss malignancy other than HCC, including cholangiocarcinoma, biphenotypic primary liver carcinoma (hepatocholangiocarcinoma), and metastases. We will review strategies to improve diagnostic accuracy in cirrhotic patients, including patient preparation, subtraction imaging, and contrast agents.

Honored Educators

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RC429C Imaging Cancer in the Cirrhotic Liver: Assessment of Response of Hepatocellular Carcinoma to Locoregional Therapy

Participants
Richard Kinh Gian Do, MD, PhD, New York, NY (*Presenter*) Consultant, Bayer AG

LEARNING OBJECTIVES

1) Recognize differences between locoregional therapies for HCC. 2) Compare response criteria used to evaluate HCC treatments. 3) Apply the LI-RADS Treatment Response Algorithm.

ABSTRACT

HCC can be treated by an increasing number of locoregional therapies, making assessment of treatment response increasingly challenging. This lecture will provide an overview of commonly used locoregional therapies and review the common post-treatment appearance of HCC. Comparisons between different response criteria for HCC will highlight challenges in their application to daily clinical practice. The LI-RADS Treatment Response Algorithm will be discussed in the context of existing response criteria and further illustrated with case examples.

RC429D Imaging Cancer in the Cirrhotic Liver: The Role of Hepatobiliary Contrast

Participants
William Masch, MD, Ann Arbor, MI (*Presenter*) Consultant for Bayer AG in 2017

LEARNING OBJECTIVES

1) To describe differences between hepatobiliary contrast and extra-cellular contrast. 2) To assemble a basic MRI protocol utilizing hepatobiliary contrast. 3) To explain possible indications for and advantages of hepatobiliary contrast-enhanced MRI for cancer diagnosis in patients with cirrhosis. 4) To identify limitations of hepatobiliary contrast-enhanced MRI for cancer diagnosis in patients with cirrhosis.

RC431

The New Standard of Care of Large Vessel Stroke is Endovascular: Is Your Radiology Practice Ready?

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S103CD

ER NR IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Joshua A. Hirsch, MD, Boston, MA (*Moderator*) Consultant, Medtronic plc; Data Safety Monitoring Board, Johnson & Johnson; Consultant, Whale Imaging Inc;

LEARNING OBJECTIVES

1) Describe the diagnostic evaluation and decision making algorithms leading to urgent endovascular treatment of acute stroke. 2) Review endovascular techniques for the treatment of acute stroke from microcatheter set up to intra-arterial thrombolysis to mechanical thrombectomy. 3) Discuss case examples of endovascular treatment including patient selection, technique, and pitfalls.

ABSTRACT

Rapid advances in the evaluation, selection, treatment and management of the acute stroke patient necessitates an ongoing educational event highlighing the newest information, techniques and strategies for obtaining the best outcomes for our patients. In this session, all of these topics will be covered in a practical 'how to' and case based approach which is designed to help the practitioner implement best practices. The course is useful for those performing imaging, treatment or both. Analysis of the latest ongoing trials, devices and techniques will be presented. Endovascular tips and tricks will be discussed, as well as pitfalls in the treatment of these patients.

Sub-Events

RC431A Data, Data, Data: How Imaging Has Been Proven to Guide Endovascular Therapy

Participants
Ramon G. Gonzalez, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the physiological changes that occur in acute stroke patients with large vessel occlusions. 2) Identify the most important variables needed to select ischemic stroke patients for endovascular thrombectomy and the most reliable neuroimaging methods to identify these key variables. 3) Review the data that has shown that there is high variability in the growth of the ischemic core that makes possible the endovascular treatment of large vessel occlusion patients up to 24 hours after stroke onset. 4) Appreciate the large proportion of patients that are slow progressors (slow infarct growth) that may be transported for successful endovascular thrombectomy.

RC431B This is How I Do It: Practical Tips for Opening the Occlusion

Participants
Allan L. Brook, MD, Bronx, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the essential ischemic stroke physiology parameters that are essential in selecting patients for endovascular treatment of a large vessel occlusion. 2) Be familiar with the imaging methods that can measure ischemic stroke physiology parameters and their relative accuracy. 3) Use the best available evidence, recognize the optimal imaging approach to select patients with acute ischemic stroke for endovascular treatment.

RC431C Health Policy and Reimbursement RE: Stroke

Participants
Joshua A. Hirsch, MD, Boston, MA (*Presenter*) Consultant, Medtronic plc; Data Safety Monitoring Board, Johnson & Johnson; Consultant, Whale Imaging Inc;

LEARNING OBJECTIVES

1) Understand the essential ischemic stroke physiology parameters that are essential in selecting patients for endovascular treatment of a large vessel occlusion. 2) Be familiar with the imaging methods that can measure ischemic stroke physiology parameters and their relative accuracy. 3) Use the best available evidence, recognize the optimal imaging approach to select patients with acute ischemic stroke for endovascular treatment.

ABSTRACT

Properly selected patients with acute ischemic stroke caused by large vessel occlusion (LVO) may be effectively and safely treated endovascularly with modern thrombectomy devices. We have developed a high-precision imaging tool for selecting such patients. It is an experience and evidence-based clinical triage tool that uses advanced imaging to identify INDIVIDUAL patients most likely to benefit from endovascular stroke therapy. It was based on over a decade of using advanced imaging (CT, CTA, CT perfusion, DWI, MR perfusion) in acute stroke patients and a critical review of the literature and has been validated in clinical trials. The approach

focuses on answering the following key questions using modern imaging: 1. Is there a hemorrhage? Noncontrast CT 2. Is there an occlusion of the distal ICA and/or proximal MCA? CTA 3. Is irreversible brain injury below a specific threshold (e.g. <70ml)? DWI Perfusion imaging is not employed unless patients cannot undergo MRI, or they do not meet the criteria for intervention. Investigations to understand the reasons for the unsuitability of perfusion CT to substitute for DWI have revealed theoretical and practical shortcomings of CTP. A major problem is the low signal-to-noise (SNR) ratio of CT perfusion that results in a poor contrast-to-noise (CNR) ratio in severely ischemic brain. In a comparison between DWI and CTP in over 50 consecutive patients with LVA, Schaefer, et al. showed that the mean CNR of DWI was >4 while it was <1 for CTP derived CBF. The poor CNR results in large measurement error: using Bland-Altman analyses it was found that the 95% confidence interval was ~+/- 50 ml for ischemic lesion volume measurements in individual patients. The Cleveland Clinic adopted a nearly identical algorithm and their results were published. They reported that after the new algorithm was adopted, there was a ~50% reduction in mortality and a ~3-fold increase in good outcomes, despite a ~50% decrease in the number of procedures. A recent prospective observational trial at the MGH using stentrievers and this imaging approach demonstrated >50% favorable outcomes (mRS 0-2) that is similar to recent randomized clinical trials. However, only 3 patients were evaluated for every patient that was treated, a screening to treatment ratio that is much lower than in recently published clinical trials.1. Gonzalez RG, Copen WA, Schaefer PW, Lev MH, Pomerantz SR, Rapalino O, et al. The Massachusetts General Hospital acute stroke imaging algorithm: an experience and evidence based approach. Journal of neurointerventional surgery. 2013;5 Suppl 1:i7-12.2. Wisco D, Uchino K, Saqqur M, Gebel JM, Aoki J, Alam S, et al. Addition of hyperacute MRI AIDS in patient selection, decreasing the use of endovascular stroke therapy. Stroke; a journal of cerebral circulation. 2014;45(2):467-72.3. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. Lancet. 1986 Feb 8;1(8476):307-10.4. Schaefer PW, Souza L, Kamalian S, Hirsch JA, Yoo AJ, Kamalian S, Gonzalez RG, Lev MH. Limited reliability of computed tomographic perfusion acute infarct volume measurements compared with diffusion-weighted imaging in anterior circulation stroke. Stroke. 2015 Feb;46(2):419-24.

RC431D **Q&A**

Participants
Joshua A. Hirsch, MD, Boston, MA (*Presenter*) Consultant, Medtronic plc; Data Safety Monitoring Board, Johnson & Johnson; Consultant, Whale Imaging Inc;
Ramon G. Gonzalez, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose
Allan L. Brook, MD, Bronx, NY (*Presenter*) Nothing to Disclose

RC432

Why Diversity and Inclusion Matter: Beyond Gender and Ethnicity

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S504AB

LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Yoshimi Anzai, MD, Salt Lake City, UT (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn what comes to our mind when you hear a word "diversity"2) To understand the fundamental value of diverse society or organization3) To discuss how we embrace diversity to enrich our culture

ABSTRACT

We have discussed many years or even decades that radiology lacks diversity. We are far from gender equity in radiology in the United States. Leaders in each academic institution are eager to recruit diverse future physician workforce to meet the goal of departmental or organizational diversity goal. We are so busy paying attention to such statistics, we often forget to remind ourselves why. Why we care about Diversity? Why diversity matters? Beyond gender, race, or sexual orientation, there are over twenty social identities that are used to characterize people, ie. married, smoker, tall, skinny, blond, democrat, and so on. Stereotyping is labeling people based on certain superficial appearance, which brings prejudice and premature judgment about people without deeply understanding each other. Studies have shown that more diverse organizations or having women or ethnic minority in the board grow faster and have better problem-solving skills than more homogeneous organizations. By working together with people who do not look like yourself, we foster more inclusive and empathetic culture, sparks creativity and innovation, and encourage "outside of the box" thinking within the organization.

Sub-Events

RC432A Why Diversity Matters

Participants
Yoshimi Anzai, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

yoshimi.anzai@hsc.utah.edu

LEARNING OBJECTIVES

1) To understand real benefits of creating diverse organization. 2) To demonstrate how a diverse team outperform a non-diverse team. 3) To learn the impact of diversity and inclusion to the organizational culture.

Honored Educators

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RC432B Pipeline and Mentorship

Participants
Derek L. West, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

RC432C Program Directors' Role in Embracing Diversity and Inclusion

Participants
Carolynn M. DeBenedectis, MD, Worcester, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

carolynn.debenedectis2@umassmemorial.org

LEARNING OBJECTIVES

1) To identify what groups are considered underrepresented in radiology. 2) Discuss why diversity and inclusion is so important for radiology's future. 3) Learn what program directors can do to reach out to these groups in order to foster their interest in radiology.

RC432D Multi-generational Workforce and Inclusive Culture

Participants
Carolyn C. Meltzer, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the intersectionality of generational issues and diversity in the workplace 2) Discuss the importance of unifying mission, values, and strategy in creating an inclusive culture 3) To explore the competitive advantage of cultivating an inclusive culture in radiology

RC432E **Q&A**

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RC450

US for Thyroid Cancer: Diagnosis, Surveillance, and Treatment

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E261

NR US HN OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jill E. Langer, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Kathryn A. Robinson, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Sheila Sheth, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Sheila.Sheth@nyulangone.org

LEARNING OBJECTIVES

1) Describe the sonographic characteristics of thyroid nodules that are suspicious for malignancy. 2) Discuss the Bethesda Cytology Classification of Thyroid FNA results and the risk of malignancy associated with each category. 3) Describe the indications for new genetic tests that may be performed on FNAs obtained from thyroid nodules with indeterminate cytology. 4) Describe the technique of US-guided biopsy of thyroid nodules and cervical lymph nodes in patients who have undergone thyroidectomy for thyroid cancer. 5) Discuss the rationale and method of performance of US-guided ethanol ablation of malignant cervical adenopathy in post thyroidectomy patients.

ABSTRACT

This presentation will consist of a three individual presentations. The first will review the sonographic characteristics of thyroid nodules that are suggestive of malignancy. Recommendations for selecting which thyroid nodules require ultrasound-guided biopsies which have been provided by both Radiology consensus conferences and published Endocrinology guidelines will be discussed. The second presentation will review with the Bethesda Cytology Classification of Thyroid FNA results and the risk of malignancy associated with each category. Additionally this presentation describes the indications for genetic tests that may be performed on FNAs obtained from thyroid nodules with indeterminate cytology. The last presentation will provide a detailed description of the technique for performing ultrasound guided biopsy of thyroid nodules and cervical lymph nodes. Various methods will be discussed and required equipment outlined. Possible complications, though rare, will be described. A comparison of the typical sonographic features of normal versus abnormal lymph nodes will be presented in an effort to identify those patients in whom sonographic follow up can be used instead of biopsy. A discussion of the possible advantages of adding thyroglobulin assay to cytologic evaluation will be provided. The rationale for and technique of performing ultrasound guided ethanol ablation of malignant cervical lymph nodes in patients with thyroid cancer will be undertaken.

Active Handout:Sheila Sheth

http://abstract.rsna.org/uploads/2018/8001013/Syllabus Thyroid cancer RC450.pdf

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RC452

Dynamic Musculoskeletal US: Clicks and Clunks of the Upper Extremity (Hands-on)

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E264

MK US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Viviane Khoury, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Jon A. Jacobson, MD, Ann Arbor, MI (*Presenter*) Research Consultant, BioClinica, Inc; Advisory Board, General Electric Company; Advisory Board, Koninklijke Philips NV; Royalties, Reed Elsevier
David P. Fessell, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Ghiyath Habra, MD, Troy, MI (*Presenter*) Nothing to Disclose
Joseph H. Introcaso, MD, Neenah, WI (*Presenter*) Nothing to Disclose
Kenneth S. Lee, MD, Madison, WI (*Presenter*) Grant, General Electric Company Research support, SuperSonic Imagine Research support, Johnson & Johnson Consultant, Echometrix, LLC Royalties, Reed Elsevier
Humberto G. Rosas, MD, Madison, WI (*Presenter*) Nothing to Disclose
Marnix T. van Holsbeeck, MD, Detroit, MI (*Presenter*) Minor stockholder, Koninklijke Philips NV; Minor stockholder, General Electric Company; Stockholder, MedEd3D; Grant, Siemens AG; Grant, General Electric Company;
Kambiz Motamedi, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Mark Cresswell, MBBCh, Vancouver, BC (*Presenter*) Research Consultant, RepliCel Life Sciences Inc; Investigator, RepliCel Life Sciences Inc; Consultant, Koninklijke Philips NV
J. Antonio Bouffard, MD, Detroit, MI (*Presenter*) Nothing to Disclose
Joseph G. Craig, MD, Detroit, MI (*Presenter*) Nothing to Disclose
Robert R. Lopez, MD, Cornelius, NC (*Presenter*) Nothing to Disclose
Girish Gandikota, MBBS , Ann Arbor, MI (*Presenter*) Nothing to Disclose
Marcos L. Sampaio, MD, Ottawa, ON (*Presenter*) Nothing to Disclose
Andrew J. Grainger, MRCP, FRCR, Leeds, United Kingdom (*Presenter*) Consultant, Levicept Ltd; Director, The LivingCare Group;
Philippe A. Peetrons, MD, Brussels, Belgium (*Presenter*) Research Consultant, Canon Medical Systems Corporation

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Identify anatomic structures which can impinge or move abnormally in the upper extremity causing pain during normal range of motion. 2) Describe the ultrasound anatomy and scanning technique for a dynamic examination of these lesions. 3) Position patients optimally for the dynamic evaluation of the upper extremity respecting ergonomics.

ABSTRACT

This course will demonstrate standardized techniques of performing the dynamic examination of upper extremity conditions that are only or best demonstrated dynamically. These include shoulder impingement syndrome, acromioclavicular joint instability, long head of biceps dislocation, medial elbow joint instability, extensor carpi ulnaris dislocation, median nerve movement, and trigger finger. In the first portion of the course, probe positioning will be demonstrated on a model patient with overhead projection during live scanning. In the second portion of the course, an international group of expert radiologists will assist participants in learning positioning and scanning of the shoulder, elbow, and wrist/ finger lesions described. An emphasis on dynamic maneuvers and ergonomic documentation of tissue dynamics will be taught. Participants will be encouraged to directly scan model patients.

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RC453

Deep Learning-An Imaging Roadmap

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E451B

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Paula M. Jacobs, PhD, Bethesda, MD (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

Paula.Jacobs@nih.gov

LEARNING OBJECTIVES

1) Understand the framework of 'Deep Learning', Machine Learning, and Neural Net computer algorithms. 2) Comprehend what aspects of radiology practice are most amenable to machine learning deployment. 3) Understand the academic, commercial and clinical perspectives on how the field will likely develop and how NCI's Cancer Imaging Archive (TCIA) can accelerate development of this new technology.

ABSTRACT

Deep Learning,' an independent self-learning computational environment that uses multilayered computational neural nets, has generated considerable excitement (as well as concerns and misperceptions) in medical imaging. Deep learning computational techniques, such as convolutional neural networks (CNNs) generate multiple layer feature classifiers that extract disease relevant features from entire regions of medical images without the need for localization or pre-segmentation of lesions. Although CNNs require training on very large image datasets that encompass particular disease expressions, they can be diagnostically effective since no human input of segmentation features such as size, shape, margin sharpness, texture, and kinetics are required. But their immediate and future applicability as tools for unsupervised medical decision-making are, as yet, not well understood by most clinical radiologists. This overview session of Deep Learning will provide a clearer picture by presenters who are active in that field and who can clarify how the unique characteristics of Deep Learning could impact clinical radiology. It will address how radiologists can contribute to, and benefit from, this new technology. Topics of this multi-speaker session will cover: 1) the general principles of deep learning computational schemas and their mechanisms of handling image inputs and outputs. 2) new technology including hardware shifts in microprocessors from CPU's to GPU devices that offer significant computational advantages 3) how to ensure that Deep Learning results are consistently clinically relevant and meaningful including nodal element tuning and provability so as to assure medical care consistency and reproducibility. 4) how to develop and leverage datasets for deep learning on archives such as the NIH The Cancer Imaging Archive (TCIA) including requirements for input image dataset magnitude and completeness of disease spectrum representation. 5) how to embed essential non-imaging data needed as inputs, (e.g. EHR, outcome, cross-disciplinary metadata, and the data pre-processing required to make DICOM ready for Deep Learning. The presentations will be at a level understandable and relevant to the RSNA radiologist audience.

Sub-Events

RC453A Computer Science Deep Learning Research by the Academic Community

Participants
Fred W. Prior, PhD, Little Rock, AR (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the basic concepts of Machine Learning and Deep Learning and how they differ. 2) Gain insights into how these techniques are being used in quantitative imaging (Radiomic) research.

RC453B Commercial Development and Deployment of Deep Learning Technology

Participants
Abdul Hamid Halabi, Santa Clara, CA (*Presenter*) Developer, NVIDIA Corporation; Spouse, Employee, Covenant Pathology

RC453C Radiology Clinician Perspectives

Participants
Andrea G. Rockall, FRCR,MRCP, London, United Kingdom (*Presenter*) Speaker, Guerbet SA

LEARNING OBJECTIVES

1) Understand the differences between an algorithm that works in the lab and one that works in clinical practice. 2) Identify common weaknesses in study design that can lead to better apparent performance than might be realized in practice. 3) Recognize challenges in practical workflow that might impede clinical adoption of some tools.

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RC454

Enterprise Imaging for the Practicing Radiologist

Tuesday, Nov. 27 4:30PM - 6:00PM Room: E263

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Christopher J. Roth, MD, Raleigh, NC (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the various descriptions of enterprise imaging, and their implications for radiologists. 2) Recognize the business needs driving enterprise imaging at health care organizations. 3) Appreciate the clinical, technical, governance, and financial challenges of enterprise imaging, and how radiologists can assist with solving them while leading local enterprise imaging initiatives.

Sub-Events

RC454A Clinical Challenges in Enterprise Imaging

Participants
Alex Towbin, MD, Cincinnati, OH (*Presenter*) Author, Reed Elsevier; Grant, Guerbet SA; Grant, Siemens AG; Grant, Cystic Fibrosis Foundation; Consultant, Anderson Publishing, Ltd; Advisory Board, IBM Corporation; Advisory Board, KLAS Enterprises LLC;

For information about this presentation, contact:

alexander.towbin@cchmc.org

LEARNING OBJECTIVES

1) Describe the concept of an enterprise imaging archive. 2) Identify the unique challenges associated with incorporating non-DICOM images into an enterprise imaging archive.

ABSTRACT

Over the past 20 years, the field of radiology has built an impressive digital infrastructure, automating many portions of the imaging process from the time of order entry through image distribution. With the advent of small, low-cost, high quality digital cameras, other medical specialties have turned to imaging to visualize and document disorders yet, they have not implemented the same type of digital infrastructure as radiology. Today, thousands of medical images are obtained in hospitals each day. With the increasing reliance on imaging, there is a greater need to build systems and processes to obtain, store, and distribute these images across the enterprise so that health care providers can better care for their patients. Even though many of these problems have been solved in radiology, the solutions are not easily transferred to other specialties due to the differences in imaging hardware and the image acquisition workflow. The purpose of this talk is to describe the problems facing hospitals as they begin to build enterprise imaging archives and to discuss potential solutions to these problems.

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RC454B Technical Challenges in Enterprise Imaging

Participants
David A. Clunie, MBBS, Bangor, PA (*Presenter*) Owner, PixelMed Publishing LLC; Consultant, Carestream Health, Inc; Consultant, CureMetrix, Inc; Consultant, MDDX Research & Informatics; Consultant, General Electric Company; Consultant, Healthcare Tech Solutions; ;

LEARNING OBJECTIVES

View Learning Objectives under main course title

RC454C Finance and Governance Challenges in Enterprise Imaging

Participants
Christopher J. Roth, MD, Raleigh, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Appreciate challenges with respect to enterprise-wide imaging governance and administration in a multi-specialty hospital or health system requiring systematic image capture, storage, metadata association, viewing, and exchange. 2) Learn how radiologists can take a leadership role in procurement, governance, infrastructure sharing and workflow design for specialties just beginning to store and use imaging.

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RCA35

3D Printing Hands-on with Open Source Software: Introduction (Hands-on)

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S401AB

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Beth A. Ripley, MD, PhD, Seattle, WA (*Presenter*) Nothing to Disclose
Tatiana Kelil, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Michael W. Itagaki, MD, MBA, Lynnwood, WA (*Presenter*) Stockholder, Embodi3D, LLC
Anish Ghodadra, MD, New Haven, CT (*Presenter*) Advisory Board, axial3D Limited
Dmitry Levin, Seattle, WA (*Presenter*) Nothing to Disclose
Steve D. Pieper, PhD, Cambridge, MA (*Presenter*) CEO, Isomics, Inc ; Employee, Isomics, Inc ; Owner, Isomics, Inc ; Research collaboration, Siemens AG ; Research collaboration, Novartis AG; Consultant, MeBio ; Research collaboration, Boston Scientific Corporation; Consultant, Boston Scientific Corporation

For information about this presentation, contact:

beth.ripley2@va.gov

LEARNING OBJECTIVES

1) To learn about basic 3D printing technologies and file formats used in 3D printing. 2) To learn how to segment a medical imaging scan with free and open-source software and export that anatomy of interest into a digital 3D printable model. 3) To perform basic customizations to the digital 3D printable model with smoothing, text, cuts, and sculpting prior to physical creation with a 3D printer.

ABSTRACT

'3D printing' refers to fabrication of a physical object from a digital file with layer-by-layer deposition instead of conventional machining, and allows for creation of complex geometries, including anatomical objects derived from medical scans. 3D printing is increasingly used in medicine for surgical planning, education, and device testing. The purpose of this hands-on course is to teach the learner to convert a standard Digital Imaging and Communications in Medicine (DICOM) data set from a medical scan into a physical 3D printed model through a series of simple steps using free and open-source software. Basic methods of 3D printing will be reviewed. Initial steps include viewing and segmenting the imaging scan with 3D Slicer, an open-source software package. The anatomy will then be exported into stereolithography (STL) file format, the standard engineering format that 3D printers use. Then, further editing and manipulation such as smoothing, cutting, and applying text will be demonstrated using MeshMixer and Blender, both free software programs. Methods described will work with Windows, Macintosh, and Linux computers. The learner will be given access to comprehensive resources for self-study before and after the meeting, including an extensive training manual and online video tutorials.

Active Handout:Michael Ward Itagaki

http://abstract.rsna.org/uploads/2018/14003455/RCA35 1.0 Intro to Open Source 3D Printing RCA35.pdf

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Tatiana Kelil, MD - 2017 Honored Educator

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
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RCB35

Querying, Parsing, and Extracting DICOM Data: Basic Functionality with Real-World Use Cases and Applications (Hands-on)

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S401CD

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Ross W. Filice, MD, Chevy Chase, MD (*Moderator*) Co-founder, DexNote, LLC; Research Grant, NVIDIA Corporation; Advisor, BunkerHill Health, Inc
Ross W. Filice, MD, Chevy Chase, MD (*Presenter*) Co-founder, DexNote, LLC; Research Grant, NVIDIA Corporation; Advisor, BunkerHill Health, Inc
Simon Rascovsky, MD, MSc, Bogota, Colombia (*Presenter*) Director, Nucleus Health, LLC
Marc D. Kohli, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ross.w.filice@gunet.georgetown.edu

LEARNING OBJECTIVES

1) Learn how to use command line tools to query and retrieve studies from an archive. 2) Parse these studies to find useful DICOM elements and metadata. 3) Summarize metadata to gain insight into exams. 4) Extract pixel data and render jpegs or other file formats and even create movies or animated gifs.

Active Handout:Ross Warren Filice

http://abstract.rsna.org/uploads/2018/18001623/RSNA DICOM workshop RCB35.pdf

RCC35

Don't Let MACRA and MIPs Kill Your Practice: How To Optimize Your Participation

Tuesday, Nov. 27 4:30PM - 6:00PM Room: S501ABC

HP IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
David C. Levin, MD, Philadelphia, PA (*Moderator*) Consultant, HealthHelp, LLC; Board Member, Outpatient Imaging Affiliates, LLC
David C. Levin, MD, Philadelphia, PA (*Presenter*) Consultant, HealthHelp, LLC; Board Member, Outpatient Imaging Affiliates, LLC
Ezequiel Silva III, MD, San Antonio, TX (*Presenter*) Nothing to Disclose
J. R. Geis, MD, Fort Collins, CO (*Presenter*) Advisor, Koninklijke Philips NV;

For information about this presentation, contact:

david.levin@jefferson.edu

LEARNING OBJECTIVES

1) Understand how the Medicare Access and CHIP Reauthorization Act (MACRA) and Merit-Based Incentive Payment System (MIPS) will affect your radiology practice. 2) Learn about new changes in the government's value based care. 3) Discover how data registries will help you comply with MIPS. 4) Find out which MIPS metrics are most applicable to radiologists.

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SPDL40

Keeping Radiology Weird: Spot Diagnoses from the Pacific Northwest (Case-based Competition)

Wednesday, Nov. 28 7:15AM - 8:15AM Room: E451B

GI MK

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Barry G. Hansford, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Kyle K. Jensen, MD, Portland, OR (*Presenter*) Nothing to Disclose
Alice W. Fung, MD, Portland, OR (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

funga@ohsu.edu

LEARNING OBJECTIVES

1) The participant will be introduced to a series of musculoskeletal and abdominal radiology case studies via an interactive game approach designed to encourage 'active' consumption of education material. 2) The participant will be able to use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) The attendee will receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. This interactive session will use RSNA Diagnosis Live. Please bring your charged wireless device (phone, tablet, laptop) to participate.

SPSH40

Hot Topic Session: Fast MSK MR Imaging

Wednesday, Nov. 28 7:15AM - 8:15AM Room: E450A

AI MR MK

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Soterios Gyftopoulos, MD, Scarsdale, NY (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

Soterios.Gyftopoulos@nyumc.org

LEARNING OBJECTIVES

1) Describe the evolution of MRI and the reasons for and against the implementation of fast MR imaging. 2) Describe the advantages and disadvantages of current and emerging techniques for fast MR imaging. 3) Describe how machine learning can be used to accelerate MR imaging.

Sub-Events

SPSH40A Fast MR Imaging: What, How, and Why

Participants
Soterios Gyftopoulos, MD, Scarsdale, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Soterios.Gyftopoulos@nyumc.org

LEARNING OBJECTIVES

1) Review the evolution of MR imaging from its inception to its current state. 2) Discuss the reasons for and against fast MR imaging.

SPSH40B Current Techniques for Fast MR Imaging

Participants
Naveen Subhas, MD, Shaker Heights, OH (*Presenter*) Research support, Siemens AG

LEARNING OBJECTIVES

1) Review current techniques that are available to obtain faster MRI scans including abbreviated MRI, single sequence 3D MRI and parallel imaging. 2) Discuss advantages and limitations of these techniques.

SPSH40C Emerging Techniques for Fast MR Imaging

Participants
Jan Fritz, MD, Baltimore, MD (*Presenter*) Research Grant, Siemens AG; Scientific Advisor, Siemens AG; Scientific Advisor, Alexion Pharmaceuticals, Inc; Speaker, Siemens AG

For information about this presentation, contact:

jfritz9@jhmi.edu

LEARNING OBJECTIVES

1) To review new and emerging acceleration techniques for 2D and 3D MRI. 2) To identify advantages and limitations of the different acceleration techniques. 3) To apply the most appropriate acceleration techniques for various clinical scenarios of musculoskeletal MRI.

SPSH40D Machine Learning for Fast MR Imaging

Participants
Michael P. Recht, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

michael.recht@nyumc.org

LEARNING OBJECTIVES

1) Explain the basic concepts behind using machine learning for MR image reconstruction. 2) Understand the advantages provided

by machine learning image reconstruction.

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MSRT41

ASRT@RSNA 2018: Ultrasound versus MRI for Imaging of the Female Pelvis

Wednesday, Nov. 28 8:00AM - 9:00AM Room: N230B

GU MR US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Deborah Levine, MD, Boston, MA (*Presenter*) Editor with royalties, Taylor & Francis Group; Editor with royalties, Reed Elsevier;

For information about this presentation, contact:

dlevine@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Understand the various adnexal masses that can be confused with neoplasms, and when MR might be useful in differentiating various types of adnexal masses. 2) Recognize features of endometriosis and when MR can add additional information that might alter patient care. 3) Understand the role of MR in triage of patients potentially under uterine artery embolization for fibroids.

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RCA41

Prostate MRI (Hands-on)

Wednesday, Nov. 28 8:00AM - 10:00AM Room: S401AB

GU MR

AMA PRA Category 1 Credits ™: 2.00
ARRT Category A+ Credits: 2.25

Participants
Jelle O. Barentsz, MD, PhD, Nijmegen, Netherlands (*Presenter*) Advisor, SPL Medical BV
Daniel J. Margolis, MD, Los Angeles, CA (*Presenter*) Consultant, Blue Earth Diagnostics Ltd
Roel D. Mus, MD, Groesbeek, Netherlands (*Presenter*) Nothing to Disclose
Joyce G. Bomers, Arnhem, Netherlands (*Presenter*) Nothing to Disclose
Jurgen J. Futterer, MD, PhD, Nijmegen, Netherlands (*Presenter*) Research Grant, Siemens AG
Rianne R. Engels, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Renske L. van Delft, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Michiel Sedelaar, MD, PhD, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Antonio C. Westphalen, MD, Mill Valley, CA (*Presenter*) Scientific Advisory Board, 3DBiopsy, Inc;
Geert M. Villeirs, MD, PhD, Ghent, Belgium (*Presenter*) Nothing to Disclose
Leonardo K. Bittencourt, MD, PhD, Rio De Janeiro, Brazil (*Presenter*) Nothing to Disclose
Vibeke B. Logager, MD, Herlev, Denmark (*Presenter*) Nothing to Disclose
Baris Turkbey, MD, Bethesda, MD (*Presenter*) Nothing to Disclose
Joseph J. Busch, MD, Chattanooga, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Renske.vandelft@radboudumc.nl

LEARNING OBJECTIVES

1) Understand the Pi-RADS v2 Category assessment to detect and localize significant cancer for both peripheral zone and transitional zone lesions. 2) Recognize benign pathology like inflammation and BPH and to differentiate these from significant prostate cancers.

ABSTRACT

In this Hands-on Workshop, the participants will able to review up to 47 multi-parametric MRI cases with various prostatic pathology using a dedicated workstation. Focus will be on the overall assessment of PI-RADS v2 category, which enables them to score the probability of the presence of a significant cancer in patients with elevated PSA and/or clinical suspicion. All cases are from daily non-academic practice, and have various levels of difficulty. The cases include: easy and difficult significant peripheral-transition- and central zone cancers, inflammation, BPH, and the most common pitfalls. Internationally renowned teachers will guide the participants during their PI-RADS v2 scoring. The coursebook can be found at: http//bit.ly/rsna2018 . Please note: To guarantee the best learning experience, we can only allow 100 people in the room (2 per computer). First come first serve.

Active Handout:Renske Lian van Delft

http://abstract.rsna.org/uploads/2018/16002005/Workshop RSNA 2018 Coursebook small RCA.pdf

MSCP41

Case-based Review of Pediatric Radiology (Interactive Session)

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E450B

GI GU NR PD VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Ricardo Restrepo, MD, Miami, FL (*Director*) Nothing to Disclose

For information about this presentation, contact:

ricardo.restrepo@nicklaushealth.org

Sub-Events

MSCP41A Pediatric Brain Disorders

Participants
Korgun Koral, MD,MBA, Dallas, TX (*Presenter*) Nothing to Disclose

MSCP41B Pediatric Vascular Disorders

Participants
Josee Dubois, MD, Montreal, QC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

josee.dubois.hsj@ssss.gouv.qc.ca

LEARNING OBJECTIVES

1) Define the classification of the vascular anomalies. 2) Describe the imaging findings of the most common vascular anomalies. 3) Identify the mimickers of the vascular tumors.

ABSTRACT

During this interactive session, vascular anomalies cases will be presented allowing the learners to recognize the imaging findings and to understand the importance of performing US and MR for diagnosis. Key points will be discussed to avoid misdiagnosis.

MSCP41C Pediatric Abdominal Disorders

Participants
Patricia T. Acharya, MD, Loma Linda, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify a wide range of pediatric abdominal disorders. 2) Describe imaging features of various pediatric abdominal disorders.

ABSTRACT

During this interactive session, pediatric abdominal disorder cases will be presented allowing the learners to recognize and describe the imaging features of various diagnostic entities. Key points will be discussed to avoid misdiagnosis.

MSCP41D Pediatric Pelvic Disorders

Participants
Jennifer K. Son, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify a wide range of pediatric pelvic disorders. 2) Describe imaging features of various pediatric pelvic disorders.

ABSTRACT

During this case-driven, interactive session, pediatric pelvic disorders will be presented allowing the participants to recognize and describe the imaging features of various diagnostic entities.

MSES41

Essentials of Cardiac Imaging

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S100AB

CA CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

MSES41A Aortic Valvular Disease

Participants
John P. Lichtenberger III, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jlichtenberger@mfa.gwu.edu

LEARNING OBJECTIVES

1) Describe the detailed imaging anatomy of the aortic valve, including congenital variants and malformations. 2) List incidental and known aortic valvular diseases detectable on radiography, CT, and MRI and organize that list based on epidemiology. 3) Select the best imaging modality to evaluate a given aortic valvular disease. 4) Adjust imaging protocols to optimize the evaluation of common aortic valvular diseases.

ABSTRACT

The increasing temporal and spatial resolution of imaging technology, the advancing functional data obtainable by imaging modalities, and the ever-broadening knowledge of aortic valvular disease present a challenge to both general and subspecialized imagers. This lecture will focus on the most common and most important diseases of the aortic valve encountered in clinical practice, whether those diseases are discovered incidentally or are known and must be comprehensively characterized. Emphasis will be placed on avoiding pitfalls and on obtaining and providing clinically useful information.

MSES41B Cardiac Devices: Appearance on Imaging

Participants
Karin E. Dill, MD, Worcester, MA (*Presenter*) Nothing to Disclose

MSES41C Imaging Complications of Myocardial Infarction and CABG

Participants
Seth J. Kligerman, MD, Denver, CO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

skligerman@ucsd.edu

LEARNING OBJECTIVES

1) Learn about the early and late complications of myocardial infarction. 2) Understand how each of these manifestations appear on cross-sectional imaging. 3) Discuss medical and surgical treatment options.

ABSTRACT

Acute myocardial infarction is a leading cause of mortality in the United States. However, even if a patient survives the initial insult, myocardilal damage can lead to both early and late complications including left ventricular free wall rupture, ventricualr septal rupture, papillary muscle rupture, pericaridits, and aneurysm formation. Some of these are life-threatening complications that require immediate diagnosis. The purpose of this talk is the review the various patholgies that involve the myocardium and pericardium, review their imaging findings, and dicuss treatment options.

MSES41D Cardiac CT in Acute Chest Pain

Participants
Christian Loewe, MD, Vienna, Austria (*Presenter*) Speaker, Bracco Group; Speaker, General Electric Company; Speaker, Siemens AG

For information about this presentation, contact:

Christian.loewe@meduniwien.ac.at

LEARNING OBJECTIVES

1) To learn about the current and possible future role of Cardiac CT in the management of patients suffering from acute chest pain. 2) To become familiar with the most important imaging biomarkers in acute coronary syndromes. 3) To discuss possible algorithms for the management of patients with acute chest pain.

ABSTRACT

Three potentially life-threatening disorders can become clinically evident by the unspecific symptom of "acute chest pain", and in two out of them including pulmonary embolism and acute aortic syndrome CT angiography was established as the first diagnostic modality of choice. Given the high evidence for the value of Cardiac CT in ruling out relevant coronary artery disease in stable patients and facing still existing challenges to safely triage patients in chest pain units, the possible role of Cardiac CT in this clinical scenario is under evaluation and discussion. It is proven that CT can be used to safely rule out acute coronary syndromes with a very high negative predictive value and that CT can help to early discharge patients from the chest pain unit. However, the possible role in the positive diagnosis of an acute coronary syndrome is not as clear. Within this presentation, an overview about the technical possibilities of using CT in the management of acute chest pain patients will be provided. Furthermore, the most important differential diagnoses will be addressed with the most relevant imaging findings in the acute setting. The main focus of the presentation, however, will be on the existing challenges and possible solutions of using Cardiac CT in patients with acute coronary syndromes. New CT techniques, including CT derived FFR as well as CT perfusion will be introduced and their potential in the emergency setting should be outlined.

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MSRO41

BOOST: Pediatrics-Oncology Anatomy and Case-based Multidisciplinary Review (Interactive Session)

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S103CD

OI PD RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Michael S. Gee, MD, PhD, Boston, MA (*Moderator*) Nothing to Disclose
Camilo Jaimes Cobos, MD, Boston, MA (*Presenter*) Nothing to Disclose
Susan L. McGovern, MD, PhD, Houston, TX (*Presenter*) Nothing to Disclose
Alison M. Friedmann, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

afriedmann@partners.org

msgee@mgh.harvard.edu

camilo.jaimescobos@partners.org

LEARNING OBJECTIVES

1) To apply knowledge of imaging anatomy to pediatric cancer diagnosis and staging. 2) To understand to role of imaging in pediatric cancer diagnosis and treatment.

ABSTRACT

per lead presenter

Active Handout:Camilo Jaimes Cobos

http://abstract.rsna.org/uploads/2018/18002071/RSNA_BOOST_CJ MSRO41.pdf

MSSR41

RSNA/ESR Sports Imaging Symposium: Upper Extremity Sports Injuries (Interactive Session)

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E352

ER MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Laura W. Bancroft, MD, Orlando, FL (*Moderator*) Author with royalties, Wolters Kluwer nv; Speaker, World Class CME; Editor, Thieme Medical Publishers, Inc; Travel support, Thieme Medical Publishers, Inc ; ;
Andrew J. Grainger, MRCP, FRCR, Leeds, United Kingdom (*Moderator*) Consultant, Levicept Ltd; Director, The LivingCare Group;

For information about this presentation, contact:

andrewgrainger@nhs.net

Sub-Events

MSSR41A Shoulder Injuries in the Throwing Athlete

Participants
Lynne S. Steinbach, MD, Tiburon, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the biomechanics of throwing forces as they relate to the shoulder. 2) To become familiar with rotator cuff, labroligamentous, and osseous abnormalities caused by overhead sports.

ABSTRACT

Overhead throwing athletes develop significant abnormalities as a result of acquired adaptations to the extremes of motion in the dominant shoulder. These abnormalities may eventually result in an inability to throw with the same velocity, the so-called "dead arm" syndrome. These abnormalities involve tendons, ligaments, labrum, muscles, nerves, vessels, and bones. This presentation will review the biomechanics of throwing forces as they relate to the shoulder. The MR imaging characteristics of the resultant abnormalities in the labroligamentous structures and the rotator cuff will also be highlighted. As a prototype, the throwing motion in baseball occurs over a period of approximately 2 seconds and is divided into six stages: wind up, cocking, early and late acceleration, deceleration, and follow through. The late cocking, acceleration, and deceleration phases produce the greatest stress on the glenohumeral joint structures. As with other throwing sports, the superior labrum and rotator cuff are often affected by these extreme forces.

MSSR41B Soft Tissue Wrist Injury in the Athlete

Participants
Christian W. Pfirrmann, MD, MBA, Forch, Switzerland (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn about the patterns of injury seen at the wrist in athletes. 2) To understand the advantages and disadvantages of different modalities for imaging the athlete's wrist. 3) To recognize the imaging appearances of cartilage and ligamentous injury at the wrist.

MSSR41C Interactive Case Discussion

Participants
Lynne S. Steinbach, MD, Tiburon, CA (*Presenter*) Nothing to Disclose
Christian W. Pfirrmann, MD, MBA, Forch, Switzerland (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To appreciate pathologic and normal developmental changes in skeletally immature throwing athletes, especially around the physis. 2) To consolidate the knowledge gained from the session with interactive cases of upper limb athletic injury as it relates to the skeletally immature throwing athlete.

ABSTRACT

The first part of this interactive session will show some cases of pathologic and normal developmental changes around the physis of shoulders of skeletally immature throwing athletes. The second part of this intercactive sessions will show and diuscuss cases with athletic unjuries about the wrist.

RC501

Lung Cancer Screening Diagnosis Live (Interactive Session)

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E353C

CH CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Caroline Chiles, MD, Winston-Salem, NC (*Moderator*) Advisory Board, ImBio, LLC

For information about this presentation, contact:

cchiles@wakehealth.edu

LEARNING OBJECTIVES

1) Confirm compliance with screening guidelines, including patient eligibility, scanning protocols, radiation dose, CMS requirements and National Lung Screening Registry. 2) Incorporate shared decision making and smoking cessation in the lung screening visit. 3) Assign Lung-RADS categories to nodules encountered at baseline and annual screening CT. 4) Evaluate atypical screening findings. 5) Manage incidental findings, including COPD, coronary artery calcification, and potential extrapulmonary malignancies.

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC501A Logistics of Screening

Participants
Jared D. Christensen, MD, Durham, NC (*Presenter*) Advisory Board, Riverain Technologies, LLC

For information about this presentation, contact:

jared.christensen@duke.edu

LEARNING OBJECTIVES

1) Confirm compliance with screening guidelines, including patient eligibility, scanning protocols, radiation dose, CMS requirements, and National Lung Screening Registry.

RC501B Shared Decision Making and Smoking Cessation

Participants
Robert Volk, PhD, Houston, TX (*Presenter*) Nothing to Disclose

RC501C Nodule Assessment and Lung-RADS Categories

Participants
Mylene T. Truong, MD, Houston, TX (*Presenter*) Nothing to Disclose

Honored Educators

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RC501D Interesting Cases Encountered in a Screening Program

Participants
Brett M. Elicker, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

brett.elicker@ucsf.edu

LEARNING OBJECTIVES

1) Describe the role of imaging in the multi-disciplinary approach to suspected lung cancer. 2) Compare the different management options in suspected lung nodules detected on lung cancer screening CT. 3) Summarize how to appropriately use Lung-RADS when interpreting lung cancer screening CTs.

RC501E Participants' Incidental Findings on the Low-Dose CT

Carol C. Wu, MD, Bellaire, TX (*Presenter*) Author, Reed Elsevier

For information about this presentation, contact:

carolcwu@gmail.com

LEARNING OBJECTIVES

1) To discuss the prevalence and significance of incidental findings on LDCT. 2) To review the latest evidence-based management recommendations for various incidental findings on LDCT.

RC502

International Radiology Outreach

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S502AB

ED

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Donald P. Frush, MD, Durham, NC (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

donald.frush@duke.edu

LEARNING OBJECTIVES

1) Learn about opportunities for international educational outreach. 2) Understand challenges with developing, implementing and maintaining outreach programs. 3) Be familiar with tactics to develop, implement and maintain outreach programs. 4) Be able to describe the RAD-AID as a model for international educational outreach. 5) Benefit from the opportunity to discuss with panel members issues related to efforts at international educational outreach.

Sub-Events

RC502A Contemporary Strategies and Tactics for Global Radiology Education Outreach

Participants
David A. Rosman, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

drosman@mgh.harvard.edu

LEARNING OBJECTIVES

1) To learn about concepts behind sustainable involvement in low and middle resource countries. 2) Discuss the starting of a residency that is designed for low resource settings in order to create long term radiology sustainability and partnership that is bilateral rather than one designed for volunteerism.

RC502B Connecting the World: Opportunities and Obstacles for Radiology Education Outreach

Participants
Eric J. Stern, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To gain a greater understanding of the many opportunities for international radiology educational outreach, with a focus on web-based activities. 2) To appreciate the multifaceted efforts aimed at providing and expanding the awareness and ready access to the many radiology educational resources currently available for under resourced radiology communities.

RC502C RAD-AID: Looking Ahead and a Vision for the Future

Participants
Daniel J. Mollura, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

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RC503

Read with the Experts (Cardiac Radiology) (Interactive Session)

Wednesday, Nov. 28 8:30AM - 10:00AM Room: N228

CA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

FDA Discussions may include off-label uses.

Participants

Jill E. Jacobs, MD, New York, NY (*Moderator*) Nothing to Disclose
Cylen Javidan-Nejad, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Smita Patel, FRCR,MBBS, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Sanjeev Bhalla, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Amar B. Shah, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ashah27@northwell.edu

jill.jacobs@nyumc.org

LEARNING OBJECTIVES

1) Use cardiac CTA cases to allow participants to generate an appropriate differential diagnosis using Cardiac CTA and Cardiac MRI when reviewing cases. 2) Develop a better understanding of when Cardiac CTA and Cardiac MRI can be used for diagnosis.

Honored Educators

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RC504

Musculoskeletal Series: Shoulder MRI

Wednesday, Nov. 28 8:30AM - 12:00PM Room: S406A

MR MK

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Adam C. Zoga, MD, Philadelphia, PA (*Moderator*) Nothing to Disclose
Lawrence M. White, MD, FRCPC, Toronto, ON (*Moderator*) Nothing to Disclose
Erin F. Alaia, MD, New York, NY (*Moderator*) Nothing to Disclose
Lynne S. Steinbach, MD, Tiburon, CA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

lawrence.white@uhn.ca

llenchik@wakehealth.edu

Erin.Fitzgerald@nyumc.org

Sub-Events

RC504-01 Rotator Cuff

Wednesday, Nov. 28 8:30AM - 8:55AM Room: S406A

Participants
Douglas W. Goodwin, MD, Lebanon, NH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To describe the spectrum of normal and pathologic imaging features of the rotator cuff.

RC504-02 Labrum/Cartilage

Wednesday, Nov. 28 8:55AM - 9:20AM Room: S406A

Participants
Lawrence M. White, MD, FRCPC, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Lawrence.White@sinaihealthsystem.ca

LEARNING OBJECTIVES

1) Describe the normal anatomy and function of the labrum and articular cartilage of the glenohumeral joint. 2) Identify appropriate imaging techniques and protocols for assessment of the labrum and articular cartilage of the glenohumeral joint 3) Describe the spectrum of normal and pathologic MR imaging features of the labrum and articular cartilage of the glenohumeral joint.

RC504-03 Isolated Teres Minor Oedema and/or Atrophy: A Manifestation of Adhesive Capsulitis with Involvement of the Primary Motor Branch of the Teres Minor Muscle at the Stout Fascial Sling

Wednesday, Nov. 28 9:20AM - 9:30AM Room: S406A

Participants
Aamer F. Iqbal, MBChB, Newport, United Kingdom (*Presenter*) Nothing to Disclose
Suresh Dalavaye, FRCR, MBBS, Swansea, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Ayesha Z. Khatib, MBBS, Cardiff, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

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PURPOSE

Isolated teres minor denervation in the absence of a structural lesion involving the axillary nerve is not an uncommon finding on shoulder MRI. Pathologies such as rotator cuff injuries and axillary nerve traction injury have been mentioned. In our centre, we have identified a number of cases of teres minor oedema in patients with adhesive capsulitis. A study by Chafik et al (2013) described the complex anatomy of the teres minor muscle and found a combined fascia of the infraspinatous, teres minor, long head of triceps and deltoid muscle which forms a stout fascial sling attaching just medial to the inferior glenoid articular cartilage. They discovered that the primary motor branch of the teres minor runs inferior to this prior to entering the muscle. We believe that

posterior inferior joint capsule involvement in adhesive capsulitis results in teres minor oedema and/or atrophy secondary to denervation of this primary motor branch.

METHOD AND MATERIALS

This retrospective study analysed all MRI shoulders with a radiolological diagnosis of adhesive capsulitis between 2014-17. Each study was re-reviewed to assess the posterior joint capsule for thickening and its proximity to the described location of the stout fascial sling, the axillary neurovascular bundle and the teres muscle for oedema and/or atrophy.

RESULTS

There were a total of 59 cases with 'adhesive capsulitis' between 2014-2017. There were 38 males and 21 females. The age range was 23-74yrs with a mean age of 47.7yrs. 48(81%) patients had thickening of the posterior inferior joint capsule in close proximity to the described location of the fascial sling. Of these, 36(75%) patients had oedema and/or atrophy. 24(50%) patients had isolated teres minor oedema and 14(29%) patients had isolated muscle atrophy. No axillary bundle lesion were identified.

CONCLUSION

The primary motor branch of the teres minor muscle courses just inferior to the stout fascial sling insertion onto the glenoid neck before it becomes sub-fascial. Adhesive capsulitis with thickening of the posterior inferior joint capsule in close proximity to the stout fascial sling may result in denervation of the primary motor branch of the teres minor resulting in isolated oedema and/or atrophy.

CLINICAL RELEVANCE/APPLICATION

Adhesive capsulitis should be excluded in symptomatic patients thought to have idiopathic isolated muscle oedema/atrophy undergoing surgical decompression of the Teres minor nerve.

RC504-04 Magnetic Resonance Arthrogram Features That Can Be Used to Distinguish Between Iatrogenic Extravasation and True Inferior Glenohumeral Ligament Complex Tears

Wednesday, Nov. 28 9:30AM - 9:40AM Room: S406A

Participants
Lidi Wan, MD,MD, San Diego, CA (*Presenter*) Nothing to Disclose
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PURPOSE

To identify MR imaging features on shoulder arthrography which can distinguish between iatrogenic-induced extravasation and real IGHL complex lesions and to determine the diagnostic performance of these imaging features.

METHOD AND MATERIALS

This was an IRB-approved, retrospective multi-institution study. 1,740 MR arthrograms were screened for extravasation through the IGHL complex. Exams were independently scored by 3 MSK fellowship-trained radiologists. The IGHL complex was assessed along the anterior-posterior and medial-lateral locations. Morphology of the disrupted margin was evaluated: maximum thickness of the portion floating in contrast (thin, <1mm; medium, 1-3mm; thick, >3mm), caliber change at the torn margin (tapering or reverse tapering), and regularity of the torn margin (single thin fascicle, mop-head, scarred). T-tests, chi-squared tests, and sensitivity/specificity were calculated.

RESULTS

35 exams fulfilled the strict inclusion criteria. Of those with true tears, 8/16 (50%) had a torn anterior band whereas 0/19 cases of iatrogenic induced extravasation demonstrated anterior band disruption ($p<0.001$). In those with iatrogenic induced extravasation, 12/19 (63.2%) had solitary extravasation through the posterior half of the axillary pouch, compared to none in true IGHL complex lesions ($p<0.001$). Thick ends were present in 10/16 (62.5%) of the true IGHL complex lesion group whereas 0/19 (0%) demonstrated this finding in the iatrogenic induced extravasation group ($p < 0.001$). Scarred margins were seen in 8/16 (50%) with true IGHL complex lesions and none of the iatrogenic induced extravasation cases ($p<0.001$). Presence of a torn anterior band, thick ligament, reverse tapered caliber, and scarred appearance of the torn margin were shown to be 100% specific and a torn posterior band demonstrated 84.2% specificity for true IGHL complex tears. The presence of solitary involvement of the posterior portion of axillary pouch demonstrated 63.2% sensitivity for iatrogenic induced contrast extravasation, but was 100% specific.

CONCLUSION

We have identified MR arthrogram features that can aid the radiologist in distinguishing between iatrogenic-induced extravasation and real IGHL complex lesions.

CLINICAL RELEVANCE/APPLICATION

Discriminating between a true IGHL complex tear from iatrogenic extravasation can be difficult on shoulder MR arthrography, however we have identified features that may aid the radiologist.

RC504-05 Cost-Effectiveness of MR Arthrography versus MRI for Slap Tears

Wednesday, Nov. 28 9:40AM - 9:50AM Room: S406A

Participants
Naveen Subhas, MD, Shaker Heights, OH (*Presenter*) Research support, Siemens AG

Jordan Conroy, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
James Koo, New York, NY (*Abstract Co-Author*) Nothing to Disclose
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Anthony Miniaci, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To determine if direct magnetic resonance arthrography (MRA) is more cost-effective than a non-contrast magnetic resonance imaging (MRI) in the diagnsosis and management of superior labral anterior to posterior (SLAP) tears.

METHOD AND MATERIALS

Our base case was a 25-year-old with clinical findings of a SLAP tear in whom an imaging test is being ordered for further management. Decision analysis software (TreeAge Pro) was used to create a model from the healthcare perspective to evaluate the cost-effectiveness of 4 imaging strategies: 3-Tesla (T) MRA, 3T MRI, 1.5T MRA and 1.5T MRI. Probability and utility estimates were obtained from published literature. Commercial insurance and Medicaid reimbursements were derived from 2017 Medicare rates. Effectiveness was measured in quality-adjusted life years (QALY) over a 2-year period and costs were calculated in 2017 U.S. dollars.

RESULTS

3T MRI is the least expensive ($6126) and most effective (1.62165 QALY) strategy for our base case and is dominant to 3T MRA ($6799, 1.6165 QALY), 1.5T MRA ($7036, 1.60407 QALY) and 1.5T MRI ($6965, 1.58446 QALY). 3T MRA becomes the most cost-effective option if the specificity of 3T MRI drops below 90.4% with a willingness-to-pay (WTP) threshold of $100,000. If 3T is excluded from the analysis, 1.5T MRA is dominant for our base case but 1.5T MRI becomes the most cost effective option if its specificity is higher than 80.3%. The results remained robust and did not change over a reasonable range of costs, utilities, probabilities and WTP thresholds in 1-way, 2-way and probabilistic sensitivity analyses.

CONCLUSION

3T MRI is the most cost-effective option for management of SLAP tears. If a 3T magnet is not available, 1.5T MRA is the most cost effective option. In both circumstances, the most cost effective option is the test with highest specificity.

CLINICAL RELEVANCE/APPLICATION

MRA has been traditionally considered the test of choice when evaluating labral tears, including SLAP tears. This study, however, shows that if imaging is performed at 3T, MRI is the most cost effective option and may obviate the need for patients to undergo a more invasive test.

RC504-06 Post-arthroscopy Shoulder

Wednesday, Nov. 28 9:50AM - 10:10AM Room: S406A

Participants
Adam C. Zoga, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

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Active Handout:Adam C. Zoga

http://abstract.rsna.org/uploads/2018/18000806/Zoga- post arthroscopy shoulder - handout RC504-06.pdf

LEARNING OBJECTIVES

1) To be comfortable evaluating radiographs of the shoulder after arthroscopic intervention. 2) To be prepared to select and prescribe an optimal MRI protocol. 3) To be able to identify common glenoid labrum repairs and glenoid augmentations.

RC504-07 Acromioclavicular and Sternoclavicular Joints

Wednesday, Nov. 28 10:20AM - 10:40AM Room: S406A

Participants
Bruce B. Forster, MD, Vancouver, BC (*Presenter*) Stockholder, Canada Diagnostic Centres

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LEARNING OBJECTIVES

1) Identify imaging findings in AC and SC joint trauma and be able to indicate how imaging changes management.

RC504-08 Multilevel Glenoid Morphology and Retroversion Assessment in Walch B2 and B3 Types

Wednesday, Nov. 28 10:40AM - 10:50AM Room: S406A

Awards
Student Travel Stipend Award

Participants
Kamran Munawar, MD, New York, NY (*Presenter*) Nothing to Disclose
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Joseph D. Zuckerman, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

A major factor that impacts the long-term outcome and complication rates of total shoulder arthroplasty (TSA) is the preoperative posterior glenoid bone loss quantified by glenoid retroversion. The purpose of this study was to assess if glenoid retroversion angles vary significantly at different glenoid heights in patients with Walch B2 and B3 glenoid types. Glenoid version measurements were also compared between 'conventional' CT slices and 'true' axial slices.

METHOD AND MATERIALS

386 consecutive CT shoulder studies performed for shoulder arthroplasty preoperative planning were retrospectively reviewed. Patients with B2 and B3 glenoid types were included. 'True axial' CT reconstructions were created using a validated technique. Two readers independently measured glenoid retroversion angles according to the Friedman method on true axial CT images using the 'intermediate' glenoid line at three glenoid heights: 75% (upper), 50% (equator) and 25% (lower). The 'clinical' glenoid version was measured on the conventional axial images and compared with the version measurement on the true axial images.

RESULTS

29 B2 and 8 B3 glenoid types were included. There was no statistically significant difference between the retroversion measurements performed by each reader at the three glenoid levels on the B2 or B3 glenoid types. Inter-reader correlation was substantial. There was a statistically significant difference in the mean glenoid retroversion measured on conventional versus true axial images for both B2 and B3 glenoid types, with 2° overestimation on conventional compared to true axial images (p=0.01).

CONCLUSION

We demonstrated that glenoid version can accurately be measured at any level between 25% to 75% of the glenoid height for Walch B2 and B3 types and that the conventional axial CT overestimates the degree of retroversion when compared with the true axial.

CLINICAL RELEVANCE/APPLICATION

Glenoid retroversion measurement is a crucial component of the pre-operative evaluation of patients with advanced glenohumeral osteoarthritis and can be measured accurately on true axial images at the glenoid equator.

RC504-09 Adhesive Capsulitis: MRI Correlation with Clinical Stages and Proposal of MRI Staging

Wednesday, Nov. 28 10:50AM - 11:00AM Room: S406A

Participants
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PURPOSE

The purpose of this study was to correlate the MR findings of adhesive capsulitis with clinical stages and thereby propose a MR staging system.

METHOD AND MATERIALS

This study consisted of 74 patients with clinically diagnosed adhesive capsulitis. The edema of the inferior glenohumeral ligament, pericapsular edema , thickness of anterior band of IGHL and axillary pouch, thickness of coracohumeral ligament, obliteration of fat in the subcoracoid triangle were evaluated by MRI.

RESULTS

Thickening of the anterior band of IGHL showed most significant correlation with the clinical stages. The distribution of edema of IGHL and pericapsular edema also showed significant correlation with the clinical stages of adhesive capsulitis. Pericapsular edema and IGHL edema was not observed in stage IV. Based on the correlation between MR findings and clinical staging , we propose a MR staging of adhesive capsulitis. The thickness of anterior band of IGHL on humeral side in range of 4.5 + 0.9 mm with no obliteration of fat in the subcoracoid triangle seen in stage I and thickness of anterior band of IGHL on humeral side in range of 7.6 + 1.9 mm with no obliteration of fat in subcoracoid triangle seen in stage II. Obliteration of fat in subcoracoid triangle with mild edema of IGHL is seen in stage III and Obliteration of fat in subcoracoid triangle with no edema of IGHL is seen in stage IV.

CONCLUSION

MR is an useful tool for evaluation and prediction of clinical stage of adhesive capsulitis.

CLINICAL RELEVANCE/APPLICATION

Imaging based grading system of adhesive capsulitis can aid in the identification of the stage of the disease even when the clinical manifestations are subtle. This helps in initiation of appropriate treatment to halt the disease progression , prevent the complications and avoid invasive treatment procedures.

RC504-10 Evaluation of On-Track/Off-Track Lesions in Anterior Shoulder Instability Using 3D Isotropic MR Arthrography and ABER (Abduction-External Rotation) Position

Wednesday, Nov. 28 11:00AM - 11:10AM Room: S406A

Participants
Federico Bruno, MD, L'Aquila, Italy (*Presenter*) Nothing to Disclose
Simone Quarchioni, Laquila, Italy (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To assess the ability of shoulder 3D MRA and additional ABER scans to quantify bipolar bone loss and detect on-track/off-track lesions in traumatic shoulder instability, using MPR CT images as a reference standard

METHOD AND MATERIALS

We evaluated 23 consecutive patients (15 men, 8 women, mean age 27.6 years, range 19-46) with anterior shoulder instability. All patients were submitted to 3D-CT of the shoulder and direct shoulder MR Arthrography using three-dimensional (3D) isotropic PD sequences in standard and ABER position. Two observers evaluated the images twice in a randomized and blinded way to calculate the glenoid track, the Hill-Sachs interval and to predict engagement using the 'on-track/off-track' method. The intra- and inter-observer agreement were calculated

RESULTS

Of the 23 defect combinations, 14 were classified as non-engaging and 9 as engaging, using the 'on-track/off-track' method. The intra-observer reliability was 0.921 for 3D-CT and 0.786 for MR Arthrography . The inter-observer agreement ranged from 'substantial' to 'almost perfect' for both glenoid track and Hill-Sachs interval measurement ($p<0.005$). ABER MR Arthrography predicted engagement accurately in 21 cases (91.3%).

CONCLUSION

MR Arthrography using 3D isotropic PD sequences is a feasible approach for measuring bony defects in patients with anterior shoulder instability and bipolar bone loss using the 'on-track/off-track' method. The same sequence in ABER position showed and added value in direct prediction of the presence of engaging lesions

CLINICAL RELEVANCE/APPLICATION

Prediction of engaging lesions using the glenoid track method represents a valuable tool for the surgeon, that can be used preoperatively to plan the type of stabilization procedure to be performed in patients with anterior shoulder instability

RC504-11 Extra-articular Shoulder

Wednesday, Nov. 28 11:10AM - 11:35AM Room: S406A

Participants
Erin F. Alaia, MD, New York, NY (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Apply a systematic approach to evaluating extra-articular pathology about the shoulder. 2) Review commonly encountered osseous and soft tissue extra-articular shoulder pathology.

RC504-12 Biceps

Wednesday, Nov. 28 11:35AM - 12:00PM Room: S406A

Participants
Lynne S. Steinbach, MD, Tiburon, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the MR imaging characteristics of normal anatomy, congenital variants and abnormalities of the long head of the biceps at the shoulder.

ABSTRACT

The long head of the biceps tendon originates at the supraglenoid tubercle and attaches to the superior labrum at the anchor. It courses through the glenohumeral joint where it is anchored by a pulley comprised of the superior glenohumeral ligament and coracohumeral ligament before it extends into the bicipital groove and down to the corresponding muscle of the upper arm. There can be anomalies of the biceps tendon ranging from absence to origin from the supraspinatus tendon. The supraspinatus aponeurosis is present in some individuals and lies in front of the biceps in the groove. This should not be mistaken for a tear. The tendon can become degenerated with tendinosis and can tear in the glenohumeral joint at any location. It often tears near the labral attachment and in younger patients this is associated with a SLAP lesion. In the region of the pulley proximal to the groove it can undergo tendinosis and the enlargement of the tendon prevents its excursion into the groove, producing pain upon motion of the biceps for everyday tasks. This is called the hourglass biceps. The biceps pulley may tear. The biceps is intimately associated

with the subscapularis and supraspinatus tendons when it enters the bicipital groove. Tears of these tendons can be associated with biceps subluxation or dislocation. This has been classified by Habermayer. The biceps sheath is continuous with the glenohumeral joint, so fluid surrounding the biceps can be normal. Fluid in the sheath can also be associated with tenosynovitis in the groove. The tendon may tear at any location along its length. Treatment for biceps problems is usually resection of the proximal biceps (tenotomy) or resection of the proximal biceps with anchoring of the proximal portion in the humerus (tenodesis).

RC505

Neuroradiology Series: Stroke

Wednesday, Nov. 28 8:30AM - 12:00PM Room: E450A

CT ER MR NR

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Max Wintermark, MD, Lausanne, Switzerland (*Moderator*) Advisory Board, General Electric Company; Consultant, More Health; Consultant, Magnetic Insight; Consultant, Icometrix; Consultant, Nines;
Achala S. Vagal, MD, Mason, OH (*Moderator*) Research Consultant, Nervive; Research Grant, Imaging Core Lab; Research Grant, ENDOLOW ; Grant, Johnson & Johnson

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Sub-Events

RC505-01 Update on Stroke Management in the Era of DAWN and DEFUSE-3

Wednesday, Nov. 28 8:30AM - 9:00AM Room: E450A

Participants
Raul G. Nogueira, MD, Boston, MA (*Presenter*) Investigator, Steering Committee, Stryker Corporation; Steering Committee, Medtronic plc; Executive Committee, Penumbra, Inc; Investigator, Advisory Board, Neuravi Ltd; Advisory Board, phenox GmbH; Advisory Board, Anaconda; Advisory Board, F. Hoffmann-La Roche Ltd; Advisory Board, Biogen Idec Inc; Advisory Board, Prolong Pharmaceuticals; Advisory Board, Allm, Inc; Advisory Board, Stockholder, Viz-AI; Advisory Board, Stockholder, Vesalio; Advisory Board, Stockholder, Ceretrieve; Editor, Interventional Neurology Journal; ;

RC505-02 Lifetime Benefit and Cost Consequences of the Achieved Grade of Reperfusion After Thrombectomy for Stroke Based on HERMES Collaboration Data

Wednesday, Nov. 28 9:00AM - 9:10AM Room: E450A

Participants
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PURPOSE

The benefit that endovascular thrombectomy (EVT) offers to stroke patients with large vessel occlusions depends strongly on reperfusion grade as defined by the eTICI (extended Thrombolysis in Cerebral Infarction) scale. Our aim was to determine the lifetime quality of life and cost consequences of reperfusion for patients, healthcare systems, and society.

METHOD AND MATERIALS

A Markov model estimated lifetime quality-adjusted life years (QALY) of EVT-treated patients and associated costs based on eTICI

grades (model structure in Figure 1). The analysis was performed from a United States perspective with two cost frameworks: 1) healthcare costs and 2) societal costs, which include productivity losses and costs of informal care given by family members. Input parameters were based on best available evidence (Table 1), including patient data from the 7-trial HERMES collaboration (ESCAPE, EXTEND-IA, MR CLEAN, REVASCAT, SWIFT PRIME, PISTE, THRACE; Figure 2). The lead analysis was conducted for stroke onset at 65 years. Probabilistic sensitivity analysis was performed using Monte Carlo simulations.

RESULTS

Lifetime QALYs increased for every grade of improved reperfusion (Figure 3A). On average, eTICI 3 resulted in 6.50 QALYs over the patients' lifetimes, eTICI 2c (90-99%) in 5.89 QALYs, eTICI 2b (67-89%) in 5.79 QALYs, eTICI 2b (50-66%) in 4.80 QALYs, eTICI 2a in 3.55 QALYs, and eTICI 1 or 0 in 2.57 QALYs. In contrast, the healthcare and societal costs of each QALY yielded by EVT decreased for every grade of improved reperfusion (Figure 3B). The advantage of achieving eTICI 3 over eTICI 2b (50-66%) reperfusion results in average cost-savings of about $15,000/QALY per patient incurred by the healthcare system and $20,000/QALY per patient incurred by the society.

CONCLUSION

Every grade of improved reperfusion grants stroke patients additional QALYs and substantially reduces healthcare and societal costs per QALY.

CLINICAL RELEVANCE/APPLICATION

Procedural strategies to achieve complete reperfusion (eTICI 3) should be assessed for safety and feasibility, even when initial reperfusion seems to be adequate (eTICI 2b).

RC505-03 Preliminary Study of Hypoxic Exposure Effect on Cerebral Blood Perfusion of Pilots Using 3D ASL

Wednesday, Nov. 28 9:10AM - 9:20AM Room: E450A

Participants
Liu Jie, Zheng Zhou, China (*Presenter*) Nothing to Disclose
Wanshi Zhang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To investigate how the cerebral blood perfusion changed in pilots with hypoxic exposure through the measurement of resting cerebral blood flow (CBF) using a 3D pcASL technique

METHOD AND MATERIALS

35 healthy male pilots (mean age 30 years, mean total flight time 1328 h) were included in this study. In order to investigate the change of CBF of the brain in the condition of hypoxic exposure, the low oxygen mixed gas inhaled by participants through a breathing mask was approximate to the air composition at the altitude of 3000 m with the oxygen concentration of 14.5%. Pulse oximetry was applied to monitor in real-time the immediate pulse and oxygenation saturation of each subject pre- and post-hypoxic exposure. Then, 3D pcASL images were acquired at both pre- (pre-OI) and post-low oxygen mixed gas inhalation (post-OI) using 3D-FSPGR BRAVO sequence on a 3.0T scanner (GE MR750, WI, US) with the scanning parameters: TR/TE= 4632ms/10.5ms; FOV=24cm2; slice thickness = 4.0mm; bandwidth=62.5KHz; flip angle=111°. Thereafter, CBF maps could be calculated from the acquired 3D pcASL images using an automatic software in the AW workstation of GE. To enhance the spatial normalization, T1 axial plane anatomical image were also acquired. CBF maps were preprocessed and analyzed by FSL and SPM8

RESULTS

After hypoxic exposure, the pulse was (63.97±10.43) beats/min, the oxygen saturation was (92.46±3.64) %, it's significant lower than initiate examination ((71.46±10.63) beats/ min, (96.31±1.23) %). 3D pcASL scan for pilots after hypoxic exposure showed lower CBF values in various regions, including bilateral superior temporal gyrus (STG), middle temporal gyrus (MTG), lingual gyrus, left inferior temporal gyrus (ITG), right middle occipital gyrus (MOG), inferior occipital gyrus (IOG), fusiform gyrus, cuneus and cerebellum ($P<0.05$), as shown in Tab.1 and Fig. 1

CONCLUSION

3D pseudo-continuous arterial spin-labeling technique could monitor CBF changes in pilots with hypoxic exposure, and the cerebral blood perfusion after hypoxic exposure was decreased mainly in the temporal and right occipital lobes.

CLINICAL RELEVANCE/APPLICATION

For the first time, in this study we mimicked hypoxic environment equal to 3000m altitude and obtained the CBF of the subjects before and after hypoxic exposure using 3D pcASL, and then fixed the corresponding brain areas.

RC505-04 Clinical and Imaging Parameters Associated With Pre-Hospital Infarction Growth in Patients with Large Vessel Occlusion Stroke Undergoing Endovascular Thrombectomy

Wednesday, Nov. 28 9:20AM - 9:30AM Room: E450A

Participants
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PURPOSE

Large vessel occlusion (LVO) stroke leads to highly variable infarction growth before hospital admission as demonstrated by DAWN and DEFUSE 3. Our aim was to identify the clinical and imaging parameters affecting pre-hospital infarction growth in patients undergoing subsequent thrombectomy.

METHOD AND MATERIALS

We selected patients with documented times from symptom onset (TFSO) and CT perfusion (CTP) imaging on admission out of 226 consecutive patients treated with thrombectomy for anterior circulation LVO stroke. Two independent, blinded readers evaluated imaging. Ischemic core volume (ICV) was determined based on CTP using automated thresholds. Pre-hospital infarction growth was defined as ICV divided by TFSO, assuming linear progression during the time from symptom onset to admission. For collateral assessment, the regional leptomeningeal collateral score (rLMC) was assessed. Clinical data including the National Institutes of Health Stroke Scale (NIHSS) score on admission were obtained. Regression analysis was performed to adjust for confounders.

RESULTS

In the total 94 patients included in this study, the median pre-hospital infarction growth was 0.34 mL/min. In regression analysis including age, sex, stroke side, NIHSS, clot burden score, Alberta Stroke Program Early CT Score, rLMC scores and systemic blood pressure on admission, only rLMC scores showed an independent association with pre-hospital infarction growth (b=-0.31, p=0.042). Trichotomizing patients by rLMC score yielded 31 patients with good (rLMC >16; 33%), 28 with intermediate (rLMC 13-16; 30%) and 35 with poor collaterals (rLMC <13; 37%). The pre-hospital infarction growth was 0.22 mL/min in patients with good, 0.35 mL/min in patients with intermediate and 0.58 mL/min in patients with poor collateral scores. The unadjusted data of ICV and TFSO are plotted by collateral grade in Figure 1.

CONCLUSION

Pre-hospital infarction growth strongly depends on collateral flow and may be a useful parameter to triage slow and fast stroke progressors. In contrast, clinical or other imaging parameters contained no relevant information on the individual stroke dynamics.

CLINICAL RELEVANCE/APPLICATION

In primary stroke centers, pre-hospital infarction growth may be interpolated to estimate the stroke progression during transfer times to thrombectomy centers and provide decision support on which patients to transfer.

RC505-05 Volumetric Segmentation of Acute Brain Infarcts on Diffusion-Weighted Imaging using Deep Learning

Wednesday, Nov. 28 9:30AM - 9:40AM Room: E450A

Awards
Student Travel Stipend Award

Participants
Ken Chang, Boston, MA (*Presenter*) Nothing to Disclose
James M. Brown, PhD, Charlestown, MA (*Abstract Co-Author*) Nothing to Disclose
Andrew Beers, Charlestown, MA (*Abstract Co-Author*) Nothing to Disclose
Bruce R. Rosen, MD, PhD, Charlestown, MA (*Abstract Co-Author*) Nothing to Disclose
Hakan Ay, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jayashree Kalpathy-Cramer, MS, PhD, Charlestown, MA (*Abstract Co-Author*) Consultant, Infotech Software Solution

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PURPOSE

Important decisions in stroke management currently rely on accurate estimation of the volume of acute ischemic brain injury. However, manual delineation of stroke regions is time-consuming and subject to inter-rater variability. In this study, we evaluate the ability of a deep learning approach for ischemic stroke volumetric segmentation in a large clinical dataset of 1,247 patients.

METHOD AND MATERIALS

Our patient cohort included 1,247 patients from the NIH-funded Heart-Brain Interactions in Human Acute Ischemic Stroke Study, recruited between June 2009 and December 2011. Expert manual annotations of acute infarcts were generated using an image outlining software (MRICron). The patients were randomly divided into training (n = 998) and testing (n=247) set in a 4:1 ratio. Only the training set was used to train our deep-learning algorithm. We utilized the 3D U-Net architecture, a network designed for fast and precise segmentation, with Nestorov Adaptive Moment Estimation optimizer and a soft dice loss function. 20 patches of size 64x64x8 were extracted for each patient in the training set and augmented by sagittal flipping. The network was trained for 30 iterations through all extracted patches on a NVIDIA Tesla P100 graphics processing unit.

RESULTS

Within the training set, the mean dice similarity coefficient was 0.679 (95% Confidence Interval, CI, 0.018-0.931) with a mean sensitivity of 0.703 (95% CI 0.026-0.979) and specificity of 1.000 (95% CI 0.977-1.000). Within the testing set, the mean dice was 0.626 (95% Confidence Interval, CI, 0.009-0.912) with a mean sensitivity of 0.648 (95% CI 0.018-0.990) and specificity of 0.999 (95% CI 0.995-1.000). In comparing manually and automatically derived infarct volumes, the Intraclass Correlation Coefficient was 0.938 (p<.0001) in the training set and 0.964 (p<.0001) in the testing set.

CONCLUSION

Our fully-automatic pipeline for stroke segmentation demonstrate the potential for deep learning-based tools to automate ischemic stroke volumetrics.

CLINICAL RELEVANCE/APPLICATION

Automatic localization and calculation of volume of ischemic stroke on diffusion-weighted imaging may bypass the need for manual segmentation, assist with timely decision making for clinical management, and hence, reduce the risk of adverse patient outcomes.

RC505-06 Fast Stroke Triage: CT and MR Protocols

Wednesday, Nov. 28 9:40AM - 10:10AM Room: E450A

Participants
Howard A. Rowley, MD, Madison, WI (*Presenter*) Research Consultant, Bracco Group; Research Consultant, Guerbet SA; Research Consultant, General Electric Company; Consultant, W.L. Gore & Associates, Inc; ; ; ; ; ; ;

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LEARNING OBJECTIVES

1) List the key goals of imaging triage in acute ischemic stroke. 2) Streamline workflow in CT and MRI to facilitate rapid and accurate treatment selection. 3) Describe the practice and pitfalls of perfusion methods in acute stroke triage. 4) Build fast and effective CT and MR protocols for stroke triage in your practice.

Honored Educators

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RC505-07 When to Swing at the Curveball: Treating Stroke Patients Who Don't Quite Match the Clinical Trials

Wednesday, Nov. 28 10:20AM - 10:50AM Room: E450A

Participants
Steven W. Hetts, MD, San Francisco, CA (*Presenter*) Royalties, Penumbra, Inc; Stockholder, ThrombX Inc; Researcher, Stryker Corporation; Researcher, Terumo Corporation; Researcher, Siemens AG

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LEARNING OBJECTIVES

1) Describe groups of patients suffering acute ischemic strokes who fall outside the inclusion criteria for recent randomized controlled trials who, nevertheless, may benefit from acute endovascular therapy. 2) Develop an approach to trauma patients at risk for ischemic stroke. 3) Evaluate the treatment of patients outside the age ranges subjected to clinical trials to date.

RC505-08 Texture Analysis to Identify Early Thrombus in Stroke Patients with Cerebral Artery Occlusion: A High-resolution MRI Study

Wednesday, Nov. 28 10:50AM - 11:00AM Room: E450A

Participants
Jinhao Lyu, Beijing, China (*Presenter*) Nothing to Disclose
Yanqun Yao, Taiyuan, China (*Abstract Co-Author*) Nothing to Disclose
Ruifeng Zhao, Jincheng, China (*Abstract Co-Author*) Nothing to Disclose
Huabing Li, Jincheng, China (*Abstract Co-Author*) Nothing to Disclose
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Lan Lin, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Yina Lan, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Jianfeng He, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Lin Ma, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xin Lou, MD, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

In the present study, we aimed to identify the features of early thrombus by qualitative evaluation and by quantitatively texture analysis based on thrombus imaging from High-resolution vessel wall imaging (HRVWI).

METHOD AND MATERIALS

The prospective study recruited patients with cerebrovascular occlusion from January 2017 to January 2018. Three-dimensional black blood T1WI HRVWI was performed in a 3.0T scanner (Skyra, Siemens) with a voxel size of 0.6mm. Thrombus was identified when visible embolization of intraluminal material downstream was present. Early thrombus was defined as symptomatic culprit thrombus within 24 hours after symptom onset. Late to chronic thrombus was defined as symptomatic culprit thrombus >24 hours after symptom onset, previous confirmed thrombus and asymptomatic thrombus. Signal intensity patterns and vascular involvement patterns of thrombus on black blood T1WI HRVWI were categorized into patterns as illustrated in Figure. Regions of interest (ROIs) were manually outlined on the optimal 2D multiple planar reconstructions of the thrombus. Each ROI was decimated to 64 gray-levels. A gray-level co-occurrence matrix was calculated for each ROI. Comparisons between patients with early thrombus and with

late to chronic thrombus were performed. ROC was performed to measure the area under the curve (AUC) for the diagnostic efficiency estimation.

RESULTS

Totally 19 patients with 23 occlusive vessels were recruited in the current study. Four occlusive vessels were confirmed to have early thrombus and 19 occlusive vessels were confirmed to have late to chronic thrombus. For thrombus qualitative analysis, the proportion of each signal intensity pattern and vascular involvement pattern of early thrombus and late to chronic thrombus on black blood T1WI HRVWI showed no significant differences. In texture analysis, 'correlate' was significantly different between early thrombus and late to chronic thrombus. AUC of 'correlate' to differentiate early thrombus from late to chronic thrombus was 0.908(P<0.001). A threshold of <= 0.330 was with a sensitivity of 100% and specificity of 78.95%.

CONCLUSION

Textural feature may be an effective imaging marker to identify early thrombus. Further studies are warranted to verify the finding.

CLINICAL RELEVANCE/APPLICATION

The textural analysis is helpful to identify early thrombus in patients with ischemic stroke and thus to support the therapy decision making.

RC505-09 Detection of the Ischemic Core in Multiphase-CT Angiography: Validation of Patients with Acute Ischemic Stroke

Wednesday, Nov. 28 11:00AM - 11:10AM Room: E450A

Participants
Tomomi Omura, Akita, Japan (*Presenter*) Nothing to Disclose
Yongbum Lee, PhD, Niigata, Japan (*Abstract Co-Author*) Nothing to Disclose
Noriyuki Takahashi, Akita, Japan (*Abstract Co-Author*) Nothing to Disclose
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Mamoru Kato, PhD, Akita, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuki Shinohara, MD,PhD, Akita, Japan (*Abstract Co-Author*) Nothing to Disclose
Hideto Toyoshima, BSc, Akita, Japan (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Multiphase CT angiography (MP-CTA) is a quick and easy-to-use imaging tool for assessing collateral circulation in patients with acute ischemic stroke (AIS). Pial arterial filling in the ischemic territory of the AIS patients is assessment by comparing it to similar arteries in the unaffected hemisphere. However, no method has been established for identifying the ischemic core territory which is an indication of mechanical thrombectomy. We developed a novel method to assess ischemic core of brain tissue using MP-CTA images. The purpose of this study is to verify the usefulness of a novel method (phase ratio map; PR map) compared with MP-CTA images in assess of AIS patients.

METHOD AND MATERIALS

The AIS patients was scanned using an area detector CT scanner (Aquilion ONE Groval Standard Edition; Toshiba Medical). CT images were acquired at 80 kV and 80 mA. CTP source images (CTP-SI) were obtained at 1-s intervals using dynamic multiphase imaging. PR map was constructed using CTP-SI. An early-phase image (EPI) was generated by computing the average of CTP-SI for 5 s in the vicinity of the peak enhancement curve of the normal hemisphere. Similarly, a late-phase image (LPI) was generated by computing the average of CTP-SI for 5 s immediately after the early phase. Subsequently EPI and LPI were denoised of images and was subtracted by mask image. Finally, The PR map was created by dividing the EPI by the LPI. The pixel value of the PR map is determined by the filling degree of the contrast medium.The ischemic core without filling shows 0, the ischemic region with a slow filling shows 1 or less. MP-CTA produced slab MIP images with a thickness of 24 mm using EPI and LPI. Pial arterial filling of MP-CTA was scored from the best 5 points to the worst 0 point ordinal scale. Twenty three patients (14 men, 9 women; mean age: 66.8 years) with AIS underwent CTP. To investigate the validity of the PR map, the ischemic core territory and the MP-CTA scoring were compared.

RESULTS

The ischemic core size of PR map was consistent with the score of MP-CTA (score 4: 0 ml, score 3: 2.7 ± 2.2 ml, score 2: 8.6 ± 5.4 ml). In addition, PR map visually showed clear ischemic core territory.

CONCLUSION

The results suggested that the PR map would provide more robust information than MP-CTA in the diagnosis of AIS patients.

CLINICAL RELEVANCE/APPLICATION

Acute ischemic stroke, Large vessel occlusion, Multi phase CT-Angiography, Mechanical thrombectomy

RC505-10 Stroke Outcome Prediction from Meta Information Available at Patient Admission

Wednesday, Nov. 28 11:10AM - 11:20AM Room: E450A

Participants
Yuan Xie, Stanford, CA (*Presenter*) Nothing to Disclose
Bin Jiang, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Enhao Gong, PhD, Stanford, CA (*Abstract Co-Author*) Stockholder, Subtle Medical
Ying N. Li, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Guangming Zhu, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Bo Zhou, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose

Patrik Michel, Lausanne, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Max Wintermark, MD, Lausanne, Switzerland (*Abstract Co-Author*) Advisory Board, General Electric Company; Consultant, More Health; Consultant, Magnetic Insight; Consultant, Icometrix; Consultant, Nines;
Greg Zaharchuk, MD, PhD, Stanford, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Stockholder, Subtle Medical;

PURPOSE

Acute stroke patients' recovery are usually evaluated using mRS, ranging from 0 for no symptoms to 6 for deceased. Early estimation of future mRS has high clinical utility as it represents recovery outcome, with mRS <=2 considered as a good recovery. We demonstrate that by applying machine learning techniques to a mix of clinical and imaging-derived data, we can accurately predict 3-month outcome in acute stroke patients.

METHOD AND MATERIALS

520 internal carotid artery (ICA) and middle cerebral artery (MCA) stroke patients were included in the study, with 3-month mRS as the goal of prediction. 24 initial features such as age, gender, Alberta stroke program early CT score (ASPECTS), and infarct volume from CTP and CT angiograms at patient's admission were used for prediction. Gradient Boosting Tree model (GBT) and Extreme Gradient Boosting Machine (xgboost) were constructed for binary prediction of mRS ('good' : 0~2, 'bad': 3~6) and full multiclass prediction (mRS 0~6). Final features were curated from the 24 initial features through a stochastic feature selection algorithm. Hyperparameters were optimized for minimized mean square error (MSE) of regression task. 5-fold cross validation was applied to estimate model performance.

RESULTS

Feature curation shows that xgboost can accurately predict the mRS using only 5 features: ASPECTS, age, hyperdense middle cerebral artery sign, NIH stroke score at 24 hours, and left-sided North American Symptomatic Carotid Endarterectomy Trial score. Binary xgboost produced an Area-under-curve (AUC) of 0.884 with selected features and an AUC of 0.873 without feature selection. Binary GBT achieved a slightly lower AUC of 0.876 with selected features, and 0.849 without feature selection. For multiclass prediction, xgboost achieved Mean Squared Error (MSE) of 1.6 and 85.2% predictions are within +/- 1 categories. GBT achieved also a MSE of 1.6 while only 68.2% predictions are within +/- 1 categories.

CONCLUSION

Using information available at diagnosis, machine learning models can accurately predict the recovery outcome at 3 months. An xgboost algorithm using curated clinical and imaging-based features achieves the best performance.

CLINICAL RELEVANCE/APPLICATION

Using machine learning, an acute stroke patient's 3-month outcome can be accurately predicted with data available at admission, improving treatment planning and recovery evaluation.

Honored Educators

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RC505-11 Stroke Aphasia Treatment Strengthens Functional Network Activity

Wednesday, Nov. 28 11:20AM - 11:30AM Room: E450A

Participants
Michael Iorga, Chicago, IL (*Presenter*) Nothing to Disclose
James Higgins, BA, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Todd Parrish, PhD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Aphasia is a common and debilitating complication of stroke, for which treatment is unrefined and responses are highly variable. However, functional magnetic resonance imaging (fMRI) is not used in the assessment of stroke aphasia. By monitoring changes in resting networks which occur with deficits and treatment, treatment-responsive patterns may be identified. Once the relationship of aphasia therapy and functional imaging is better defined, there is potential to predict which therapy a given patient will benefit most from, and how to modify existing treatments to maximize outcomes.

METHOD AND MATERIALS

We followed 60 right-handed subjects with past left hemisphere strokes from three institutions who participated in one of three aphasia therapies (sentence comprehension & production, naming, spelling). Each subject had a resting-state fMRI at baseline, and following three months of treatment. Group independent component analysis (GICA) was used to decompose all scans into 20 primary networks. The fractional amplitude of low-frequency fluctuations (fALFF) was measured for each network's time series, and compared in subjects before and after treatment.

RESULTS

Of twenty networks, three were observed to increase in activity across sentence comprehension and production treatment, four increased in spelling treatment, and five increased in naming treatment ($p < 0.05$, Wilcoxon Signed Rank Test). Four networks were found to differentiate between initial aphasia deficits ($p < 0.05$, Kruskal-Wallis Analysis of Variance). A naive bayesian classifier was constructed, using these four networks as features, which classified aphasia deficits with 75% accuracy (leave-one-out cross-validation).

CONCLUSION

Stroke aphasia treatment for sentence comprehension & production, naming, and spelling each alter patterns of activity in resting-state functional networks. Networks are typically treatment-specific, with the exception of one component which was elevated across treatments. Most components were more pronounced in the right hemisphere. Component specificity was observed at baseline across deficits, suggesting potential utility for fMRI in aphasia assessment.

CLINICAL RELEVANCE/APPLICATION

Treatment outcomes for stroke aphasia have high variability, suggesting treatment requires further optimization. Changes in resting fMRI networks may provide insight to treatment effects.

RC505-12 Carotid Plaque Imaging

Wednesday, Nov. 28 11:30AM - 12:00PM Room: E450A

Participants
J. Kevin Demarco, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define the CT and MR appearance of three vulnerable carotid plaque features. 2) Describe how these three vulnerable plaque features are associated with improved risk assessment compared with simple carotid stenosis measurements. 3) Assess the ability of MR to depict the individual patient's response to new medical therapy by measuring the change in these three vulnerable carotid plaque features.

RC506

Essentials of Temporal Bone Imaging

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E451A

CT HN MR NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

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Sub-Events

RC506A Optimizing Temporal Bone CT and MR Imaging

Participants
Joseph M. Hoxworth, MD, Scottsdale, AZ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Appraise the adequacy of CT and MR protocols for temporal bone imaging. 2) Modify temporal bone CT and MR protocols based on specific clinical indications.

RC506B Cholesteatoma and Non-cholesteatomatous Inflammatory Disease

Participants
Amy F. Juliano, MD, BOSTON, MA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Be familiar with the inflammatory disease entities that occur in the temporal bone. 2) Understand the pathophysiology of cholesteatoma and other inflammatory processes. 3) Recognize the imaging appearance of these diseases on CT and MR imaging. 4) Know the differential diagnoses, versus when certain imaging characteristics may be pathognomonic for one particular entity.

RC506C Temporal Bone Tumors

Participants
Nikdokht Farid, MD, San Diego, CA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) To become familiar with the different types of tumors which arise in the temporal bone by considering the differential for masses in specific regions of the temporal bone-i.e. internal auditory canal, jugular fossa region, middle ear, and petrous apex. 2) To recognize key imaging features of the various types of tumors arising in the temporal bone in order to provide accurate and useful differential diagnoses to our clinical colleagues.

RC506D Imaging of the Post-operative Temporal Bone

Participants
Gul Moonis, MD, New York, NY (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Review surgical options for otomastoiditis and cholesteatoma. 2) Learn to differentiate between canal wall up and down mastoidecotomy. 3) Discuss the complications pertaining to temporal bone surgeries. 4) Illustrate imaging findings of cochlear implants.

RC507

Urolithiasis: Urologist Perspective, Recent Imaging Advances, and Relevance to Practice (Interactive Session)

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S404CD

GU

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Avinash R. Kambadakone, MD, Boston, MA (*Moderator*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Understand the urologist's perspective on stone disease and the value of imaging in the decision-making process. 2) Learn the imaging advances in diagnosis of urolithiasis including Dual energy CT techniques. 3) Discuss the multi-modality imaging techniques in diagnosis of stone disease including re-emergence of ultrasound. 4) Review the management updates in stone disease and its relevance to radiology practice.

Sub-Events

RC507A Urologist Perspective on Urolithiasis

Participants
Brian H. Eisner, MD, Boston, MA (*Presenter*) Advisory Board, Sonomotion

RC507B Imaging Approach for Right Flank Pain in the Emergency Department (Basics and What's New in ED)

Participants
Jennifer W. Uyeda, MD, Boston, MA (*Presenter*) Consultant, Allena Pharmaceuticals, Inc; Invited Speaker, Siemens AG

LEARNING OBJECTIVES

1) List the various imaging modalities used to evaluate right flank pain. 2) Compare the various available types of imaging modalities to assess right flank pain. 3) Identify CT appearances of nephroureterolithiasis and associated complications. 4) Apply structured reporting of nephroureterolithiasis on CT.

RC507C Advances in CT and Radiation Dose

Participants
Avinash R. Kambadakone, MD, Boston, MA (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Describe the advances in the imaging diagnosis of urolithiasis with focus on DECT. 2) Learn about CT radiation dose concerns and apply strategies to diminish the risk.

RC507D Interesting Case Presentations

Participants
Nicole M. Hindman, MD, New York, NY (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Learn the most common chemical stone compositions, risk factors for developing, ways to image and appropriate treatment for each type. 2) Learn imaging techniques for stone diagnosis, including Dual Energy Techniques. 3) Learn information Urologists need to know for diagnosis, monitoring and management of renal stones. 4) Review updated surgical and medical management of renal stones.

RC508

Emergency Radiology Series: Contemporary Topics in Imaging of Trauma

Wednesday, Nov. 28 8:30AM - 12:00PM Room: S406B

CH CT ER GI

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

Participants
Kathirkamanathan Shanmuganathan, MD, Baltimore, MD (*Moderator*) Nothing to Disclose
Clint W. Sliker, MD, Baltimore, MD (*Moderator*) Nothing to Disclose
Ludo F. Beenen, MD, Amsterdam, Netherlands (*Moderator*) Nothing to Disclose
Michael N. Patlas, MD,FRCPC, Hamilton, ON (*Moderator*) Nothing to Disclose

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Sub-Events

RC508-01 AAST and Other Trauma Grading Systems

Wednesday, Nov. 28 8:30AM - 9:00AM Room: S406B

Participants
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Active Handout:Kathirkamanathan Shanmuganathan

http://abstract.rsna.org/uploads/2018/18000578/RSNA - handout RC508-01.pdf

RC508-02 CT Imaging of Hepatic Trauma: Predictors of Arterial Injury and Need for Intervention

Wednesday, Nov. 28 9:00AM - 9:10AM Room: S406B

Participants
Ken Zhao, MD, New York, NY (*Presenter*) Nothing to Disclose
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Meredith McDermott, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Eric T. Aaltonen, MD, MPH, New York, NY (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Determine which CT findings are predictive of arterial injury and need for intervention in the setting of hepatic trauma.

METHOD AND MATERIALS

From June 2011 to April 2017, 42 trauma patients (30 male, 12 female; mean age 36.1; age range 16-82) underwent contrast-enhanced CT angiography (CTA) and subsequent conventional hepatic angiography within 24 hours at two level 1 trauma centers. Hepatic injuries on CTA were graded based on the American Association for the Surgery of Trauma (AAST) liver injury scale. Scans were assessed for the presence and extent of contrast extravasation, hemoperitoneum, and lacerations. Hepatic angiograms were reviewed for evidence of arterial injury, including contrast extravasation and pseudoaneurysm. The chi-squared test was used to evaluate the univariate association between the tested parameters. A p value of less than 0.05 was considered to be statistically significant.

RESULTS

There were 3 (7%) AAST grade 1, 9 (21%) grade 2, 15 (36%) grade 3, 14 (34%) grade 4, and 1 (2%) grade 5 injuries. Twenty one (50%) patients had arterial extravasation, 41 (98%) had parenchymal laceration, and 39 (93%) had hemoperitoneum on CT. The AAST liver injury scale was significantly associated with angiographic evidence of arterial injury (x^2 10.8, p=0.029); 46.7% (7/15) of grade 3 injuries and 57.1% (8/14) of grade 4 injuries demonstrated this finding. High AAST grade liver injuries (3-5) were also significantly associated with angiographic evidence of arterial injury when compared with low grade injuries (1-2); 0% (0/12) of low grade and 50% (15/30) of high grade injuries demonstrated arterial injury on angiography (x^2 9.3, p=0.002). In addition, extravasation > 1 cm on CTA demonstrated a significant association with arterial injury on angiography; 57.1% (8/14) versus 25% (7/28) when CTA extravasation > 1 cm was not present (x^2 4.2, p=0.040).

CONCLUSION

High grade injuries per the AAST liver injury scale and presence of contrast extravasation > 1 cm on CTA are associated with positive angiographic findings in the setting of hepatic trauma. This study also suggests that low grade injuries (1-2) have a very low likelihood of arterial injury on angiography.

CLINICAL RELEVANCE/APPLICATION

CT based predictors of arterial injury in the setting of hepatic trauma would help clinicians manage patients and diagnostic radiologists make appropriate recommendations.

RC508-03 The Role of CEUS in the Detection and Grading of Renal Injuries in Blunt Abdominal Trauma

Wednesday, Nov. 28 9:10AM - 9:20AM Room: S406B

Participants
Deepak Ravichandran, MD, New Delhi, India (*Presenter*) Nothing to Disclose
Atin Kumar, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Raju Sharma, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Ashu S. Bhalla, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Shivanand R. Gamanagatti, MBBS, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Contrast Enhanced CT (CECT) is the gold standard for the detection of renal injuries in blunt abdominal trauma (BAT). However its disadvantages include radiation exposure and the risks associated with iodinated contrast media. Contrast enhanced ultrasound (CEUS) provides an alternative tool for the detection and grading of renal injuries. This study was done to find the sensitivity of detection of renal injuries and to compare the AAST grading on CECT and CEUS

METHOD AND MATERIALS

Consecutive hemodynamically stable patients with BAT with CECT showing solid abdominal organ injuries were recruited in this ethically approved study. These patients underwent CEUS by a radiologist blinded to the findings of CECT and the injuries were identified and graded on both CECT and CEUS using the American Association for the Surgery of Trauma(AAST) scales. The sensitivity and specificity of detection on CEUS was obtained with CECT as the gold standard and the agreement between the grading on CECT and CEUS was analysed using kappa statistics. The injuries were further classified as high grade (AAST grades IV & above) and low grade (AAST grades I to III) and agreement between grading on CECT and CEUS was analysed

RESULTS

Among the 105 patients included as a part of a larger study, there were 22 renal injuries in the 210 kidneys assessed. CEUS detected 19 out of the 22 injuries and these injuries were graded on AAST scales and compared. The sensitivity, specificity, PPV and NPV of detection of renal injuries on CEUS using CECT as the gold standard was 86.4%, 100%, 100% and 98.4% respectively. On comparing the grading on CEUS and CECT, there was no significant agreement with a kappa value of 0.46 (>0.75 significant). On combining the grades as low grade and high grade injuries on both modalities, there is poor agreement between the grading with a kappa value of 0.46. The reason for the discrepancy is because US contrast agents are purely intravascular and do not get excreted through the renal pelvicalyceal system. Hence, the patients with PCS injuries were downgraded as grade III on CEUS

CONCLUSION

Though CEUS has a reasonable accuracy for detection of renal injuries but is poor for grading them and hence cannot be used to triage management.

CLINICAL RELEVANCE/APPLICATION

While CEUS is accurate in detecting renal injuries, it is unreliable as an alternative modality to CECT in grading renal injuries and in suggesting further management.

RC508-04 Liver Trauma: Vascular Injury on Computed Tomography as a Predictor of Patient Outcome

Wednesday, Nov. 28 9:20AM - 9:30AM Room: S406B

Awards
Student Travel Stipend Award

Participants
Nicholas Wilson, MD , Boston, MA (*Presenter*) Nothing to Disclose
Avneesh Gupta, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Stephan W. Anderson, MD, Cambridge, MA (*Abstract Co-Author*) Nothing to Disclose
Diana Dinh, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
John M. Campbell, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose
Daniel Adran, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Alec Maggi, Rossmoor, CA (*Abstract Co-Author*) Nothing to Disclose
Jasmine Gandhi, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Muhammad M. Qureshi, MBBS,MPH, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Heidi Wing, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Robert W. Schulze, MD,MBA, Boston Ma, MA (*Abstract Co-Author*) Nothing to Disclose
Christina A. LeBedis, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To assess the utility of MDCT findings in predicting patient outcomes after liver injury.

METHOD AND MATERIALS

This retrospective study was IRB approved and HIPAA compliant. Informed consent was waived. Patients >= 16 years old who sustained blunt or penetrating trauma and found to have liver laceration from 5/1/2005 - 2/28/2017 were included. During this interval, 169 patients met inclusion criteria (123 male, 46 female; mean age of 34; age range 16-80 years old; 61 blunt trauma, 108 penetrating trauma). Liver injury was graded in blinded, consensus fashion by two abdominal fellowship trained radiologists (9 and 13 years-experience) using the AAST liver injury scale. Additional CT variables recorded in blinded fashion were contained vascular injury and active extravasation. Length of stay, treatment (interventional radiology or operative), and peri-operative transfusion were recorded from the electronic medical record. Multivariate linear regression was performed to determine crude and adjusted parameter estimate for length of stay. Logistic regression models were run and crude and adjusted odds ratio were calculated to estimate association between categorical variables.

RESULTS

41/128 (24.3%) patients who sustained hepatic injury have concomitant hepatic vascular injury; 23/61 (38%) in the setting of penetrating trauma and 18/108 (17%) in the setting of blunt trauma. Hospital length of stay was increased by 9.0 days for hepatic vascular injury regardless of mechanism, and by 6.0 days for those with high AAST grade (grades 4-6) as compared to referents. Patients with high grade AAST liver lacerations (grades 4-6) and patients with hepatic vascular injuries were more likely to require treatment (interventional radiology or operative) compared to referents, OR 4.74, 95% CI 2.21-10.16, p<0.0001 and OR 7.0, 95% CI 2.96-16.54, p<0.0001, respectively.

CONCLUSION

There is a high incidence of hepatic vascular injury in patients with liver laceration (24.3%). High grade hepatic laceration and the presence of hepatic vascular injury is predictive of longer lengths of stay and need for treatment.

CLINICAL RELEVANCE/APPLICATION

Hepatic vascular injury in patients who sustained blunt or penetrating liver trauma is predictive of patient outcomes.

Honored Educators

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RC508-05 Pitfalls in Abdominal Trauma CT

Wednesday, Nov. 28 9:30AM - 10:00AM Room: S406B

Participants
Michael N. Patlas, MD,FRCPC, Hamilton, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) To discuss the impact of suboptimal trauma MDCT protocols. 2) To review common and uncommon pitfalls in interpretation of abdominal trauma MDCT examinations. 3) To suggest strategies to improve detection of easily missed injuries.

RC508-06 Correlation between CT-Based Liver Injury Severity Scoring, Contrast Extravasation and Subsequent Management

Wednesday, Nov. 28 10:00AM - 10:10AM Room: S406B

Awards
Student Travel Stipend Award

Participants
Martin Reim, MD, Tartu, Estonia (*Presenter*) Nothing to Disclose
Pilvi Ilves, Tartu, Estonia (*Abstract Co-Author*) Nothing to Disclose
Andrus Lomp, BA,MSc, Tartu, Estonia (*Abstract Co-Author*) Nothing to Disclose
Vladislav Mihnovits, MD, Tartu, Estonia (*Abstract Co-Author*) Nothing to Disclose
Urmas Lepner, PhD, Tartu, Estonia (*Abstract Co-Author*) Nothing to Disclose
Peep Talving, PhD, Tartu, Estonia (*Abstract Co-Author*) Nothing to Disclose

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reimmartin@gmail.com

PURPOSE

The liver is the second most commonly injured abdominal solid organ. The aim of the study was to elucidate the correlation between CT-based liver injury severity scoring, contrast extravasation and subsequent management.

METHOD AND MATERIALS

Data on consecutive trauma admissions to two major national trauma facilities with liver injuries between 1/2009 and 12/2013 were retrospectively reviewed using ICD-10 codes (S36.10). The images were accrued from the population-based Picture Archive (PACS). CT scoring per American Association for the Surgery of Trauma organ injury scale was utilized to stratify liver injuries into

minor/moderate (grades I-III) vs. severe (grades IV-V) injuries. The primary outcomes were operative management and in-hospital mortality.

RESULTS

A total of 81 cases were included. The mean age of the cohort was 31.5 ± 12.2 years and 26.9% were female. Overall, grade I-III injuries in 86.4% (n=70) and grade IV-V injuries in 13.6% (n=11) were observed. The most common associated injuries involved chest wall (n=44; 54.4%), lung (n=42; 51.8%), lower ribs (n=32; 39.5%). Overall, 17.3 % (n=14) and 82.7% (n=67) were subjected to operative and non-operative management, respectively. There was no correlation between CT scoring of liver injuries and surgical management (p=0.196). CT signs of active bleeding was noted in 20 patients (25%) and 30% (n=6) of these patients underwent operative treatment. The remaining 10% (n=2) of patients with active bleeding were embolized per interventional radiology (IR). One patient had IR intervention for a concomitant abdominal injury and one was treated surgically for a splenic injury. A total of 8 cases (13%) without CT-verified active bleeding (n=60) required surgery. There was no statistically relevant correlation between CT-based active liver hemorrhage and subsequent operative treatment (p=0,102). The overall mortality of the study population was 2.5% (n=2).

CONCLUSION

The majority of the population-based liver injuries were minor or moderate and CT-scoring of liver injuries did not determine subsequent surgical management. There was no correlation between CT signs of active bleeding and operative treatment decision. Further prospective studies are warranted.

CLINICAL RELEVANCE/APPLICATION

To improve our clinical practices we need to analyze our previous performance using existing injury scoring criteria and imaging characteristics regarding clinical outcome and decision making.

RC508-07 Treatment Decisions in Blunt Splenic Trauma: Insights from a UK Trauma Centre

Wednesday, Nov. 28 10:10AM - 10:20AM Room: S406B

Awards
Student Travel Stipend Award

Participants
Jim Zhong, Leeds, United Kingdom (*Presenter*) Nothing to Disclose
Fathallah Islim, Leeds, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
James Lenton, Wakefield, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Simon J. McPherson, MBBS, North Yorkshire, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Jai Patel, MD, FRCR, Leeds, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Tim Stansfield, Leeds, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Jonathan Jones, Leeds, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Karen Flood, BMedSc, MBBS, Leeds, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To review the imaging findings and clinical outcomes in blunt splenic trauma (BST) and identify common themes that help stratify management and determine the role of interventional radiology (IR), specifically splenic embolization (SE).

METHOD AND MATERIALS

Retrospective study. All patients admitted with BST from 01/01/2010 to 01/01/2018 included. Data collected included demographics, injury severity, haemodynamic stability, treatment type (Non-operative, IR or surgery), complications and follow-up. 4 Attending IRs reviewed the admission CT imaging whilst blinded to the original report or outcomes. Based on the CT findings and haemodynamic stability of the patient they were asked to recommend non-operative, SE (proximal or distal) or surgery for each case. The inter-observer agreement was calculated using Fleiss Kappa on SPSS for the CT findings and management plan.

RESULTS

257 patients included. Median age 27(3-90). 178 were male and 49 female. 15 patients had isolated splenic injuries and 212 had >2 organ system injuries. 220 had a CT scan on presentation. CT findings included splenic contrast extravasation(n=44), pseudoaneurysms(n=24), splenic lacerations(n=196, 30 full thickness and 23 involved the splenic hilum), perisplenic haematoma(n=105) and haemoperitoneum(n=65). For initial treatment, 17 had splenectomy, 32 had SE and 178 were managed conservatively. 5 had delayed SE following failure of conservative management. A total of 12 patients had proximal SE and 25 had distal SE. The 4 Attendings were in most agreement on the presence of active bleeding on CT (89%), Fleiss' Kappa 0.696. For chosen method of treatment, the overall inter-observer agreement was 84% (range 83-93%) and Fleiss' Kappa was 0.614. For haemodynamically stable patients with active bleeding on CT with either perisplenic haematoma or haemoperitoneum, all Attending IRs opted for SE with a view to distal embolization for splenic preservation.

CONCLUSION

Both clinical and imaging findings are invaluable in guiding management of blunt splenic trauma. In the presence of splenic injury and active bleeding on CT imaging even with a stable patient, splenic artery angiogram with a view to embolization is recommended.

CLINICAL RELEVANCE/APPLICATION

In the presence of splenic injury and active bleeding on CT imaging even with a stable patient, splenic artery angiogram with a view to embolization is recommended.

RC508-08 Uncommon Sites of Abdominal Trauma

Wednesday, Nov. 28 10:30AM - 11:00AM Room: S406B

Participants
Felipe Munera, MD, Key Biscayne, FL (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Describe MDCT findings of unusual sites of injury in patients with blunt abdominopelvic trauma. 2) Describe management implications.

ABSTRACT

Uncommon sites of injury can be overlooked. This lecture will use cases to highlight MDCT findings of unusual sites of injury in abdominoplevic trauma such as the pancreas, adrenal, colon, uterus/fetus, gallbladder, abdominal aorta, IVC, renal veins, etc.

RC508-09 Segmented Pelvic Hematoma Volumes, Intravenous Contrast Extravasation Volumes, and Extravasation Rate Are All Independently Predictive of Major Arterial Injury After Pelvic Fracture: Analysis of a Prospective Cohort

Wednesday, Nov. 28 11:00AM - 11:10AM Room: S406B

Participants
David Dreizin, MD, Baltimore, MD (*Presenter*) Research Grant, Siemens AG ;
Matthew P. Dattwyler, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Alexis R. Boscak, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Christina A. LeBedis, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Nikki Tirada, MD, Baltimore, MD (*Abstract Co-Author*) Spouse, Research Grant, Siemens AG
Stephan W. Anderson, MD, Cambridge, MA (*Abstract Co-Author*) Nothing to Disclose
Nemil Shah, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Oam Bhate, Cary, NC (*Abstract Co-Author*) Nothing to Disclose
Uttam Bodanapally, MD, Baltimore, MD (*Abstract Co-Author*) Speakers Bureau, Siemens AG; Travel Support, Siemens AG;

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PURPOSE

The predictive value of hematoma volumes for major arterial injury after pelvic fractures is known. Area measurements of contrast extravasation (CE) and area rate of change between phases are also important. A model using hematoma volume and contrast extravasation volume on multiphasic CT is derived.

METHOD AND MATERIALS

Patients with CT in the trauma bay were screened prospectively for pelvic ring disruptions between July 2016-Oct 2017. Patients were excluded if CT was performed: after a) laparotomy or angiography, b) at another institution, or c) without IV contrast. Hematoma volumes (HMVs) were measured in all remaining patients. Patients with HMV < 50 mL were not considered at risk for arterial injury requiring intervention and were excluded a priori. Included patients were additionally assessed for: binder, Tile grade, comminution, fracture gap (> 5 mm), obturator/greater sciatic fracture, atherosclerosis, multiple/bilateral foci of arterial blush, art and PVP CE volume, and difference in CE volume between phases (bleeding rate). Variables with $p<0.05$ on univariate analysis (tests for proportions, Chi squared test for trend, comparison of means) were included in logistic regression with backward elimination to determine independent predictors and derive a parsimonious predictive model.

RESULTS

241 patients had pelvic ring disruptions on CT. 121 had non-negligible hematoma volumes (>50 mL). 19 patients underwent catheter embolization for pelvic arterial bleeding. In univariate analysis, predictor variables included hematoma vol ($p < 0.0001$), Tile grade ($p = 0.002$), multiple/bilateral foci of extravasation ($p = 0.049$), arterial blush vol ($p < 0.0001$), PVP blush vol ($p = 0.004$), and bleeding rate: PVP-art ($p = 0.001$). In logistic regression, hematoma vol (OR 1.007 Δ per mL), arterial CE vol (OR 194.3 Δ per mL), PV CE vol (OR 0.015 Δ per mL), bleeding rate (OR 61.7 Δ per mL), and Tile C vertical instability (OR 6.2) remained as independent predictors.

CONCLUSION

Hematoma vol, CE vol on art and PV phase, and bleeding rate between phases are independent predictors of major arterial hemorrhage after pelvic fracture. The generalizability of the model is under evaluation using a dataset from a second high-volume level I trauma center.

CLINICAL RELEVANCE/APPLICATION

Volumetric measurements of hematoma, arterial and PV CE, and rate of change of CE between phases can potentially improve prediction of major arterial injury after pelvic fractures.

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RC508-10 Non-Vascular Thoracic Trauma

Wednesday, Nov. 28 11:10AM - 11:40AM Room: S406B

Participants
Krystal Archer-Arroyo, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

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Active Handout:Krystal Archer-Arroyo

http://abstract.rsna.org/uploads/2018/18000580/RSNA 2018 Non-Vascular Chest Trauma RC508-10.pdf

LEARNING OBJECTIVES

1) Describe common imaging findings of tracheobronchial injury. 2) Classify parenchymal injuries of the lung. 3) Discuss rib fracture patterns and pre-operative planning for chest reconstructive surgery.

RC508-11 A 2018 International Survey to Assess Use of Intraluminal Contrast in CT Protocols for Penetrating Torso Trauma

Wednesday, Nov. 28 11:40AM - 11:50AM Room: S406B

Awards
Student Travel Stipend Award

Participants
Cory J. Ozimok, BSC, MD, Ottawa, ON (*Presenter*) Nothing to Disclose
Vincent M. Mellnick, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Michael N. Patlas, MD,FRCPC, Hamilton, ON (*Abstract Co-Author*) Nothing to Disclose

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patlas@hhsc.ca

PURPOSE

There is controversy regarding the administration of oral and rectal contrast in CT protocols to detect bowel injury in the context of penetrating torso trauma. Given the lack of published societal guidelines, our goal was to survey trauma radiologists across North America and abroad to determine consensus on CT protocols for penetrating trauma.

METHOD AND MATERIALS

With IRB approval, an anonymous 10-question online survey was distributed via email to 589 radiologists in the American Society of Emergency Radiology (ASER) member database. The survey was open for a 4-week period in February 2018. A commercially available website that allows subscribers to create and analyze survey results was used for analysis.

RESULTS

We received 124 responses (21% response rate) with majority from U.S. institutions (82%), followed by Europe (7%), Canada (6%), Asia (3%) and Australia/New Zealand (2%). Seventy-four percent of respondents indicated they do not routinely administer oral contrast in penetrating trauma and 68% do not administer rectal contrast. The decision to administer intraluminal contrast is made by the referring physician at 52% of institutions, the attending radiologist at 18% and a resident or fellow at 20%. Most centers do not use software to assess trajectory of penetrating trauma (90%). There is in-house attending level coverage at 54% of institutions. When asked if trauma scans are reviewed before removing the patient from the table, 41% of respondents answered 'No' and of those who answered 'Yes,' 12% said they are reviewed by an attending, 33% by a resident, and 4% by a fellow.

CONCLUSION

The majority of major trauma centers do not routinely administer oral or rectal contrast in cases of penetrating torso trauma and the decision is often made by the referring physician.

CLINICAL RELEVANCE/APPLICATION

There is international consensus that the added benefit of intraluminal contrast to detect bowel injury in CT protocols for penetrating trauma is outweighed by the delay in patient management.

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RC508-12 Imaging and Clinical Predictors of Outcomes in Torso Trauma

Wednesday, Nov. 28 11:50AM - 12:00PM Room: S406B

Awards
Student Travel Stipend Award

Participants
Pedro V. Staziaki, MD, Boston, MA (*Presenter*) Nothing to Disclose
Aaron Maybury, Jamaica Plain, MA (*Abstract Co-Author*) Nothing to Disclose
Neha Gangasani, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Michael J. Hsu, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Mustafa Qureshi, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Christina A. LeBedis, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jorge A. Soto, MD, Boston, MA (*Abstract Co-Author*) Royalties, Reed Elsevier
Stephan W. Anderson, MD, Cambridge, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the utility of CT findings with clinical parameters to predict clinical outcomes in trauma

To assess the utility of CT findings with clinical parameters to predict clinical outcomes in trauma.

METHOD AND MATERIALS

IRB-approved retrospective study of all adults who sustained blunt/penetrating trauma in a Level 1 trauma center in 2015.Clinical parameters: admission blood pressure (SBP), heart rate, Glasgow Coma Scale (GCS), hemoglobin, hematocrit (HCT) and lactate. A blinded radiologist assessed CT for colon, kidney, liver, spleen, bony pelvic ring, lung parenchyma, and/or rib injuries.Outcomes: admission to ICU, length of stay (LOS) in the ICU, life-saving procedures (conventional angiography/intervention, surgery) and total LOS in the hospital.Multivariate linear and logistic regression models were employed and covariate-adjusted parameter estimates and odds ratios (OR) with 95% confidence intervals (CI) were computed.

RESULTS

Among 723 patients, 162 were excluded due to missing lab data, resulting in 561 patients (72% males, age 39 ± 18 years).168 patients were admitted to the ICU. Liver (OR 15.9 [4.8-52.5]), spleen (OR 15.9 [4-62.8]), pelvis (OR 3.4 [1.5-7.5]), lung (OR 3.3 [1.5-7.1]) and rib (OR 4.1 [2.4-7.3]) injuries in addition to age, GCS and lactate predicted admission to the ICU. Among these, the LOS in the ICU was 6 (3-11) days. Only pelvic injury (2.4, $p < 0.05$) was associated with longer LOS in the ICU.31 patients had life-saving procedure. Colon (OR 37.3 [7.4-189.3]), liver (OR 3.9 [1.2-12.3]), spleen (OR 8.5 [2.3-31.0]) and pelvis (OR 4.8 [1.7-13.7]) injuries, in addition to lactate, predicted undergoing procedures.Total LOS in the hospital was 2 (1-5) days. Kidney (3.6, $p = 0.02$), liver (2.9, $p = 0.03$), spleen (3.5, $p = 0.02$), pelvis (7.2, $p < 0.01$), lung (3.8, $p < 0.01$) and rib (2.2, $p < 0.01$) injuries in addition to age, GCS, HCT and lactate were associated with longer LOS.

CONCLUSION

Liver, spleen, pelvis, lung and rib injuries are predictive of ICU admission, among which only pelvic injury predicts longer LOS in the ICU. Colon, liver, spleen and pelvis injuries are predictive of life-saving procedure. Kidney, liver, spleen, pelvis, lung and rib are predictive of increased LOS in the hospital. These are independent of age, SBP, GCS, HCT or lactate.

CLINICAL RELEVANCE/APPLICATION

Radiologists can demonstrate value by developing strong predictive models of interest to clinicians and administrators alike.

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RC509

Challenging Abdominal Imaging Cases (Interactive Session)

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E353B

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Judy Yee, MD, Bronx, NY (*Moderator*) Research Grant, EchoPixel, Inc; Research Grant, Koninklijke Philips NV;

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC509A Challenging Cases: Pancreas/Biliary

Participants
Jorge A. Soto, MD, Boston, MA (*Presenter*) Royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Through the use of illustrative cases, this presentation will help develop a strategy to provide logical differential diagnoses for solid and cystic pancreatic lesions. 2) Recognize common imaging pitfalls that can lead to errors in diagnosis of pancreatic and biliary lesions. 3) Understand how the various imaging modalities play a complementary role in imaging of the pancreas and biliary tract.

Honored Educators

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RC509B Challenging Cases: Mesentery

Participants
Milana Flusberg, MD, Bronx, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review various common and uncommon mesenteric and peritoneal processes. 2) Use clinical and imaging features to narrow the differential diagnosis of a mesenteric or peritoneal abnormality. 3) Develop a search pattern for often overlooked mesenteric and peritoneal findings.

RC509C Challenging Cases: Liver

Participants
Zhen J. Wang, MD, Hillsborough, CA (*Presenter*) Stockholder, Nextrast, Inc

For information about this presentation, contact:

Jane.Wang@ucsf.edu

LEARNING OBJECTIVES

1) Describe key imaging features of various liver masses. 2) Apply the most appropriate imaging exams for the characterization of liver masses.

RC509D Challenging Cases: Bowel

Participants
David H. Kim, MD, Middleton, WI (*Presenter*) Shareholder, Cellectar Biosciences, Inc; Shareholder, Elucent Medical;

LEARNING OBJECTIVES

1) Be able to apply a logic-based approach to difficult abdominal cases. 2) Be aware of typical pitfalls that may mimic disease. 3) See some unusual abdominal diagnoses or unusual presentations of more common disease.

RC510

Renal and Scrotal Ultrasound with Renal Contrast and Elastography

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E350

GU US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

LEARNING OBJECTIVES

1) Identify the imaging features of a variety of etiologies of renal masses and understand the potential overlap between malignant, non-malignant mass-like lesions and pseudomasses. 2) Recognize the potential limitations of ultrasound in the identification of renal masses and learn to maximize technique. 3) Demonstrate the wide range of appearances of parenchymal diseases on ultrasound and develop an approach to evaluation of parenchymal disease with ultrasound. 4) To learn the basic technical principles of contrast-enhanced ultrasound. 5) To apply these principles in everyday practice. 6) To learn the indications for CEUS in the evaluation of cystic renal lesions. 6) To explain the principles and limitations of elastographic techniques applied to the kidney. 7) To learn about the impact of the renal structure on elasticity values. 8) To identify the significant structural changes responsible for variations of renal elasticity. 9) Describe the normal anatomy of the scrotum. 10) Describe common mass-like pathologic conditions of the scrotum. 11) Describe the significance and management of testicular microlithiasis.

Sub-Events

RC510A Ultrasound Evaluation of Renal Masses and Parenchymal Disease

Participants
Michael D. Beland, MD, Providence, RI (*Presenter*) Research Grant, Canon Medical Systems Corporation; Consultant, General Electric Company

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LEARNING OBJECTIVES

1) Identify the imaging features of a variety of etiologies of renal masses and understand the potential overlap between malignant, non-malignant mass-like lesions and pseudomasses. 2) Recognize the potential limitations of ultrasound in the identification of renal masses and learn to maximize technique. 3) Demonstrate the wide range of appearances of parenchymal diseases on ultrasound and develop an approach to evaluation of parenchymal disease with ultrasound.

RC510B Contrast Evaluation of Renal Masses

Participants
Dirk-Andre Clevert, MD, Muenchen, Germany (*Presenter*) Speaker, Siemens AG; Speaker, Koninklijke Philips NV; Speaker, Bracco Group; Speaker, Samsung Electronics Co, Ltd;

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dirk.clevert@med.uni-muenchen.de

LEARNING OBJECTIVES

1) To learn the basic technical principles of contrast-enhanced ultrasound. 2) To apply these principles in everyday practice. 3) To learn the indications for CEUS in the evaluation of cystic renal lesions.

ABSTRACT

Never before has a new technique changed the field of ultrasound in such a revolutionary way as the use of ultrasound contrast media. With the introduction of second-generation ultrasound contrast agents, contrast-enhanced ultrasound (CEUS) has become widely available as an adjunct to the conventional B-mode sonography in suspect or oncologic imaging. This course will focus on the use of contrast-enhanced ultrasound in the characterisation of cystic renal lesions its impact on clinical decision-making.

RC510C Renal Elastography: Where Are We?

Participants
Nicolas Grenier, MD, Bordeaux CEDEX, France (*Presenter*) Advisory Board, Supersonic Imagine; Travel support, Guerbet SA; Travel support, Bracco Group; Travel support, General Electric Company;

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) To explain the principles and limitations of elastographic techniques applied to the kidney. 2) To learn about the impact of the renal structure on elasticity values. 3) To identify the significant structural changes responsible for variations of renal elasticity.

ABSTRACT

Ultrasound elastography is a new imaging technique under development that provides information about renal stiffness. Kidney elasticity quantification with ultrasound should be better performed with a quantitative technique, based on shear wave velocity measurements (ARFI or SSI methods). Kidney stiffness changes can be affected by mechanical factors such as external pressure induced by the probe and intrarenal characteristics such as tissue anisotropy, which is high in renal medulla, vascularization, which is high within the cortex, and hydronephrosis. Chronic kidney disease (CKD) incidence and prevalence are increasing in Western countries, due particularly to diabetes mellitus and hypertension-related nephropathies. During progression of such renal parenchymal diseases, cellular density may increase, mainly during acute inflammatory phases, and the interstitial matrix may be invaded by fibrosis. All components of these tissue changes may induce an increase of renal elasticity which is not specifically related to fibrosis. Tubular, glomerular, interstitial and vascular changes may also be responsible for an increase of stiffness. This is why, further studies are now necessary before to understand the real impact of elastography measurement in clinical nephrology.Considering characterization of renal tumors with elastography, clinical experience is still limited. Preliminary results show that benign tumors seem to have lower values of elasticity than malignant ones, but, here too, more experience is also necessary.

RC510D There is a Mass in the Scrotum: What Does it Mean?

Participants
Thomas C. Winter III, MD, Salt Lake City, UT (*Presenter*) Speakers Bureau, General Electric Company; Research support, Siemens AG ; ; ;

LEARNING OBJECTIVES

1) Describe the normal anatomy of the scrotum. 2) Describe common mass-like pathologic conditions of the scrotum. 3) Describe the significance and management of testicular microlithiasis.

ABSTRACT

This didactic lecture will review proper sonographic technique for scrotal examination, review normal anatomy of the scrotum as demonstrated by ultrasound, and will then progress to a description of the common pathologic and normal conditions that may present as a scrotal mass.

RC511

Head and Neck PET/CT: Clinical Approach

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S504CD

CT HN MR NR NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

RC511A Oropharyngeal Cancer: Evolving Challenges-Clinician's Perspective

Participants
Bhishamjit Chera, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand how radiological interpretation of pre-treatment and post-treatment imaging studies influences the management of patients with head and neck cancer.

RC511B CT and MRI Anatomy and Interpretation

Participants
Valerie L. Jewells, DO, Chapel Hill, NC (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Provide radiologists with the tools to access CT and MRI imaging for head and neck cancer. 2) Teach attendees how to address the images in a manner that will assist the ENT surgeon for staging and surgical planning. 3) Address the principles for critical thinking and analysis as well as preparation and skill development for a head and neck tumor board.

ABSTRACT

A successful multidisciplinary head and neck tumor board requires coordination and imaging review on the part of radiology to assist the surgeon, radiation oncolcogist and medical oncologist. The goal is to reach the best option for each individual patient depending upon tumor type, staging and underlying medical conditions. Appropriate imaging and interpretation is key to this endeavor. These topics will be addressed through discussion of selective CT and MRI cases from our weekly tumor board. References: 1. Heineman T, St John MA, Wein RO and Weber RS. It takes a village: The importance of multidisicplinary care. Otoloaryngol Clin North Am 2017 Aug;50(4):679-687. 2. Liao CT, Kang CJ, Lee LY et al. Association between multidisciplinary team care approach and survival rates in patients with oral cavity squamous cell carcinoma. Head Neck 2016 Apr;38 Suppl 1:E5444-53. 3. Shah BA, Qureshi MM, Jalisi et al. Analysis of decision making at a multidisciplinary head and neck tumor board incorporating evidence-based National Cancer Comprehensive Network (NCCN) guidelines. Pract Radiat Oncol 2016 Jul-Aug;6(4):248-54.

RC511C FDG-PET/CT: Applications and Interpretation

Participants
Terence Z. Wong, MD, PhD, Chapel Hill, NC (*Presenter*) Consultant, Lucerno Dynamics, LLC;

LEARNING OBJECTIVES

1) Describe applications for FDG-PET/CT for initial evaluation and follow up of patients with head and neck cancer. 2) Learn the value of combining metabolic findings on FDG-PET findings with morphology on CT and endoscopic appearance. 3) Understand potential etiologies of false positive and false negative studies.

ABSTRACT

Optimal evaluation of patients with head and neck malignancies requires a multidisciplinary approach. Correlation of FDG-PET, CT, direct visualization, and clinical examination is important to provide the best management of these patients.

RC511D Panel Discussion: Q&A

Participants
Bhishamjit Chera, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose
Valerie L. Jewells, DO, Chapel Hill, NC (*Presenter*) Nothing to Disclose
Terence Z. Wong, MD, PhD, Chapel Hill, NC (*Presenter*) Consultant, Lucerno Dynamics, LLC;

LEARNING OBJECTIVES

Case examples which highlight the value of multidisciplinary approaches for managing patients with head and neck cancer.

RC512

Vascular Series: MR Angiography: New Techniques and Their Application

Wednesday, Nov. 28 8:30AM - 12:00PM Room: S503AB

MR VA

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Thomas K. Foo, PhD, Niskayuna, NY (*Moderator*) Employee, General Electric Company
Martin R. Prince, MD,PhD, New York, NY (*Moderator*) Patent agreement, General Electric Company; Patent agreement, Hitachi, Ltd; Patent agreement, Siemens AG; Patent agreement, Canon Medical Systems Corporation; Patent agreement, Koninklijke Philips NV; Patent agreement, Nemoto Kyorindo Co, Ltd; Patent agreement, Bayer AG; Patent agreement, Lantheus Medical Imaging, Inc; Patent agreement, Bracco Group; Patent agreement, Mallinckrodt plc; Patent agreement, Guerbet SA;

LEARNING OBJECTIVES

1) To review the latest MR techniques for vascular imaging. 2) Learn how to optimize MR Angiography pulse sequences. 3) Review a spectrum of Vascular Disease on MRI/MRA.

Sub-Events

RC512-01 K-Space Options for Improving MRA

Wednesday, Nov. 28 8:30AM - 9:05AM Room: S503AB

Participants
Walter F. Block, PhD, Madison, WI (*Presenter*) Stockholder and Co-founder, TherVoyant; Research support, General Electric Company;

Active Handout:Walter F. Block

http://abstract.rsna.org/uploads/2018/18002602/RSNA kspace mra improved Block RC512-01.pdf

LEARNING OBJECTIVES

View learning objectives under main course title.

RC512-02 Sub-Millimetric 4D Flow MR in Small Intracerebral Aneurysms at 7 Tesla with Experimental Verification in Upscaled 3D Printed Replica

Wednesday, Nov. 28 9:05AM - 9:15AM Room: S503AB

Participants
Pierre-Francois Van de Moortele, Minneapolis, MN (*Presenter*) Nothing to Disclose
Mostafa Toloui, PhD, Minneapolis, MN (*Abstract Co-Author*) Nothing to Disclose
Omid Amili, PhD, Minneapolis, MN (*Abstract Co-Author*) Nothing to Disclose
Sean Moen, BS, Minneapolis, MN (*Abstract Co-Author*) Nothing to Disclose
Ang Zhou, PhD, Minneapolis, MN (*Abstract Co-Author*) Nothing to Disclose
Sebastian Schmitter, Braunschweig, Germany (*Abstract Co-Author*) Nothing to Disclose
Susanne Schnell, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Ruoyun Ma, Minneapolis, MN (*Abstract Co-Author*) Nothing to Disclose
Michael Markl, PhD, Chicago, IL (*Abstract Co-Author*) Institutional research support, Siemens AG; Consultant, Circle Cardiovascular Imaging Inc;
Kamil Ugurbil, Minneapolis, MN (*Abstract Co-Author*) Nothing to Disclose
Filippo Coletti, PhD, Minneapolis, MN (*Abstract Co-Author*) Nothing to Disclose
Bharathidasan Jagadeesan, MD, Minneapolis, MN (*Abstract Co-Author*) Research Consultant, MicroVention Inc; Research Consultant, Medtronic plc; Research Consultant, CVRx

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PURPOSE

To demonstrate the reproducibility of hemodynamic parameters in small intracranial aneurysms measured with 7 T MRI in an upscaled 3 D Printed model of the same aneurysms at 3 T.

METHOD AND MATERIALS

Scan: Five patients with silent aneurysm(s) were scanned at 7T. TOF was obtained for lesion localization and mask generation. ECG-gated, 4-points 3-directional 4D Flow was used in an axial 3D slab centered on the aneurysm with 15 cardiac phases, 2 k-space lines per cardiac phase, voxel size 0.76x0.76x0.8mm3, TR/TE=50.4ms/3.38ms, VENC=0.8m/s, Images were processed in

Matlab (noise filtering, correction for maxwell term and eddy current, velocity computation); vessel masks segmented in MimicsTM (based on TOF and/or PC-MRA from 4D Flow data); 3D streamlines and vorticity visualized using TecplotTMs ; WSS was computed in matlab. Replica: Based on TOF, PC-MRA or CT-Scan, 3 aneurysms were numerically modelled, upscaled, 3D printed and assembled in an MR-compatible, dynamic fiow circuit filled with a fiuid chosen for its Reynolds and Womersley numbers4. Time re-scaled patient specific cardiac input functions from in-vivo measurements fed a programmable pump. 4D Flow MR data were acquired at 3T with this setting (see Fig.1).

RESULTS

A few studies failed because because of ECG issues, motion, or too small aneurysm size. When successful, 4D Flow revealed sharply defined velocity vectors and derived parameters. Velocity streamlines showed a tendency to form circular patterns rotating inside the aneurysm. It appears that at some cardiac cycle phases stronger local WSS develop on part of the aneurysm wall, despite a low velocity. 3T measures of 4D Flow in the upscaled 3D printed replica of the same aneurysm (Fig.1) demonstrated fairly similar velocity patterns when compared to in-vivo data.

CONCLUSION

We successfully obtained sub-millimetric in-vivo 4D Flow scans in small IAs at 7T. 4D Flow at 3T of aneurysm-specific 3D printed replicas yielded fiow patterns comparable to those obtained in-vivo. We believe that the very promising results of this pilot study pave the way for us to study a larger cohort of patients. 3D models of ruptured IAs could provide relevant information when in-vivo scanning is impossible.

CLINICAL RELEVANCE/APPLICATION

Our results show good agreement between invivo measurements at 7 T and invitro measurements at 3 T in an unruptured 6 mm internal carotid artery aneurysm .

RC512-03 Focused, Ferumoxytol Enhanced MR Angiography (f-FEMRA) in Five Minutes Table Time for Patients With Claustrophobia: A Comparative Study

Wednesday, Nov. 28 9:15AM - 9:25AM Room: S503AB

Participants
Puja Shahrouki, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Kim-Lien Nguyen, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
John M. Moriarty, MD, Los Angeles, CA (*Abstract Co-Author*) Speaker, AngioDynamics, Inc Consultant, AngioDynamics, Inc Speaker, Sequent Medical, Inc Consultant, Sequent Medical, Inc Speaker, Argon Medical Devices, Inc Consultant, Argon Medical Devices, Inc
Adam N. Plotnik, MBBS,FRANZCR, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Takegawa Yoshida, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
J. Paul Finn, MD, Los Angeles, CA (*Presenter*) Speakers Bureau, Bayer AG; Scientific Advisory Board, AMAG Pharmaceuticals, Inc

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PURPOSE

To demonstrate the diagnostic performance of focused ferumoxytol-enhanced MR angiography (*f*-FEMRA) for evaluation of thoracic, abdominal and pelvic vasculature in <5 minutes in patients with claustrophobia.

METHOD AND MATERIALS

In this IRB-approved study, 13 patients (age 61.425.2 years, 6 F) with claustrophobia underwent *f*-FEMRA between December 2014 and August 2017 with an abbreviated acquisition protocol. Ferumoxytol 4mg/kg was administered as a slow infusion outside the scanner bore and steady state FEMRA was completed using default tuning and shim parameters to minimize adjustment time on a 3.0T MRI system. We retrospectively identified a matching cohort of 13 patients who had multi-phase, gadolinium-enhanced (GE) MRA with gadobenate dimeglumine, 0.15 mmol /kg. Two radiologists independently scored the images for arterial and venous image quality, motion artifacts, and diagnostic confidence using a 5-point scale where a score of 5 indicated the highest image quality and confidence and lowest level of artifact. Readers indicated whether they felt additional imaging was required for diagnostic assessment. Signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) of the aorta and inferior vena cava (IVC) were measured All assessments were compared between groups and P-values <0.05 were considered statistically significant.

RESULTS

All scans were fully diagnostic and assessed with high confidence (scores >=4). Both reviewers indicated additional imaging was not required in all 26 (100%) studies. There was no significant difference between *f*-FEMRA and GEMRA for diagnostic confidence (4.86 ± 0.24 vs 4.69 ± 0.25, P = 0.125), arterial image quality (4.62 ± 0.57 vs 4.65 ± 0.49, P = 0.775) and motion artifact score (4.58 ± 0.49 vs 4.58 ± 0.28, P > 0.99). *f*-FEMRA had a significantly higher score for venous image quality than GEMRA (4.62 ± 0.42 vs 4.19 ± 0.56, P = 0.039). The CNR of the IVC was significantly higher for steady-state *f*-FEMRA than GEMRA regardless of the enhancement phase (P < 0.05).

CONCLUSION

Comprehensive and fully diagnostic vascular imaging of the thorax, abdomen and pelvis can be completed in less than 5 minutes of scan time with *f*-FEMRA.

CLINICAL RELEVANCE/APPLICATION

In patients with claustrophobia, comprehensive vascular imaging was completed successfully in as little as five minutes using *f*-FEMRA with noninferior diagnostic performance to conventional GEMRA.

RC512-04 Accuracy of ECG-Gated Time-Of-Flight Magnetic Resonance Angiography (TOF-MRA) versus Contrast Enhanced Magnetic Resonance Angiography (CE-MRA) at 3T for the diagnosis Peripheral Arterial Disease (PAD) of the Lower Limb

Wednesday, Nov. 28 9:25AM - 9:35AM Room: S503AB

Awards
Trainee Research Prize - Medical Student

Participants
Saanchi A. Malhotra, MBBS, Mumbai, India (*Presenter*) Nothing to Disclose

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PURPOSE

To evaluate the sensitivity, specificity, PPV, NPV and diagnostic accuracy of ECG-gated TOF-MRA at 3T for the diagnosis of PAD of the lower limb.

METHOD AND MATERIALS

A prospective study was conducted with 50 patients(age:mean=64y)with clinically diagnosed PAD. On a 3T MRI machine, TOF-MRA was performed using 16 channel body coil (with ecg gating and presaturation), from the level of the infrarenal aorta to the dorsalis pedis artery. CE-MRA was performed with 15ml Gd Dimeglumine injected at a flow rate of 0.4ml/sec followed by normal saline flush. All the images were viewed on a 3D workstation using standard 3D reconstruction software. The degree of stenoses was graded for 27 anatomic segments in each patient. The subjective image quality (5-point Likert scale) and degree of stenoses in each vascular segment (5-point likert scale) were evaluated by 2 observers and compared using the Mann-Whitney U and nonparametric Wilcoxon signed-rank test, respectively. Sensitivity, specificity, PPV and NPV of the TOF-MRA for the detection of significant (>50%) stenoses were assessed relative to the CE-MRA as the reference standard.

RESULTS

For TOF-MRA, 394/1326 segments(29.71%) were rated as significantly stenosed. For CE-MRA, 393/1326 segments(29.6%) were rated as significantly stenosed. DSA results were available for 324 segments. The sensitivity of TOF-MRA for detecting significant stenosis was 100% as compared to CE-MRA, the specificity was 99.89%, the PPV was 99.75%, the NPV was 100% and accuracy was 99.92%. In the pairwise comparison, TOF-MRA and CE-MRA techniques yielded significantly similar stenoses grades in all but 5 of 27 segments. These segments were right proximal ATA, right proximal PTA, right distal PTA, right proximal peroneal, left proximal ATA (p value <0.05)

CONCLUSION

ECG-gated TOF-MRA at 3T showed a high sensitivity, specificity, PPV, NPV and diagnostic accuracy, as compared to CE-MRA in the evaluation of significant stenoses in the lower limb arteries at a reasonable imaging time.

CLINICAL RELEVANCE/APPLICATION

Previous studies have shown the superiority of CE-MRA over TOF-MRA at 1.5T magnetic strength. ECG-gated TOF-MRA at 3T has comparable diagnostic accuracy to CE-MRA for the diagnosis of PAD of the lower limb and thus offers an alternative to the currently used imaging tests for PAD, especially in patients in whom the administration of iodinated or gadolinium-based contrast agents is contraindicated.

RC512-05 4D Flow MRA

Wednesday, Nov. 28 9:35AM - 10:10AM Room: S503AB

Participants
Shreyas S. Vasanawala, MD, PhD, Palo Alto, CA (*Presenter*) Research collaboration, General Electric Company Consultant, Arterys Inc Research Grant, Bayer AG

LEARNING OBJECTIVES

1) To know components required to implement clinically 4D flow. 2) To know types of clinically relevant data that can be extracted from 4D flow. 3) Become familiar with approaches to integrating 4D flow into clinical protocols.

ABSTRACT

4D flow is a time resolved volumetric phase contrast MRI technique.This presentation will cover essential components required to implement 4D flow in a clinical setting, review types of clinically relevant data that can be extracted from 4D flow, and present several approaches to integrating 4D flow into clinical MRI protocols. Essential components include a pulse sequence and postprocessing software. Data that can be extracted includes blood flow, cardiovascular function, and anatomy. Protocols can be greatly simplified with 4D flow, enabling a decoupling of image acquisition and interpretation, thereby enhancing efficiency of patient, technologist, and radiologist time.

RC512-06 Comprehensive MRA: Morphology and Function

Wednesday, Nov. 28 10:20AM - 10:55AM Room: S503AB

Participants
Tim Leiner, MD, PhD, Utrecht, Netherlands (*Presenter*) Speakers Bureau, Koninklijke Philips NV Research Grant, Bayer AG

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LEARNING OBJECTIVES

To review state of the art and investigational methods for evalation of vascular morphology and function

LEARNING OBJECTIVES

View learning objectives under main course title.

RC512-07 4D Flow MRI Improves Dissection Flap Fenestration Detection and Characterization in Type B Aortic Dissection

Wednesday, Nov. 28 10:55AM - 11:05AM Room: S503AB

Participants
Bradley D. Allen, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Pascale Aouad, MD, Creteil, France (*Abstract Co-Author*) Nothing to Disclose
Amir Ali Rahsepar, MD, Bridgeport, CT (*Abstract Co-Author*) Nothing to Disclose
Nicholas S. Burris, MD, San Francisco, CA (*Abstract Co-Author*) Entitled to royalties from liscensure of intellectual property to Imbio LLC
Christopher J. Francois, MD, Madison, WI (*Abstract Co-Author*) Departmental research support, General Electric Company;
Alex Barker, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Chris Malaisrie, Chicago, IL (*Abstract Co-Author*) Consultant, Edwards Lifesciences Corporation Proctor, Edwards Lifesciences Corporation Speaker, Edwards Lifesciences Corporation Consultant, Baxter International Inc Speaker, ABIOMED, Inc Speaker, Werfen Life Group SAU
James C. Carr, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Astellas Group; Research support, Siemens AG; Speaker, Siemens AG; Advisory Board, Guerbet SA
Jeremy D. Collins, MD, Chicago, IL (*Abstract Co-Author*) Consultant, Guerbet SA Grant, Siemens AG Grant, C. R. Bard, Inc
Michael Markl, PhD, Chicago, IL (*Abstract Co-Author*) Institutional research support, Siemens AG; Consultant, Circle Cardiovascular Imaging Inc;

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PURPOSE

Flap fenestrations are key determinants of false lumen hemodynamics in type B aortic dissection. The purpose of this study was to compare dissection flap fenestration visualization between 4D flow MRI, conventional MRI/MRA, and CTA and qualitatively describe fenestration flow using 4D flow MRI.

METHOD AND MATERIALS

Nineteen patients with residual or chronic type B dissections (age: 59±12 years, M/F: 11/8) who had undergone MRI/MRA of the thoracic aorta including 4D flow MRI were retrospectively identified. Fourteen of the 19 patients had CTA performed within 2 years of MRI/MRA with no interval surgery. 4D flow images were post-processed and visualized on dedicated software (cvi42, Circle, Canada). Blinded image review was performed independently by two radiologists (rev 1 and rev 2). Cine 4D flow velocity maximum intensity projection (MIP) images were qualitatively evaluated for flow jets between true and false lumens, and MRI/MRA and CTA images were reviewed using a standard clinical approach. The number of fenestrations (including entry and exit tears) were reported. Frequency of fenestration detection was compared between all three techniques using a $\chi 2$-test and assuming alpha of 0.05.

RESULTS

4D flow MRI detected more fenestrations relative to MRI/MRA (rev 1: +3 (33/30), rev 2: +5 (30/25)) and similar numbers relative to CTA (rev 1: +1 (26/25), rev 2: -3 (23/26)). MRI/MRA detected fewer fenestration relative to CTA (rev 1: -6 (19/25), rev 2: -5 (21/26)). These differences were not statistically significant ($p > 0.05$), although we were underpowered to detect small differences in detection rate. Only fenestrations with associated flow jets were identified using 4D flow. Both observers report that diastolic flow from false to true lumen (retrograde) was the easiest hemodynamic feature to identify. Many fenestrations demonstrated biphasic flow between lumens (rev 1: 18/33, rev 2: 16/30).

CONCLUSION

4D flow MRI in type B dissection patients has the potential to better detect and hemodynamically characterize fenestrations. Future work will correlate these hemodynamic characteristics with thrombosis and aneurysmal enlargement of the false lumen to better direct medical or surgical management.

CLINICAL RELEVANCE/APPLICATION

4D flow MRI may improve detection and hemodynamic characterization of type B aorta dissection flap fenestrations with the potential to better inform patient risk-stratification and surgical planning.

RC512-08 Safe Follow-up after EndoVascular Aortic Repair (EVAR) with Non-contrast Magnetic Resonance Imaging (NCMRI): the SAFEVAR Study (Preliminary Data)

Wednesday, Nov. 28 11:05AM - 11:15AM Room: S503AB

Participants
Giulia Lastella, MD, Milan, Italy (*Presenter*) Nothing to Disclose
Paola M. Cannao, MD, Milano, Italy (*Abstract Co-Author*) Nothing to Disclose
Marco Ali, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Massimiliano Marrocco-Trischitta, San Donato Milanese, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesco Secchi, MD,PhD, Milano, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesco Sardanelli, MD, San Donato Milanese, Italy (*Abstract Co-Author*) Speakers Bureau, Bracco Group; Advisory Board, Bracco Group; Research Grant, Bayer AG; Advisory Board, General Electric Company; Reserach Grant, General Electric Company; Speakers Bureau, Siemens AG; Reserach Grant, Real Imaging Ltd;

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PURPOSE

Endovascular aortic repair (EVAR) is become a standard tecnique for the treatment of aortic and/or iliac aneurysm. A common short and long time complication is endoleak, which is well-known identified with arterious phase CT images. Magnetic resonance imaging

(MRI) could be useful, without use of contrast, in its early identification and during the follow-up of these patients. The presence of hyperintensity in MRI in the area closed to the EVAR is related to the presence of endoleak. Our aim was to evaluate the correlation between hyperintensity in MRI and endoleak and its appearance in CT.

METHOD AND MATERIALS

Forty-two patients after EVAR for aortic and/or iliac arterial aneurysms were enrolled and underwent MRI and contrast-enhanced CT in the same day between 0,01 and 1,55 years after the implantation. MRI was focused on true fast imaging with steady-state free precession (TRUFI) and half-Fourier-acquisition single-shot turbo spin-echo (HASTE) sequences at the precise level of the vessel were EVAR was implanted. CT was performed before and after iodate contract injection with basal and arterious phase contrast images. Two independent observers reviewed MRI to evaluate the presence of hyperintensity near the EVAR. Then, they evaluated in CT images the presence of endoleak and classified them according to the classification of Stanford in type I and II.

RESULTS

MRI revealed that 11 patients had no hyperintensity, and no one of these had endoleak in CT images. 31 patients presented hyperintensity in MRI, and 19 of these reveled a presence of endoleak (6 type I, 13 type II). Sensitivity, specificity, positive predictive value and negative predictive value of both observers were 100% (19/19), 48% (11/23), 61% (19/31) and 100% (11/11) respectively.

CONCLUSION

The absence of hyperintensity near the EVAR in MRI images can exclude the eventual presence of endoleak; nonetheless the hyperintensity can correlate with the presence of endoleak and require CT with iodate contrast to confirm it.

CLINICAL RELEVANCE/APPLICATION

Endoleaks can be previously excluded if there is no hyperintensity in MRI images without contrast injection. Data are still insufficient, but evidence revealed that CT can be considered as a second level exam only in the presence of hyperintensity after MRI without contrast.

RC512-09 Prone Position Scan Reduces B1 Inhomogeneity Effect in Non-Contrast-Enhanced MR Angiography of Lower Extremities

Wednesday, Nov. 28 11:10AM - 11:25AM Room: S503AB

Participants
Katsumi Nakamura, MD, Kitakyushu, Japan (*Presenter*) Nothing to Disclose
Akiyoshi Yamamoto, RT, Kitakyushu, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroki Matoba, Kitakyushu, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuji Shintani, RT, Kitakyushu, Japan (*Abstract Co-Author*) Nothing to Disclose
Mitsue Miyazaki, PhD, La Jolla, CA (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To compare image quality on non-contrast MR angiography (MRA) acquired in prone position (prone-MRA) and that in supine position (supine-MRA) for the visualization of lower extremity arteries, and evaluate an effect of prone-MRA for improvement in B1 inhomogeneity

METHOD AND MATERIALS

Ten relatively thin volunteers (8 males, 2 females, mean age: 26.3 y.o.) underwent both supine- and prone-MRA examinations. The body mass index (BMI) range was from 17.3 to 24.0 (mean 20.2 ± 2.1).The arterial visualization was evaluated using a five-point scale. Overall successful rate was also calculated. Artifacts were compared in both prone- and supine-MRA images. Non-contrast MRA (Fresh blood imaging) was performed on a 3T-clinical imager using ECG-gated 3D half-Fourier FSE. After acquisition, the system subtracts the systolic triggered from diastolic triggered data. Systolic and diastolic delay times were automatically determined using a DelayTracker software. B1 map was obtained at a pelvic-femoral level in order to evaluate B1 inhomogeneity, and a B1 value ratio index (BRI) was calculated; BRI = (B1 value of right thigh) - (B1 value of left thigh) / B1 value of right thighx100.

RESULTS

The visualization of the left superficial femoral artery in the supine-MRA was significantly decreased due to B1 inhomogeneity compared to that in prone-MRA (average score = 3.7, 4.5, respectively, $p<0.05$). In B1 map analysis, B1 inhomogeneity in an anterior region of the left femoral indicated superb improvement in the prone position than in the supine position (BRI were 5.3, 12.0, respectively, $p<0.05$). The overall successful rate was increased from 50% in the supine-MRA to 90% in the prone-MRA. Misregistration artifacts were slightly greater in supine-MRA; however, appearances of other artifacts were considerably small and almost similar between the two methods.

CONCLUSION

Prone-MRA alleviates B1 inhomogeneity effect, causing an arterial signal loss of the pelvic-femoral region in supine-MRA, especially in thin volunteers. Proximal portion of superficial femoral artery must be insensitive to B1 inhomogeneity in the prone position. However, comfortless of prone-MRA scan is required to consider in elder patients.

CLINICAL RELEVANCE/APPLICATION

Non-contrast MR angiography (MRA) acquired in prone position alleviates B1 inhomogeneity effect, causing an arterial signal loss of the pelvic-femoral region in supine-MRA, especially in thin volunteers.

RC512-10 MRA and 3T or Higher Field Strength

Wednesday, Nov. 28 11:25AM - 12:00PM Room: S503AB

Participants
Winfried A. Willinek, MD, Bonn, Germany (*Presenter*) Speakers Bureau, Bayer AG Speakers Bureau, Bracco Group Speakers Bureau, General Electric Company Speakers Bureau, Koninklijke Philips NV Speakers Bureau, Sirtex Medical Ltd

LEARNING OBJECTIVES

View learning objectives under main course title.

RC513

Pediatric Series: Pediatric Radiology

Wednesday, Nov. 28 8:30AM - 12:00PM Room: S405AB

MR PD US

AMA PRA Category 1 Credits ™: 3.00
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants
Brian D. Coley, MD, Cincinnati, OH (*Moderator*) Royalties, Reed Elsevier; Travel support, Canon Medical Systems Corporation; Travel support, Koninklijke Philips NV; Board of Directors, NeoView Ltd; Departmental Research support, Canon Medical Systems Corporation; Departmental Research support, Koninklijke Philips NV
Geetika Khanna, MD, MS, Iowa City, IA (*Moderator*) Nothing to Disclose
Mary-Louise C. Greer, FRANZCR,MBBS, Toronto, ON (*Moderator*) Research Grant, AbbVie Inc;
Christopher I. Cassady, MD, Houston, TX (*Moderator*) Nothing to Disclose

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Sub-Events

RC513-01 Pediatric Lung Sonography

Wednesday, Nov. 28 8:30AM - 8:50AM Room: S405AB

Participants
Brian D. Coley, MD, Cincinnati, OH (*Presenter*) Royalties, Reed Elsevier; Travel support, Canon Medical Systems Corporation; Travel support, Koninklijke Philips NV; Board of Directors, NeoView Ltd; Departmental Research support, Canon Medical Systems Corporation; Departmental Research support, Koninklijke Philips NV

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LEARNING OBJECTIVES

1) To describe the basic findings of normal pediatric lung ultrasound. 2) Differentiate normal from abnormal, and determine when the application of lung ultrasound may provide benefit on patient diagnosis and management.

RC513-02 Convolutional Neural Networks Accurately Determine Bone Age Utilizing Radiographs of the Second Digit Alone

Wednesday, Nov. 28 8:50AM - 9:00AM Room: S405AB

Awards
Student Travel Stipend Award

Participants
Nakul Reddy, MD, Houston, TX (*Presenter*) Nothing to Disclose
Jesse C. Rayan, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
J. H. Kan, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Ananth Annapragada, PhD, Houston, TX (*Abstract Co-Author*) Stockholder, Alzeca Biosciences, LLC Stockholder, Sensulin, LLC Stockholder, Abbott Laboratories Stockholder, Johnson & Johnson
Wei Zhang, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Convolutional neural networks (CNN) have shown remarkable success in evaluating bone age, achieving accuracy beyond conventional evaluation by a radiologist in the RSNA Pediatric Bone Age Challenge in 2017 . The primary purpose of our study was to determine if bone age can be estimated by a CNN using radiographs of the second digit alone. A secondary purpose was to evaluate the effect of reduced radiation dose on the accuracy of bone age determination.

METHOD AND MATERIALS

Data was obtained from the RSNA pediatric bone age challenge training data set (Larson et al), which included 12606 hand radiographs and 200 test radiographs. Bone ages ranged from 1 month to 19 years of age. An object detector network (RetinaNet) by Lin et al, was used to extract the second digit terminal and middle phalanx. A grayscale convolutional neural network based on Inception v3 architecture was used to output a scalar value. Training was performed over 400 epochs, with randomized weights, on a desktop system equipped with a GTX 1070 Ti graphics card. Three subsets of the data were evaluated by the CNN: the whole hand/wrist, the second digit, and second digit with addition of Gaussian noise to simulate radiation reduction (25% standard

deviation of the pixel intensity distribution).

RESULTS

The average difference in assessed bone age of the entire hand/wrist by the CNN compared to the reviewers' consensus age was 4.8 months (standard deviation of 4.35). Comparing reviewers to second digit only with standard radiation differed by 7.3 months (standard deviation of 6.30), and comparing with second digit only with radiation reduction simulation differed by 6.8 months (standard deviation of 6.16).

CONCLUSION

A CNN can extract a clinically useful bone age from the second phalanx, similar to whole hand/wrist evaluation by both CNNs and pediatric radiologists. Adding noise to the images to simulate the effect of reduced radiation dose results in no change in bone age estimates.

CLINICAL RELEVANCE/APPLICATION

These results suggest a potential for reduced radiation burden as well as convenience in evaluating for bone age in pediatric patients when compared to the current state of the art.

RC513-03 Improving the Accuracy of Deep Learning Networks for Bone-Age Estimation by Incorporating Radiological Insight Guided Feature Analysis

Wednesday, Nov. 28 9:00AM - 9:10AM Room: S405AB

Participants
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PURPOSE

The Greulich-Pyle (GP) method of bone age determination primarily involves estimation of ossification of the epiphyseal centers around the radiocarpal, carpometacarpal and the proximal interphalangeal joints and the carpal bones. This radiological insight was applied to devise a novel sequential approach, involving segmentation of relevant wrist anatomy from hand X-Rays followed by deep learning, and compared it against a standard deep learning technique to assess bone age in pediatric population between 7 years to 18 years.

METHOD AND MATERIALS

Dataset containing 12,600 radiographs provided by RSNA for Bone Age Challenge is used for this work. Out of the 12,600 we used ~10,000 radiographs of children between 7 years to 18 years of age. The intensity values of the hand radiographs are standardized across dataset by histogram matching image pre-processing techniques. A pre-processing algorithm was created to crop relevant regions, i.e. proximal phalanges, metacarpals, carpals and distal ends of radius and ulna, from the hand radiographs. Finally, ~9,000 cropped images were used to train a convolutional neural network implemented in the research version of HealthSuite Insights (Philips HealthTech) to predict the bone age from the image. The remaining images (~1,000) were used for validation purposes. Additional datasets of 200 test images released by RSNA and 50 test images obtained as part of routine clinical practice (extracted from PACS and anonymised using HIPAA compliant methods) were used to calculate Mean Absolute Error (MAE). Similar MAE was calculated for the same convolutional neural network implemented in the research version of HealthSuite Insights (Philips HealthTech) trained on the images without cropping the images.

RESULTS

The performance of deep learning model trained using cropped images was found to be superior with MAE of 5.08 months compared to the model trained using the full radiographs, which had MAE of 5.51 months.

CONCLUSION

The accuracy of machine learning models for specific tasks on radiographs can be improved by training using cropped/segmented radiographs containing areas of anatomy relevant to the task.

CLINICAL RELEVANCE/APPLICATION

Automated and accurate bone age estimation has wide-ranging clinical and medicolegal applications. Our novel method combines radiologist guided feature-based analysis with deep learning to improve the accuracy.

RC513-04 Diagnostic Accuracy of Post-Mortem Computed Tomography (PMCT) in Children

Wednesday, Nov. 28 9:10AM - 9:20AM Room: S405AB

Participants
Susan C. Shelmerdine, MBBS, FRCR, London, United Kingdom (*Presenter*) Nothing to Disclose
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PURPOSE

To determine the diagnostic accuracy of PMCT compared to standard autopsy (gold standard) in children

METHOD AND MATERIALS

This single centre, retrospective study reviewed whole body non-contrast PMCTs over 6 years (2012-18) in children <16 years with corresponding full autopsy reports, irrespective of clinical indication for referral. Perinatal deaths (i.e. death *in utero* or within 24 hours of delivery) were excluded. PMCT was reported by radiologists with at least 2 years of paediatric post-mortem radiology experience. Autopsy was performed by experienced paediatric pathologists according to routine clinical practice. All imaging was reported blinded to autopsy findings. Overall diagnoses and findings by body systems at PMCT were compared to autopsy findings to evaluate diagnostic accuracy statistics.

RESULTS

136 cases were included (74(54.4%) male). The mean age was 2.1 years (median: 7 months, range: 2 days - 14.7 years). All cases and imaging were diagnostic. A cause of death at autopsy was found for 77/136 (56.6%) cases. PMCT gave a correct cause of death in 55/77 (71%) cases i.e. 55/136 overall (40.4%), with the majority attributable to traumatic brain and/or body injuries. For overall cause of death, diagnostic accuracy rates of PMCT with 95% confidence intervals were sensitivity of 71.4% (60.5%, 80.3%), specificity of 81.4% (69.6%, 89.3%), PPV of 83.3% (72.6%, 90.4%), NPV of 68.6% (57%, 78.2%) and concordance rate of 75.7% (67.9%, 82.2%). By body systems the sensitivity for PMCT was highest for intracranial (75.6%; 60.7-86.2%) and musculoskeletal pathologies (98.4%; 91.4-99.7%) and lowest for cardiac (31.3%; 14.2-55.6%), and abdominal findings (46.2%; 23.2-70.9%).

CONCLUSION

PMCT gives acceptable diagnostic accuracy rates of up to 75% in a paediatric population. Highest accuracy rates were found for intracranial and musculoskeletal pathologies.

CLINICAL RELEVANCE/APPLICATION

This is the largest paediatric PMCT accuracy study to date showing good concordance with autopsy, particularly for intracranial and musculoskeletal pathologies.

RC513-05 Impact of Adaptive Statistical Iterative Reconstruction-V on Radiation Dose and Image Quality in Children with Chest CT Scan

Wednesday, Nov. 28 9:20AM - 9:30AM Room: S405AB

Participants
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PURPOSE

To investigate the impact of adaptive statistical iterative reconstruction-V (ASIR-V) on radiation dose and image quality in children with chest CT scan

METHOD AND MATERIALS

280 patients underwent chest CT scan using a 256-row multi-detector CT (MDCT). The patients and divided into 4 groups (A, B, C and D) of 70 each. Conventional FBP reconstruction algorithm was used in group A. 80kV tube voltage, automated tube current modulation (Smart mA 10-720) and noise index (NI) 13 was used in image acquisition. Subjective image quality were assessed independently by three radiologists. A five-point scale (from 1=poor to 5=excellent) system was used. The Mann-Whitney U test and Kruskal-Wallis H test was used to test whether measurements between groups were different.

RESULTS

Radiation dose in the study group was reduced as compared with the control group. Effective dose in the group B (0.68±0.38), C(0.37±0.06), and D (0.15±0.03) were lower than group A(1.3±0.22). On the image quality evaluation, the 70%ASIR-V image has better image quality on the lung window and the mediastinum window. The the SD value of the fat and muscle (12.09 ± 3.44, 12.37 ± 3.58) is obviously lower than the SD value of 0%, 80% and 90% ASIR-V ($p<0.05$), The SNR (4.83 ± 0.62, 2.93 ± 0.54) was significantly higher than the SNR value ($p<0.05$) of the 0%, 80% and 90% ASIR-V images, and the subjective score of the 70%ASIR-V image in the lung and medial window (4.15 ± 0.51, 4.09 ± 0.53) was also better than the score of 0%, 80% and 90%ASIR-V ($p<0.05$). Post ASIR-V can improve the image quality.

CONCLUSION

The ASIR-V technique of GE Revolution-CT with 70%pre-ASIR-V and 90%post-ASIR-V technique can reduce radiation dose while maintain good overall image quality.

CLINICAL RELEVANCE/APPLICATION

Adaptive statistical iterative reconstruction technology can significantly improve the children's chest radiation dose and CT image quality under low voltage scan conditions. The best new multi-model iterative reconstruction algorithm (ASIR-V) obtained in this study has certain guiding significance for low-tube voltage chest CT scan in children.

RC513-06 Comparative Evaluation of a Novel Portable Bedside Fluoroscopy System That Uses a Cassette-Sized Detector to the Standard of Care for ICU Pediatric Imaging

Wednesday, Nov. 28 9:30AM - 9:40AM Room: S405AB

Participants
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Terry L. Levin, MD, Mamaroneck, NY (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To evaluate the imaging performance of a portable bedside fluoroscopy unit in pediatric patients and compare it to a standard of care (SOC) in-room fluoroscopy unit in preparation for a pre-clinical study in the intensive care unit (ICU).

METHOD AND MATERIALS

Nineteen patients (< 3 years of age) scheduled to undergo upper gastrointestinal series (UGI) or voiding cystourethrograms (VCUG) were recruited under an IRB-approved protocol designed to evaluate the non-FDA approved portable fluoroscopic unit. Informed consent was obtained from the patients' guardians. The unit, a modified portable radiographic system with a cassette-sized detector (Carestream Health Revolution, USA) was positioned adjacent to the in-room fluoroscopy system (Philips Healthcare Optimus 80, Netherlands). Images were captured on both units; each study began on the portable unit and ended on the SOC unit. All diagnoses were based on SOC images. The SOC system was operated under a low-dose pediatric protocol and the portable unit used a comparable technique (i.e., 2.5 fps and no grid). Study dose was recorded on both units. To evaluate image quality, four pediatric radiologists (blinded to the system used to obtain the image) were asked to score 20 images from each system based on spatial resolution (SR), image contrast (IC), uniformity (UY), noise appearance (NA) and overall quality (OQ) using the Radlex score (1-4). The same attributes were evaluated using a preference test, by displaying side-by-side images of the same exam acquired on each system.

RESULTS

Average dose rates for the SOC and portable systems were 0.32mGy/min and 0.31mGy/min, respectively ($p= 0.38$). The Radlex scores for SOC and portable systems for the single stimulus study were 2.9 and 3.0 (IC) ($p=.08$), 3.1 and 2.8 (UY) ($p<0.05$), 2.7 and 2.9 (SR) ($p<0.05$), 2.4 and 2.6 (NA) ($p<0.05$), 2.8 and 3.0 (OQ) ($p<0.05$), respectively. While most attributes scored slightly higher for the portable system, the side-by-side comparative study found no significant system preference for any of the image quality attributes.

CONCLUSION

The portable fluoroscopy prototype is capable of providing comparable image quality at equivalent dose levels to an in-room system for young children.

CLINICAL RELEVANCE/APPLICATION

The ability to provide fluoroscopy at the bedside is expected to improve patient outcomes in neonatal and pediatric ICUs by reducing the need to transport critically ill patients.

RC513-07 Neonatal Imaging Pearls

Wednesday, Nov. 28 9:40AM - 10:00AM Room: S405AB

Participants
Christopher I. Cassady, MD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recommend an appropriate strategy for the work up of common neonatal imaging problems. 2) Assess practically, based on outcomes data where available, the utility of imaging in the management of the ill neonate.

RC513-08 Whole Body Imaging in Cancer Predisposition Syndromes

Wednesday, Nov. 28 10:20AM - 10:40AM Room: S405AB

Participants
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LEARNING OBJECTIVES

1) To specify cancer predisposition syndromes where whole body MRI plays a role in surveillance. 2) Apply a systematic approach to analysis of whole body imaging. 3) Identify related tumors.

RC513-09 Utility of Follow-up Head Ultrasound in Premature Infants Less than 32 Weeks Gestational Age When the Initial Head Ultrasound is Normal

Wednesday, Nov. 28 10:40AM - 10:50AM Room: S405AB

Participants
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PURPOSE

To determine the incidence of abnormal findings on follow up routine head ultrasounds (US) performed on premature infants less than 32 weeks gestation at 4 weeks post-natally when the initial head US performed in the first week of life is normal.

METHOD AND MATERIALS

An IRB-approved HIPAA-compliant retrospective study was performed on premature infants imaged at a tertiary care academic pediatric hospital from January 2012 to December 2015. Inclusion criteria included premature infants less than 32 weeks gestational age with a head US in the first week of life read as normal and a routine head US performed at 4 weeks of age. Infants with severe congenital defects were excluded. Follow up reports were then classified as normal or abnormal and abnormal reports were reviewed for findings.

RESULTS

Of the 194 premature infants that met inclusion criteria, none had Papile grade II, III, or IV germinal matrix hemorrhage. Fourteen patients (7%) had new grade I germinal matrix hemorrhage. At outpatient clinic follow-up (range 6 months to 3 years), all of the 14 patients with grade I germinal matrix hemorrhage were meeting appropriate developmental milestones, and none had significant neurological deficit.

CONCLUSION

When initial head ultrasounds in premature infants are found to be normal, follow up routine head ultrasounds at 4 weeks of age are typically found to be normal. Those rare abnormal cases are restricted to grade 1 germinal matrix hemorrhages. The clinical significance of isolated grade 1 germinal matrix hemorrhages in premature infants on long-term neurocognitive development is unclear. However, several large cohort studies have found no difference in rates of cerebral palsy among premature infants with grade 1 germinal matrix hemorrhages and those without.

CLINICAL RELEVANCE/APPLICATION

In premature infants less than 32 weeks gestational age, with no severe congenital defects, screening routine follow up head ultrasound at 4 weeks of age is of limited clinical utility if the initial postnatal head ultrasound is normal.

RC513-10 Game Plan for a Double-Play or Extra-Point: Can Dual-Source, Dual-Energy CT Help Reduce Radiation Dose and Contrast Volume in Children?

Wednesday, Nov. 28 10:50AM - 11:00AM Room: S405AB

Participants
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Cristy Savage, RT, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
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Bernhard Schmidt, PhD, Forchheim, Germany (*Abstract Co-Author*) Employee, Siemens AG
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PURPOSE

We hypothesized that dual-source, dual energy CT (DS-DECT) can reduce radiation dose and contrast volume compared to single energy CT (SECT) scanning in children.

METHOD AND MATERIALS

Our ongoing, institutional review board approved study included 64 children who underwent contrast enhanced CT of the chest (n=38) or abdomen (n=26) on 2nd or 3rd generation dual source CT (Siemens Flash or Force) for clinically justified reasons. Equal number of patients were scanned with SECT (with automatic kV selection, CARE kV & AEC, CARE Dose4D) and DS-DECT (each with 19 chest CT, 13 abdomen CT). Clinical indications, radiologic findings, and any study limitations (noise or artifacts) were assessed. Patient demographics (age, gender, weight), scan parameters (kV, mAs, section thickness) CT dose descriptors (size specific dose estimates [SSDE], dose length product [DLP]), and contrast volume (370 mg% Isovue, Bracco) were recorded. Descriptive statistics were performed for data analysis.

RESULTS

Patient ages and weights in DS-DECT (11±6 years; 47±32 kg) and SECT (10±6 years; 44±27 kg) groups were not different ($p>0.05$). Most DS-DECT and SECT were performed for oncologic staging, abnormal prior imaging, and trauma. Chest SECT exams were performed at 80-100kV, and abdominal SECT at 80-120kV. Respective SSDE and DLP were: chest DS-DECT 3.3±2.0mGy, 187±75mGy.cm; chest SECT 5.2±3.0mGy, 129±118mGy.cm; abdominal DS-DECT 3.7±2.0mGy, 161±89mGy.cm; abdominal SECT 6.1±3.0mGy, 179±70mGy.cm (SSDE, DS-DECT < SECT, $p<0.01$). Chest and abdomen DS-DECT were performed with 9-18% lower contrast volume compared to weight and region matched children scanned with SECT. All DS-DECT and SECT studies were deemed acceptable for evaluation of chest and abdominal findings.

CONCLUSION

In children, dual-source DECT enables substantial radiation dose and contrast volume reductions compared to single energy CT performed with automatic exposure control & automatic kV selection techniques.

CLINICAL RELEVANCE/APPLICATION

Dual-source, dual energy CT help reduce radiation dose and contrast volume in children undergoing contrast enhanced chest and abdominal CT.

RC513-11 Comparison of the Diagnostic Performance of the 2017 ACR TI-RADS Guideline to the 2015 Guideline in Children with Thyroid Nodules

Wednesday, Nov. 28 11:00AM - 11:10AM Room: S405AB

Participants
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Juan Bass, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose
Ellen Goldbloom, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose
Ken Tang, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose
Kerri A. Highmore, MD, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the inter-rater reliability and diagnostic performance of the 2017 Thyroid Image Reporting and Data System (TI-RADS) guideline in the pediatric population and compare it to the previous 2015 TI-RADS guideline.

METHOD AND MATERIALS

This retrospective study comprised 77 children with thyroid nodules noted on US at a tertiary-level pediatric hospital. Three pediatric radiologists and one pediatric radiology fellow graded the US findings using both 2017 and 2015 TI-RADS guidelines. Reliability of radiologists' ratings was assessed two ways: % inter-rater agreement among all pairwise combinations of within-patient ratings, and intra-class correlation coefficients based on a two-way random model (ICC2,1). Area under the receiver operating characteristic curve (AUROCC) was assessed to compare the discriminative ability of the various TI-RADS categories of scoring system against histopathology/cytology or stability on US over a 2-year follow-up period for cases without tissue diagnosis.

RESULTS

Percent pairwise agreement for 2017 TI-RADS points, levels, recommendations, and the 2015 TI-RADS levels was 33.3 % (95% CI-29.2-37.8%), 50.9% (46.3-55.4%), 64.9% (60.5-69.1%), and 35.7% (31.5-40.2%) respectively. Estimated ICC2,1 for the same four scoring system was 0.48 (95%CI: 0.36 -0.59), 0.5 (0.39-0.62), 0.55 (0.44-0.66), and 0.42 (0.29-0.55) respectively. AUROCC for the 2017 TI-RADS points, levels, recommendations, and the 2015 TI-RADS levels was 0.73 (95% CI- 0.62-0.84), 0.72 (0.61-0.83), 0.78 (0.69-0.87), and 0.74 (-0.66-0.82) respectively. Difference in AUROCCs between the TI-RADS 17 levels and TI-RADS 15 levels was estimated to be -0.02 (95% CI: -0.05 -0.09).

CONCLUSION

Inter-rater reliability and diagnostic performance was moderate across scoring systems derived from both the 2015 and 2017 TI-RADS when applied to a pediatric population. No one scoring system was shown to be clearly superior in terms of diagnostic performance. Further work to adjust the recommendations for pediatric patients needs to be considered.

CLINICAL RELEVANCE/APPLICATION

The 2015 and 2017 TI-RADS scoring systems show similar moderate inter-rater reliability and diagnostic performance when applied to a pediatric population.

RC513-12 Diagnostic Yield of Renal Ultrasound with Doppler Studies in Children with Hypertension

Wednesday, Nov. 28 11:10AM - 11:20AM Room: S405AB

Participants
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Heather R. Collins, PhD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Jeanne G. Hill, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Anil G. Rao, MD, Charleston, SC (*Abstract Co-Author*) Speaker, Siemens AG

PURPOSE

Renal Doppler study is a commonly performed exam in the pediatric population. In our experience, the majority of these are normal. The aim of this study is to assess the diagnostic yield of this test in children who have hypertension.

METHOD AND MATERIALS

A retrospective analysis of 1000 consecutive pediatric renal Doppler studies was done. Study indications, renal lengths, renal arterial and venous Doppler findings, and incidental findings were noted. Demographic data, blood pressure, blood pressure percentile, height, weight, weight percentile, BMI, kidney size, and lab values were collected. A Wilcoxon signed-rank test was performed on relevant variables to evaluate differences in the RAS absent group with the medians from RAS positive patients.

RESULTS

Of 1000 studies, 638 renal Doppler studies were done for the evaluation of hypertension. There were 7 diagnoses of renal artery stenosis (RAS) with left-sided disease in 3 patients, right-sided involvement in 1 patient, and both renal arteries affected in 3 patients (1 had bilateral compression from neuroblastoma, 1 had bilateral narrowing in association with coarcation of the abdominal aorta and 1 had bilateral stenosis in association with Takayasu's arteritis with worse narrowing on the right). Two of the left-sided patients had a kidney size discrepancy greater than 1 cm and the remaining RAS patients had no significant renal size discrepancy. Only 1 of the 7 patients had an indication other than hypertension, and this patient had a known history of Wilms tumor with left nephrectomy. The remaining 631 studies were negative for RAS although one patient had non-diagnostic results with discordant findings on U/S, CT and MRI. There was no correlation between weight %/blood pressure % (sys/dia) as measured by Pearson

Correlation [.07 and .008].

CONCLUSION

Renovascular cause for hypertension in children is extremely low. Selective referral of pediatric patients with hypertension for renal Doppler studies can improve the diagnostic yield of this test. In the absence of renal size discrepancy, Doppler study may not be indicated. A renal ultrasound study without Doppler could be considered for initial evaluation of pediatric patients with hypertension.

CLINICAL RELEVANCE/APPLICATION

Selective referral and/or stricter adherence to guidelines for hypertensive pediatric patients can improve the diagnostic utility of Renal Doppler studies, as the majority of these studies are normal.

RC513-13 Novel Quantitative Contrast-Enhanced Ultrasound Detection of Hypoxic Ischemic Injury in Neonates and Infants: Pilot Study I

Wednesday, Nov. 28 11:20AM - 11:30AM Room: S405AB

Participants
Misun Hwang, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
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Kassa Darge, MD,PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Becky Riggs, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To investigate whether quantitative contrast-enhanced ultrasound (CEUS) can accurately identify neonates and infants with hypoxic ischemic brain injury and monitor associated perfusion abnormalities.

METHOD AND MATERIALS

In this prospective cohort study, 8 neonates and infants with suspicion for hypoxic ischemic injury were evaluated with CEUS between August 2017 and December 2017. CEUS brain scans of the 8 neonates and infants were acquired for assessment of brain perfusion. Main outcomes and measures included comparison of quantitative CEUS parameters between normal and affected patients. CEUS perfusion maps were compared to cerebral magnetic resonance imaging (MRI) for those with available MRI data.

RESULTS

An interesting trend was observed in the central gray nuclei-to-cortex perfusion ratios. The ratios at peak enhancement, wash-in area under the curve, perfusion index and maximum wash-in slopes were lower in all the affected cases as compared to the normal group. Statistically, all these comparisons were approaching significance (p=0.0571), but not currently significant given the small sample size. Additionally, when the central gray nuclei-to-cortex perfusion ratio was plotted for all time points along the time intensity curve (TIC), it was observed that the affected cases exhibited a trend that was qualitatively different from the normal cases. In the affected cases, the ratio TICs either stayed under 1.0 for the entire enhancement period or reached 1.0 close to peak wash-in before falling just under 1.0 for the remaining period of enhancement. However, in the unaffected subjects, there was a steep wash-in that crossed the 1.0 threshold and remained above 1.0 for most of the enhancement period.

CONCLUSION

Bedside CEUS is an easily obtainable brain imaging technique that has the potential to reliably identify infants and neonates with evolving hypoxic brain injury. A larger prospective study evaluating the correlation between CEUS findings and the gold-standard of MRI diffusion-weighted and perfusion-weighted imaging is needed to establish this as a diagnostic tool.

CLINICAL RELEVANCE/APPLICATION

Our preliminary data also suggests that hypoxic ischemic injury can be detected via both qualitative and quantitative contrast-enhanced ultrasound evaluation.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Kassa Darge, MD,PhD - 2016 Honored Educator

RC513-14 The Use of MRI in an Acute Abdomen as an Alternative to CT in Young Patients

Wednesday, Nov. 28 11:30AM - 11:40AM Room: S405AB

Participants
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Velauthan Rudralingam, MBBCh, Cheshire, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

In acute abdominal pain, ultrasound is the preferred imaging modality in younger patients, particularly females, often followed by CT

if negative and ongoing clinical concern. However, this comes with a radiation cost. MRI offers no ionizing radiation, excellent tissue contrast and can be used without nephrogenic iodinated contrast. It has been shown to be effective in diagnosis acute appendicitis, diverticulitis and cholecystitis. Nevertheless, there are disadvantages such as higher cost, limited availability, claustrophobia and a relative contra-indication in early pregnancy. Furthermore, MRI abdomens in the acute setting are likely to need interpretation by experienced GI radiologists. Our aim was to assess the role of MRI in the acute abdomen as an alternative to CT.

RESULTS

A total of 47 patients, 36 female and 11 males. The most common indication for imaging was right iliac fossa pain (66%). 39/47 patients had a prior ultrasound of which 20/39 were abnormal and 19 reported as normal. 30/39 of these patients had a MRI within 48 hours of the ultrasound. Of the 19 normal ultrasounds, 5 had abnormal MRI findings and included appendicitis, ovarian cyst haemorrhage (two cases), ileitis and acute epiploic appendagitis. Patients went onto have MRI as there was ongoing clinical suspicion of an acute abdomen. All abnormal ultrasounds were abnormal on subsequent MRI and were performed to increase the diagnostic confidence of the ultrasound findings. 17/20 of these had similar findings on MRI, but 3 cases showed minor differences but MRI was organised by the Consultant performing the ultrasound. In the 1st case, the history was right iliac fossa pain and to rule out intra-abdominal abscess. The ultrasound showed an incidental gallstone but was not able to assess the abdomen/retroperitoneum adequately therefore a MRI was organised by the Consultant Radiologist which showed acute right septic hip arthritis with extension into the adjacent adductor muscles. In the 2nd case, the history was of lower abdominal pain with a raised white cell count. The ultrasound showed gross pelvic and abdominal ascites but was unable to identify the cause so a MRI was arranged, demonstrating a ruptured corpus luteal cyst. In the 3rd case, the history was right upper quadrant pain and the ultrasound was non-specific with sluggish bowel so MRI was arranged, showing haemorrhagic ovarian cyst. Overall, 32/47 of the MRIs demonstrated acute pathology, with the most common diagnosis acute appendicitis. 8/47 went to MRI directly of which 5 were normal and the remaining 3 showed appendicitis (two cases) and small volume non-specific free fluid in a male patient.

CONCLUSION

Ultrasound is a good primary imaging modality with excellent correlation between the abnormal ultrasounds and MRI (86%). These results have given confidence to the ultrasound diagnosis which may lead to reduced cross-sectional imaging in the future. We suggest an ultrasound as first line, but recommend MRI when ultrasound is normal but clinically suspicious of an acute abdomen, or when abnormal ultrasound findings needed further confirmation to increase the level of diagnostic accuracy and avoid negative laparoscopies/laparotomies. MRI has potential to fast track discharge patients, reducing the burden on the hospital and should ideally be performed within 24 hours.

METHODS

A 12 month retrospective review between 1.4.16 and 31.3.17 was performed and all inpatients undergoing a MRI abdomen were included. Prior ultrasound findings were noted and compared to the MRI.

PDF UPLOAD

http://abstract.rsna.org/uploads/2018/18015075/18015075_e9hl.pdf

RC513-15 **Pediatric Abdominal MRI: Understanding Signal Intensity Patterns**

Wednesday, Nov. 28 11:40AM - 12:00PM Room: S405AB

Participants
Geetika Khanna, MD, MS, Iowa City, IA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To describe the normal signal intensity patterns of abdominal visceral organs. 2) Learn to recognize disease/diagnosis based on MR signal intensity pattern alteration.

RC514

Interventional Series: Peripheral and Visceral Occlusive Disease

Wednesday, Nov. 28 8:30AM - 12:00PM Room: S105AB

VA IR

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Bulent Arslan, MD, Chicago, IL (*Moderator*) Advisory Board, Medtronic plc; Advisory Board, Guerbet SA; Speakers Bureau, Biocompatibles International plc; Speakers Bureau, C. R. Bard, Inc; Advisory Board and Speakers Bureau, Boston Scientific Corporation; Speakers Bureau, Penumbra, Inc
Laura K. Findeiss, MD, Atlanta, GA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

bulent_arslan@rush.edu

LEARNING OBJECTIVES

1) Describe pros and cons of intervention for median arcuate ligament compression on the celiac axis. 2) Review clinical presentation and endovascular treatment options for acute and subacute portal vein thrombus. 3) Outline three recommendations for endovascular treatment of peripheral vascular disease. 4) Describe how and when to intervene in patients with mesenteric ischemia. 5) Describe two vascular compression syndromes.

Sub-Events

RC514-01 Compressive Arterial Syndromes

Wednesday, Nov. 28 8:30AM - 8:50AM Room: S105AB

Participants
Minhaj S. Khaja, MD, MBA, Ann Arbor, MI (*Presenter*) Consultant, Penumbra, Inc; Speaker, Penumbra, Inc

For information about this presentation, contact:

mkhaja@umich.edu

LEARNING OBJECTIVES

1) Review the role of cross-sectional imaging and IR in the diagnosis and potential treatment of compressive arterial syndromes. 2) Illustrate case based examples of compressive arterial syndromes.

RC514-02 Acute Portal Venous Thrombosis

Wednesday, Nov. 28 8:50AM - 9:10AM Room: S105AB

Participants
Wael E. Saad, MBBCh, Ann Arbor, MI (*Presenter*) Speaker, W. L. Gore & Associates, Inc; Consultant, Siemens AG

LEARNING OBJECTIVES

View Learning Objectives under main course title.

RC514-03 Mid-Term Result of Thoracic Endovascular Aortic Repair in Octogenarians and Nonagenarians

Wednesday, Nov. 28 9:10AM - 9:20AM Room: S105AB

Participants
Takashi Hashimoto, Tsu, Japan (*Presenter*) Nothing to Disclose
Noriyuki Kato, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Takafumi Ouchi, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Ken Nakajima, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Takatoshi Higashigawa, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Shuji Chino, MD, Matsusaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Hajime Sakuma, MD, Tsu, Japan (*Abstract Co-Author*) Research Grant, Fuji Pharma Co, Ltd; Research Grant, DAIICHI SANKYO Group; Research Grant, FUJIFILM Holdings Corporation; Research Grant, Siemens AG; Research Grant, Nihon Medi-Physics Co, Ltd; Speakers Bureau, Bayer AG

PURPOSE

Thoracic endovascular aortic repair (TEVAR) is expected to benefit old patients with high operative risk. We investigated the outcome of TEVAR in octogenarians and nonagenarians.

METHOD AND MATERIALS

From May 1997 through December 2017, 638 patients had undergone TEVAR for TAA or AD in our hospitals. We retrospectively reviewed the medical records of 113 patients aged 80 years or older (17.7%) among them.

RESULTS

There were 78 men and 35 women. The mean age was 83.4±3.1 years (mean±standard deviation). Emergent TEVAR was performed in 28 patients (25.7%). Thirty-day mortality rate and the rate of 30-day mortality plus major adverse events calculated using Japan score were 24.0±22.5% and 40.7%±20.2%, respectively. Mortality rate and the rate of mortality plus morbidity calculated using STS score were 6.6±5.1% and 25.8±13.9%, respectively. Operative mortality rate calculated using euroSCORE was 11.7±10.9%. To preserve aortic arch branches, bypass surgery was added to 1 aortic branch in 6 patients, 2 branches in 11 patients, 3 branches in 1 patient. In 5 patients, chimney technique was used to preserve the left subclavian artery. To preserve a celiac artery, periscope technique was used in 1 patient, and bypass surgery was added in 1 patient. The mean follow-up term was 23.5±21.1 months. Overall survival rate was 96.4% at 1 month, 94.5% at 3 months, 88.1% at 1 year, and 83.7% at 3 years. Cause of early death was aortic rupture in 2 patients, sepsis in 1, and cancer in 1. Aorta-related adverse event free rate was 88.5% at 1 month, 85.6% at 3 months, 81.3% at 1 year, and 71.3% at 3 years. Regarding patients undergoing elective TEVAR, overall survival rate was 98.8% in 1 month and 3 months, 91.9% at 1 year, and 88.4% at 3 years. Aorta-related adverse event free rate was 89.4% at 1 month and 3 months, 85.3% at 1 year, and 76.7% at 3 years.Excluded 6 patients whose discharge to unknown, 107 patients were analyzed about discharge to home or not. After logistic regression, emergency and combined procedure were the negative predictors of home discharge.

CONCLUSION

TEVAR in octogenarians and nonagenarians seems to be acceptable in terms of life prognosis. Emergency and combined procedure were the negative predictors of home discharge.

CLINICAL RELEVANCE/APPLICATION

TEVAR in octogenarians and nonagenarians seems to be acceptable in terms of life prognosis or high operative risk.

RC514-04 Frequency and CTA-based Volumetric Analysis of Endoleaks after Fenestrated Endovascular Aortic Aneurysm Repair (FEVAR) using Custom and Off-the-Shelf Devices

Wednesday, Nov. 28 9:20AM - 9:30AM Room: S105AB

Participants
David E. Timaran Montenegro, MD , Mexico City, Mexico (*Presenter*) Nothing to Disclose
Marilisa Soto Gonzalez, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Angie Garcia, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Carlos Timaran, Dallas, TX (*Abstract Co-Author*) Consultant, Cook Group Incorporated Consultant, Getinge AB Consultant, W. L. Gore & Associates, Inc

For information about this presentation, contact:

david_timaranQyahoo.com

PURPOSE

The aim of the study was to assess the type, frequency, morphologic characteristics and outcomes of endoleaks after FEVAR/BEVAR using custom-made- devices (CMDs) and off-the-shelf branched devices.

METHOD AND MATERIALS

A single institutional study was performed to assess the frequency and volume of endoleaks after FEVAR using fenestrated/branched CMDs and off-the-shelf devices. All fenestrated procedures were performed using investigational CMDs under a physician-sponsored investigational device exemption. Endoleaks were detected and characterized on duplex and CT angiography. CTA-based volumetric analysis was performed using Terarecon software. Kruskal-Wallis and Mann-Whitney U tests were used for univariate analysis.

RESULTS

Over a 25-month period, 70 patients (52 men [74%] and 18 women [26%]) with a median age of 68 years (interquartile range [IQR], 63.5-73 years) underwent FEVAR using Fenestrated/Branched Custom-Made-Devices (CMDs) (64[91%]) and Zenith T-Branch (6[9%]). The median number of fenestrations/branches was 4 (IQR, 3-4). Endoleaks were detected in 11 patients (7.7%) accounting for a total of 15 endoleaks during follow-up. Endoleaks were found at a median time of 1 month (Interquartile range [IQR], 1-8 months). Type IB endolaks were found in 1 patient (7%) , type IC in 8 (53%) , type II in 3 (20%), and type III in 3 patients (20%). Overall median endoleak volume was 10 cc (IQR, 5.8-10.8 cc). Median endoleak volume per type of endoleak volume was as follows: type IB, 56 cc; type IC, 10.3 cc (IQR, 8.1-11.4 cc), type II, 10cc (IQR, 4.8-11.6 cc); and type III, 8.9 cc(IQR, 5.8-10.6 cc) (p>.1). All patients underwent endoleak repair.Endoleak secondary repair was required in 3 patients (20%). Those patients were found with higher endoleak volumes (10.6 cc [IQR,10.3-341.2cc]) when compared to patients that were repaired at a primary intervention (8.78 cc [IQR,5.7-10.6 cc]) (p=.07).

CONCLUSION

The frequency of endoleaks that required intervention after FEVAR using investigational devices was 7%. Type IC endoleaks were the most frequently found. Endoleaks with higher volume were found have higher risk for secondary endoleak repair.

CLINICAL RELEVANCE/APPLICATION

Endoleaks after endovascular repair of AAAs are frequent. For FFEVAR, the incidence and natural history of endoleaks are still under invetigation. This study assess the incidence of endoleaks and predictors of primary endoleak failure.

RC514-05 Endovascular Reconstruction Offers Non-Inferior Outcomes at Reduced Cost Compared to Surgical Bypass for TASC-II D Aorto-Iliac Occlusive Disease

Wednesday, Nov. 28 9:30AM - 9:40AM Room: S105AB

Participants
Roger T. Tomihama, MD, Loma Linda, CA (*Presenter*) Nothing to Disclose
Joshua Gabel, MD, Loma Linda, CA (*Abstract Co-Author*) Nothing to Disclose
Ahmed Abou-Zamzam, MD, Loma Linda, CA (*Abstract Co-Author*) Nothing to Disclose
Theodore Teruya, MD, Loma Linda, CA (*Abstract Co-Author*) Nothing to Disclose
Udo Oyoyo, Loma Linda, CA (*Abstract Co-Author*) Nothing to Disclose
Sharon C. Kiang, MD, Loma Linda, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the clinical outcomes and cost of endovascular reconstruction of occlusive and near-occlusive disease of the aortic bifurcation to surgical bypass.

METHOD AND MATERIALS

Thirty-three consecutive patients with symptomatic TASC-II D Aorto-Iliac Occlusive Disease (AIOD) who underwent surgical bypass or endovascular reconstruction from 2012 to 2017 were retrospectively reviewed. Lesion characteristics, technical approach, survival, limb salvage, and patency were analyzed. Device, operating room, and length of stay costs were calculated based on rates provided by the Department of Veterans Affairs (VA) and compared between treatment groups.

RESULTS

Nineteen patients at prohibitive risk for open surgery underwent endovascular reconstruction, while thirteen underwent surgical bypass. Kissing stent technique was used in all patients for reconstruction of the aortic bifurcation. The endovascular group had decreased operative time (157 vs 245 minutes, p=0.004), blood loss (273 vs 763 milliliters, p=0.005), and peri-operative complications (5% vs 31%, p=0.045) compared to surgical bypass. At mean follow-up of 2.8 years, endovascular reconstruction compared to surgical bypass demonstrated non-inferior primary/primary-assisted patency (85% vs 85%, p=0.98), limb salvage (100% vs 92%, p=0.76), and survival (90% vs 85%, p=0.65). Endovascular device costs were $4,223 greater then surgical bypass (p<0.001), but with operating room cost $3,332 less then surgical bypass (p=0.001). Length of stay costs was $13,580 less for patients undergoing endovascular reconstruction compared to surgery (p<0.001), and led to an overall reduction of $11,706, in hospitalization costs in favor of endovascular reconstruction (p<0.001).

CONCLUSION

Patients with occlusive and near-occlusive disease of the aortic bifurcation treated with endovascular reconstruction achieve non-inferior outcomes of patency, limb-salvage, and survival compared to surgical bypass at a mean 2.8 years. Decreased operative and length of stay costs associated with endovascular reconstruction produced an $11,706 cost advantage relative to surgical bypass.

CLINICAL RELEVANCE/APPLICATION

Patients with occlusive and near-occlusive disease of the aortic bifurcation treated with endovascular reconstruction achieve non-inferior clinical outcomes and average $11,706 cost savings relative to surgical bypass.

RC514-06 Treatment of Visceral Aneurysms

Wednesday, Nov. 28 9:40AM - 10:00AM Room: S105AB

Participants
Jordan C. Tasse, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the clinical presentation and diagnosis of visceral aneurysms. 2) Describe endovascular and surgical approaches to the management of visceral aneurysms. 3) Illustrate case based examples of their endovascular treatment.

RC514-07 Advanced Arterial Revascularization

Wednesday, Nov. 28 10:00AM - 10:20AM Room: S105AB

Participants
Aseem Bhandari, MD, Savannah, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title.

RC514-08 Below-the-Knee Interventions

Wednesday, Nov. 28 10:30AM - 10:50AM Room: S105AB

Participants
Ryan C. Schenning, MD, Portland, OR (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title.

RC514-09 Association of Plasma Rcn2 Levels with Lower Extremity Arterial Calcification in Patients with Peripheral Arterial Disease Complicated with Type 2 Diabetes Mellitus

Wednesday, Nov. 28 10:50AM - 11:00AM Room: S105AB

Participants
Zhihui Chang, BMedSc, MMed, Shenyang, China (*Presenter*) Nothing to Disclose
Zhaoyu Liu, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose

Jiahe Zheng, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Qiyong Guo, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Vascular calcification is a prominent feature of both atherosclerosis and diabetes,and is clinically associated with outcomes of interventional treatment for peripheral arterial disease. Rcn2 is a key regulator of cytokine expression in arterial wall cells. Herein we examined the association of plasma Rcn2 levels with lower extremity arterial calcification in patients with peripheral arterial disease (PAD) complicated with type 2 diabetes mellitus(T2DM).

METHOD AND MATERIALS

This study had medical ethics committee approval, with waiver of informed consent. A total of 54 patientswith T2DM and 38 non-diabetic patients were recruited. All patients have critical limb ischemia or intermittent claudication. Diagnosis of PAD was based on clinical ischemic symptoms, lower extremity arterial CT angiography showing stenosis or occlusion and ankle-brachial index (ABI). Plasma Rcn2 levels were measured using ELISA. Lower extremity artery calcification scores were measured on noncontrast computed tomography scans. Spearman's correlation testing was used to assess the relationship between Rcn2 level and calcification scores.

RESULTS

Patients with PAD complicated with T2DM had higher Rcn2 levels than non-diabetic patients. In subjects with PAD, Rcn2 level was associated with ABI. There was a significant correlation between the Rcn2 level and lower extremity artery calcification scores ($R=0.69$, $p<0.01$). Patients with critical limb ischemia had higher calcification scores than patients with intermittent claudication.

CONCLUSION

Plasma Rcn2 levels are associated with lower extremity arterial calcification in patients with peripheral arterial disease complicated with T2DM . Further research aimed at understanding the regulatory mechanism of Rcn2 in arterial calcification is warranted.

CLINICAL RELEVANCE/APPLICATION

Rcn2 is expected to be a new therapeutic target for the prevention and treatment of arterial calcification.

RC514-10 Retrograde Recanalization of the Celiac Trunk via the Pancreaticoduodenal Arcade: A Valid Alternative to an Antegrade Approach?

Wednesday, Nov. 28 11:00AM - 11:10AM Room: S105AB

Participants
Federico Pedersoli, MD, Aachen, Germany (*Presenter*) Nothing to Disclose
Peter Isfort, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Markus Zimmermann, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Maximilian F. Schulze-Hagen, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Martin Liebl, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Fabian Goerg, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Sebastian Keil, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Christiane K. Kuhl, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Bruners, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

fpedersoli@ukaachen.de

PURPOSE

Antegrade recanalization of a high-grade stenosis or short occlusion of the celiac trunk from the aorta often presents a challenge. In fact, in the absence of vascular stump ("flash-occlusions") or pronounced calcification of the aortic wall, an antegrade approach may remain unsuccessful. Therefore, we evaluated the feasibility of a retrograde access by the superior mesenteric artery, via the pancreaticoduodenal arcade and the common hepatic artery.

METHOD AND MATERIALS

A retrospective analysis of all patients, who underwent stent implantation in the celiac trunk from 01/2010 to 12/2017 was performed. Data on the indication of the intervention, the access, the material used, the stent model and the follow-up were collected from the hospital information system.

RESULTS

Successful stent implantation into the celiac trunk was performed in 34 patients. An antegrade passage of the occlusion or stenosis was not possible in 4/34 (12%) patients. In these cases, a 5F-catheter was placed in the proximal superior mesenteric artery and a 2.4 F microcatheter and micro-guidewire was used to cross the stenosis or occlusion via the pancreaticoduodenal arcade. Once the tip of the micro-wire crossed the lesion in the celiac trunk and entered into the aorta, it was caught with a snare, pulled out of the femoral introducer sheath and then used as a guide for the antegrade implantation of a balloon-expandable stent into the celiac trunk. Follow-up showed no complications related to the stent implantation; in particular, no signs of mesenteric ischemia.

CONCLUSION

Retrograde access to the celiac trunk via pancreaticoduodenal arcade is a valid alternative if antegrade access fails.

CLINICAL RELEVANCE/APPLICATION

Offering a valid option in case of difficult antegrade access to the celiac trunk.

RC514-11 Magnetic Particle Imaging (MPI)-Guided Percutaneus Transluminal Angioplasty in an Iliac Artery Phantom Model

Wednesday, Nov. 28 11:10AM - 11:20AM Room: S105AB

Participants
Stefan M. Herz, MD, Wuerzburg, Germany (*Presenter*) Nothing to Disclose
Patrick Vogel, Wurzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas Kampf, Wurzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Martin A. Ruckert, Wurzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Dietrich, Wurzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Simon Veldhoen, MD, Wurzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Aleksander Kosmala, Wurzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Ralph Kickuth, MD, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Volker C. Behr, Wurzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Thorsten A. Bley, MD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of this study was to assess the feasibility of real-time magnetic particle imaging (MPI)-guided percutaneous transluminal angioplasty (PTA) in-vitro and compare it to conventional X-ray guided PTA.

METHOD AND MATERIALS

MPI experiments were conducted on a custom-built MPI scanner (FOV: length 65 mm, diameter 29 mm; isotropic resolution ~ 1-1.5 mm; gradient strength ~ 3 T/m). Vascular stenosis phantoms (Fig. 1a) consisted of polyvinyl chloride (PVC) tubes with an inner diameter 8 mm prepared to form ~ 50 % stenoses. MPI angiography for visualization of stenoses and post-interventional results was performed using the SPIO contrast agent Ferucarbotran (10 mmol (Fe)/l). Balloon catheters and guidewires were visualized with MPI fluoroscopy using a custom-made Ferucarbotran-based lacquer marker (Fig. 1b). An online reconstruction algorithm for real-time imaging was implemented. X-ray based angiography was conducted on a floor mounted Artis zee Interventional Angiography System (Siemens Healthcare GmbH, Erlangen, Germany) using an iodine-based contrast agent (Imeron 300, dilution 1:4 with sodium chloride 0.9 % injection solution).

RESULTS

Visualization of stenosis phantoms and MPI-guided PTA procedures (4 frames/sec) were in concordance to the conventional PTA approach (Fig 1 c+d). Labeling of guidewires and balloon catheters allowed for precise tracking of endovascular instruments with MPI. The spatial resolution of MPI is still distinctly lower than the submillimeter resolution of state of the art X-ray fluoroscopes.

CONCLUSION

Real-time MPI-guided PTA in an iliac artery phantom model is feasible. Further research is necessary to improve MPI scanner hardware and SPIO design for cardiovascular interventions.

CLINICAL RELEVANCE/APPLICATION

Magnetic particle imaging is a promising new tomographic imaging method with the potential to provide radiation-free cardiovascular imaging and guided interventions.

RC514-12 Mesenteric Ischemia

Wednesday, Nov. 28 11:20AM - 11:40AM Room: S105AB

Participants
Laura K. Findeiss, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title.

RC514-13 Renovascular Occlusive Disease: Current Paradigm

Wednesday, Nov. 28 11:40AM - 12:00PM Room: S105AB

Participants
Bulent Arslan, MD, Chicago, IL (*Presenter*) Advisory Board, Medtronic plc; Advisory Board, Guerbet SA; Speakers Bureau, Biocompatibles International plc; Speakers Bureau, C. R. Bard, Inc; Advisory Board and Speakers Bureau, Boston Scientific Corporation; Speakers Bureau, Penumbra, Inc

LEARNING OBJECTIVES

View Learning Objectives under main course title.

RC515

BI-RADS Interactive Challenge (Interactive Game)

Wednesday, Nov. 28 8:30AM - 10:00AM Room: N227B

BR MR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jay R. Parikh, MD, Houston, TX (*Moderator*) Nothing to Disclose

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC515A Mammography

Participants
Cindy S. Lee, MD, Garden City, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Cindy.Lee3@nyumc.org

LEARNING OBJECTIVES

1) To define BIRADS terms used to describe mammography findings and recognize common appearances of malignant and benign disease.

ABSTRACT

This case-based session will review a variety of imaging findings at mammography, appropriate use of BI-RADS descriptors and categories, as well as highlight potential pitfalls and strategies to avoid them.

Active Handout:Cindy S. Lee

http://abstract.rsna.org/uploads/2018/18000473/RSNA 2018 DBT Handout RC515A.pdf

RC515B Case-based Session on Ultrasound

Participants
Ana P. Lourenco, MD, Providence, RI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

alourenco@lifespan.org

LEARNING OBJECTIVES

1) Apply appropriate BI-RADS descriptors and categories to a variety of benign and malignant lesions on ultrasound. 2) Describe how certain imaging features may predict pathology.

ABSTRACT

This case-based session will review a variety imaging findings at US, appropriate use of BI-RADS descriptors and categories, as well as highlight potential pitfalls and strategies to avoid them.

Active Handout:Ana P. Lourenco

http://abstract.rsna.org/uploads/2018/18000474/Lourenco.RSNA.US RC515B.pdf

RC515C Case-based Session on MRI

Participants
Elizabeth S. McDonald, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define BIRADS terms used to describe MRI findings and recognize common appearances of malignant and benign disease.

RC515D Audit and Outcomes Monitoring

Participants
Jay R. Parikh, MD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the basic clinically relevant mammography medical outcomes audit based on BIRADS. 2) Strategies to monitor outcomes and provide radiologist feedback.

ABSTRACT

Bi-RADS enables annual the basic clnically relevant medical outcomes audit, which can be used to monitor outcomes and provide radioloigsts feedback.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC516

Parental/FMLA Leave in Residency: A Panel Discussion (In Conjunction with the American Association for Women Radiologists)

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E353A

ED OT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Cheri L. Canon, MD, Birmingham, AL (*Presenter*) Royalties, The McGraw-Hill Companies
Lori A. Deitte, MD, Nashville, TN (*Presenter*) Nothing to Disclose
Allison M. Grayev, MD, Madison, WI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Compare parental leave policies.

RC517

Emerging Technology: PET/MRI Update 2018

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S505AB

MR NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Rathan M. Subramaniam, MD,PhD, Dallas, TX (*Moderator*) Consultant, Blue Earth Diagnostics Ltd; Speaker, Blue Earth Diagnostics Ltd

For information about this presentation, contact:

rathan.subramaniam@utsouthwestern.edu

LEARNING OBJECTIVES

1) To discuss opportunities of PET/MRI in clinical practice and research. 2) To discuss challenges of PET/MRI in clinical practice and research.

Sub-Events

RC517A PET/MRI: Update 2018

Participants
Rathan M. Subramaniam, MD,PhD, Dallas, TX (*Presenter*) Consultant, Blue Earth Diagnostics Ltd; Speaker, Blue Earth Diagnostics Ltd

For information about this presentation, contact:

rathan.subramaniam@utsouthwestern.edu

LEARNING OBJECTIVES

1) To discuss the status of PET/MRI in clinical practice in 2018 and the opportunities and challenges in implementation.

RC517B PET/MRI Update 2018: Clinical Practice Implementation - Pearls

Participants
Geoffrey B. Johnson, MD,PhD, Rochester, MN (*Presenter*) Research Grant, General Electric Company; Research Grant, Pfizer Inc

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Geoffrey B. Johnson, MD,PhD - 2015 Honored EducatorGeoffrey B. Johnson, MD,PhD - 2017 Honored Educator

RC517C PET/MRI Update 2018: Clinical Applications - Brain and Head and Neck

Participants
Alexander Drzezga, MD, Cologne, Germany (*Presenter*) Consultant, Siemens AG; Consultant, Bayer AG; Consultant, General Electric Company; Consultant, Eli Lilly and Company; Consultant, The Piramal Group; Speakers Bureau, Siemens AG; Speakers Bureau, Bayer AG; Speakers Bureau, General Electric Company; Speakers Bureau, Eli Lilly and Company; Speakers Bureau, The Piramal Group

LEARNING OBJECTIVES

1) Review relevant clinical applications for PET/MR in the diagnostic work-up of disorders of the brain. 2) Review strengths of PET/MR for disorders of the head and neck. 3) Understand the value of different currently available tracers for neuroimaging and oncological applications. 4) Review challenges and limitations of PET/MR in brain/head&neck and expected future developments.

RC517D PET/MRI Update 2018: Clinical Applications - Body

Participants
Thomas A. Hope, MD, San Francisco, CA (*Presenter*) Research support, General Electric Company

For information about this presentation, contact:

thomas.hope@ucsf.edu

LEARNING OBJECTIVES

1) Review common current applications for abdominopelvic oncologic PET/MRI, including hepatic malignancies, rectal cancer, and

cervical cancer. 2) Understand the role of novel tracers in prostate cancer (PSMA PET) and neuroendocrine tumors (somatostatin receptor PET). The presentation will focus on prostate cancer as an application. 3) Present the current limitations and future advances in PET/MRI that will help increase the clinical acceptance and applicability of body PET/MRI.

RC517E PET/MRI Update 2018: Clinical Applications - Cardiac

Participants
Pamela K. Woodard, MD, Saint Louis, MO (*Presenter*) Research agreement, Siemens AG; Research, Eli Lilly and Company; Research, F. Hoffmann-La Roche Ltd; ; ; ; ; ;

For information about this presentation, contact:

woodardp@wustl.edu

LEARNING OBJECTIVES

Discuss clinical cardiac PET/MR imaging applications; applications will include myocardial perfusion and viability, nonischemic cardiomyopathy, and tumor assessment.

RC517F PET/MRI Update 2018: Physics

Participants
Georges El Fakhri, PhD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the challenges and opportunities afforded by simultaneous PET/MR. 2) Understand the role of PET/MR in imaging myocardial membrane potential.

RC518

Metabolic Tumor Imaging: Current and Beyond

Wednesday, Nov. 28 8:30AM - 10:00AM Room: N229

MR NM OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Evis Sala, MD, PhD, Cambridge, United Kingdom (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn about he new PET tracers and they new potential clinical applications. 2) Review the added value of PET/MRI in oncology. 3) Learn about the current and future applications of hyperpolarised MRI.

Sub-Events

RC518A PET Tracers: Which Ones Will Be Next to Make it to Clinical Practice?

Participants
Jason S. Lewis, PhD, New York, NY (*Presenter*) Shareholder, pHLIP, Inc; Research support, MabVax Therapeutics, Inc; Research support, Eli Lilly and Company; Research support, Sapience Therapeutics; Research support, Telix Pharmaceuticals

LEARNING OBJECTIVES

1) To have an appreciation for some of the latest PET tracers in clinical research in oncology. 2) Understand the PET and radiotherapy agents currently FDA approved and those undergoing the approval process. 3) Understand the next generation of PET tracers and molecular imaging agents that could be the next standard-of-care imaging probes.

RC518B PET/MRI: The Added Value in Oncology

Participants
Hebert Alberto Vargas, MD, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the concept of value in imaging and how it relates to PET/MR technology. 2) To discuss the need for research specifically geared toward assessing the value of PET/MRI in oncology.

RC518C Hyperpolarized MRI: Current and Future Applications

Participants
Ferdia A. Gallagher, PhD, FRCR, Cambridge, United Kingdom (*Presenter*) Research support, General Electric Company; Research support, GlaxoSmithKline plc

For information about this presentation, contact:

fag1000@cam.ac.uk

LEARNING OBJECTIVES

1) To explore the role of metabolism in cancer development. 2) To understand how these changes in metabolism can be exploited using hyperpolarised 13C-pyruvate. 3) To review the current evidence for hyperpolarised carbon-13 imaging in oncology. 4) To understand potential clinical applications for hyperpolarised carbon-13 imaging. 5) To consider the role of new hyperpolarised molecules in oncology.

ABSTRACT

There is increasing evidence to support a role for metabolism in tumor development; for example, deregulation of cellular energetics is now considered to be one of the key hallmarks of cancer. Changes in tumor metabolism over time are now known to be early biomarkers of successful response to chemotherapy and radiotherapy. There are a number of imaging methods that have been used to probe cancer metabolism: the most widely available is 18F-fluorodeoxyglucose (FDG), an analogue of glucose, used in PET. Hyperpolarized carbon-13 MRI (13C-MRI) is an emerging molecular imaging technique for studying cellular metabolism, particularly in the field of oncology. This method allows non-invasive measurements of tissue metabolism in real-time. To date, the most promising probe used in conjunction with hyperpolarized MRI has been 13C-labelled pyruvate: pyruvate is metabolized into lactate in normal tissue in the absence of oxygen, but in tumors this occurs very rapidly even in the presence of oxygen. Results from many animal models have shown that there is a reduction in the metabolism of pyruvate following successful treatment with chemotherapy. Tumor lactate labelling has also been shown to correlate with the grade of some tumor types. There are now a small number of sites performing human hyperpolarized carbon-13 MRI imaging. This talk will discuss the progress that has been made in this field within the area of oncology and potential clinical applications.

RC520

Fundamentals of Imaging for the Radiation Oncologist

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S104A

CH GI GU NR RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Stanley L. Liauw, MD, Chicago, IL (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

sliauw@uchicago.edu

Sub-Events

RC520A Fundamentals of Imaging of Liver Cancer in Radiation Oncology

Participants
Michael I. Lock, MD,FRCPC, London, ON (*Presenter*) Speaker, sanofi-aventis Group

LEARNING OBJECTIVES

1) Provide a step-by-step method to distinguish recurrence from normal radiation changes. 2) Appraise new research to better select MRI sequences to localize tumors. 3) Provide an image review of common errors in imaging post radiation.

ABSTRACT

Imaging changes after treatment with radiation can be difficult and misleading. Recent evidence provides insight into better timing of imaging, appropriate MRI sequences (these sequences often differ from sequences used by radiologists) and imaging features that are associated with a higher risk of recurrence.

RC520B Fundamentals of Imaging of Lung Cancer in Radiation Oncology

Participants
Candice A. Johnstone, MD, Milwaukee, WI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cjohnstone@mcw.edu

LEARNING OBJECTIVES

1) Define the most appropriate uses for the use of PET-CT in lung cancer. 2) Identify situations when imaging is sufficient for mediastinal staging. 3) Describe new imaging techniques and their application to lung cancer treatment.

RC520C Fundamentals of Imaging of Gynecologic Cancer in Radiation Oncology

Participants
Eric Leung, MD, FRCPC, Toronto, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review imaging modalities for staging, planning and response of gynaecological cancer treatments with radiation therapy. 2) To review imaging techniques in three-dimensional based brachytherapy for locally advanced gynaecological cancers. 3) To review imaging techniques for stereotactic radiation therapy of gynaecological cancers. 4) To review functional imaging techniques for gynaecological cancers and radiation treatment.

RC520D Fundamentals of Imaging of CNS Tumors in Radiation Oncology

Participants
Hui-Kuo G. Shu, MD, PhD, Atlanta, GA (*Presenter*) Speakers Bureau, Varian Medical Systems, Inc; Stockholder, Medtronic plc; Stockholder, Apple Inc; Stockholder, ICON plc; Stockholder, Raytheon

For information about this presentation, contact:

hgshu@emory.edu

LEARNING OBJECTIVES

1) List the imaging modalities most often used by the radiation oncologist in the management of CNS tumors. 2) Explain how specific CNS imaging techniques are utilized to assess the extent of disease prior to initiation of radiation therapy (upfront staging). 3) Describe various imaging evaluations of CNS tumors after radiation therapy for longitudinal response assessment with attention to interpretation of specific results.

ABSTRACT

Radiation therapy (RT) is critical for the overall management of many central nervous system (CNS) tumors. Advances in radiation treatment planning, with techniques such as intensity modulated radiation therapy, volumetric modulated arc therapy, and stereotactic radiosurgery, now allow the delivery of highly conformal doses with very high precision. These techniques rely on high-resolution 3-dimensional anatomic imaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI) scans to accurately and reliably define CNS targets and avoidance structures. The integration of cross sectional imaging into CNS radiation oncology has directly translated into improvements in the therapeutic window of RT, and the union between radiation oncology and imaging is only expected to grow stronger. In addition to standard imaging such as CT and MRI scans, advanced imaging techniques including diffusion/perfusion/spectroscopic MRIs and positron emission tomography (PET) scans with novel tracers are being used to provide additional insight into CNS tumor biology and behavior beyond anatomy. Together, standard and advanced imaging modalities hold significant potential to improve future RT delivery and response assessment. In this talk, we will discuss the current utilization of standard/advanced imaging for CNS malignancies from a radiation oncology perspective as well as discuss the implications of novel MRI and PET modalities currently under investigation.

RC521

Advances in CT: Technologies, Applications, Operations-Functional CT

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E351

CT PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc
Lifeng Yu, PhD, Chicago, IL (*Coordinator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Comprehend the principles of CT Perfusion imaging in stroke and cancer applications. 2) Apply the principles to discern errors that my occur in perfusion calculation. 3) Design scanning protocols for CT Perfusion imaging of stroke and cancer. 4) Apply dose saving techniques to reduce radiation dose. 5) Discuss the application of CT Perfusion imaging in stroke and cancer with examples. 6) Comprehend the theoretical basis and pitfalls of each myocardial CTP method (qualitative, semi-quantitative and quantitative). 7) Assess the sources and solutions of various image artifacts in myocardial CTP. 8) Evaluate the effectiveness of radiation dose reduction methods for low dose quantitative myocardial CTP. 9) Develop the optimal myocardial CTP protocol for assessing high-risk coronary artery disease. 10) Assess the recent advances in quantitative CTP for imaging myocardial edema and scar and their potential applications to guide therapy in post infarction settings.

ABSTRACT

CT has become a leading medical imaging modality, thanks to its superb spatial and temporal resolution to depict anatomical details. New advances have enabled extending the technology to depict physiological information. This has enabled a wide and expanding range of clinical applications. These advances are highlighted in this multi-session course. The course offers a comprehensive and topical depiction of these advances with material covering CT system innovations, CT operation, CT performance characterization, functional and quantitative applications, and CT systems devised for specific anatomical applications. The sessions include advances in CT system hardware and software, CT performance optimization, CT practice management and monitoring, spectral CT techniques, quantitative CT techniques, functional CT methods, and special CT use in breast, musculoskeletal, and interventional applications.

Sub-Events

RC521A Contrast Administration for Cardiovascular Imaging and Beyond

Participants
Dominik Fleischmann, MD, Stanford, CA (*Presenter*) Research Grant, Siemens AG

RC521B Perfusion Techniques and Applications-Stroke and Cancer

Participants
Ting-Yim Lee, MSc, PhD, London, ON (*Presenter*) License agreement, General Electric Company

LEARNING OBJECTIVES

1) Comprehend the principles of CT Perfusion imaging in stroke and cancer applications. 2) Apply the principles to discern errors that my occur in perfusion calculation. 3) Design scanning protocols for CT Perfusion imaging of stroke and cancer. 4) Apply dose saving techniques to reduce radiation dose. 5) Discuss the application of CT Perfusion imaging in stroke and cancer with examples.

RC521C Perfusion Techniques and Applications-Cardiac

Participants
Aaron So, PhD, London, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Comprehend the theoretical basis and pitfalls of each myocardial CTP method (qualitative, semi-quantitative and quantitative). 2) Assess the sources and solutions of various image artifacts in myocardial CTP. 3) Evaluate the effectiveness of radiation dose reduction methods for low dose quantitative myocardial CTP. 4) Develop the optimal myocardial CTP protocol for assessing high-risk coronary artery disease. 5) Assess the recent advances in quantitative CTP for imaging myocardial edema and scar and their potential applications to guide therapy in post infarction settings.

RC522

Advanced PET Imaging for Radiotherapy Planning and Response Assessment

Wednesday, Nov. 28 8:30AM - 10:00AM Room: N226

BQ NM PH RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Paul E. Kinahan, PhD, Seattle, WA (*Moderator*) Research Grant, General Electric Company; Co-founder, PET/X LLC

Sub-Events

RC522A State of the Art in PET Imaging

Participants
Paul E. Kinahan, PhD, Seattle, WA (*Presenter*) Research Grant, General Electric Company; Co-founder, PET/X LLC

LEARNING OBJECTIVES

1) Understand the connections between the capabilities of PET imaging and clinical and research uses. 2) Become familiar with recent technical advances in PET imaging and tradeoffs. 3) Gain awareness of initiative in quantitative imaging for clinical trials.

RC522B Technical Challenges in the Integration of PET Imaging into Radiotherapy Treatment Planning

Participants
Stephen R. Bowen, PhD, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

srbowen@uw.edu

LEARNING OBJECTIVES

1) Understand the differences between diagnostic and treatment planning PET/CT imaging technical requirements. 2) Become familiar with the source and propagation of technical errors in PET/CT-guided radiation therapy. 3) Gain awareness of technical design elements in PET/CT-guided radiation therapy clinical trials.

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104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC523

Optimization and Technology in Interventional Radiology

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S403B

CT IR PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
William F. Sensakovic, PhD, Scottsdale, AZ (*Coordinator*) Speaker, Bayer AG; Research Grant, Mazor Robotics Ltd; Founder, Telerad Physics Teaching, LLC
Thaddeus A. Wilson, PhD, Madison, WI (*Coordinator*) Nothing to Disclose

For information about this presentation, contact:

wfsensak@gmail.com

LEARNING OBJECTIVES

1) Apply techniques to optimize dose in the interventional setting. 2) Identify opportunities where ionizing radiation can be replaced by ultrasound to guide interventional procedures. 3) Understand new CT interventional techniques that will open new fields of CT intervention for percutaneous and intravascular interventions. 4) Describe a 500X dose reduced CT fluoroscopy mode. 5) Describe a method for quantitative high frame rate CTA that provides vascular velocity and flow information to help plan and evaluate CT vascular interventions.

Sub-Events

RC523A Dose Optimization in the Interventional Suite

Participants
Robert G. Dixon, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bob_dixon@med.unc.edu

LEARNING OBJECTIVES

1. Review the importance of dose optimization in the angiography suite. 2. Discuss basic concepts that will help to build a culture of safety at your institution. 3. Identify simple, practical steps that operators can take to protect patients, staff and themselves in the IR suite.

RC523B Using Ultrasound in Place of CT and Fluoroscopy in the Interventional Suite

Participants
Patrick Warren, MD, Columbus, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss skills, techniques, and pitfalls of invasive sonography. 2) Discuss basic skills involved in utilizing ultrasound guidance in lieu of CT fluoroscopy or conventional fluoroscopy during minimally invasive percutaneous procedures in order to minimize radiation exposure to patients and healthcare providers. 3) Incorporate these component skill sets into further life-long learning for expansion of competency and implementation into clinical interventional practice.

RC523C Advances in Interventional Use of CT

Participants
Charles A. Mistretta, PhD, Madison, WI (*Presenter*) Founder, Mistretta Medical Intellectual Property Licensing Activities; Research, Siemens AG; Co-Founder, LiteRay Medical LLC

For information about this presentation, contact:

camistre@wisc.edu

LEARNING OBJECTIVES

1) To familiarize attendees with new CT interventional techniques that will open new fields of CT intervention for percutaneous and intravascular interventions. 2) To describe a 500X dose reduced CT fluoroscopy mode. 3) To describe a method for quantitative high frame rate CTA that provides vascular velocity and flow information to help plan and evaluate CT vascular interventions.

ABSTRACT

We will summarize recent developments in C-Arm 4D DSA that have now been extended to conventional CT. These include a 500X dose reduced CT fluoroscopy mode and 4D CT DSA that provides quantitative velocity and flow information from 30 CTA volumes

per second. These modes in combination, promise to provide new opportunities for ultra low dose artifact-free percutaneous needle placement and CT vascular intervention including real time intra-luminal views.

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104th Scientific Assembly and Annual Meeting
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RC524

How to Turn Your Abstract into an Award-winning Publication: Tips from the Editors of the RSNA Journals

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S402AB

ED RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

RC524A How to Publish a Great Paper in RADIOLOGY

Participants
David A. Bluemke, MD,PhD, Bethesda, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dbluemke@rsna.org

LEARNING OBJECTIVES

1) Describe the elements of a scientific manuscript that are necessary to achieve publication. 2) Identify methods for creating effective scientific manuscripts that increase the likelihood of acceptance by peer reviewed journals. 3) Describe methods to improve the writing of scientific abstracts and manuscripts, in order to clearly and effectively communication your results and new information in the field.

ABSTRACT

The peer-review process for scientific publications is the international standard for scientific advancement in your career. Although you may have the most innovative or novel scientific breakthrough, it remains necessary to publish your ideas in order to advance the field. Much effort is placed on obtaining funding and generating the data to prove your idea. But there is often less attention paid to methods of publishing your scientific breakthrough. Effort and initiative is needed to translate your ideas into a manuscript that can be read and interpreted by your peers. In this seminar, the editors of RSNA journals will describe the publication process, from the starting point of submission, to peer review to editorial board review and eventual publication. Techniques that help authors write effective manuscripts and communicate their ideas will be illustrated. The critical elements of a scientific manuscript, including the title, abstract and main body of the paper will be discussed. The overall goal of this seminar is to help your manuscript be eligible for acceptance at the leading manuscripts in the field of imaging.

RC524B Creating Manuscripts for Radiology and RadioGraphics

Participants
Jeffrey S. Klein, MD, Burlington, VT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jklein@rsna.org

LEARNING OBJECTIVES

1) Explain the processes that RadioGraphics uses to identify content for potential publication. 2) List the required elements of a manuscript submitted to RadioGraphics. 3) Describe the journal's peer-review and decision processes. 4) Show how an accepted manuscript is produced for publication.

ABSTRACT

RadioGraphics is unique in that the majority of content published in the journal is solicited from education exhibits displayed at the RSNA annual meeting. The editor of RadioGraphics will review the process that the journal uses to identify appropriate content in the various radiology subspecialties, safety and quality, and informatics, as well as medical physics and radiation oncology, including the consideration of unsolicited materials. The proper components of a RadioGraphics submission, including online-only interactive education content, will be detailed. The peer review process, acceptance/revision/rejection decision process will be described and the production of accepted materials reviewed.

RC525

Mini-course: Image Interpretation Science - Perception in the Clinic

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S103AB

PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Coordinator*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

For information about this presentation, contact:

ekrupin@emory.edu

LEARNING OBJECTIVES

1) Describe how fatigue impacts diagnostic accuracy. 2) Describe how fatigue impacts the efficiency with which cases are interpreted. 3) Provide ways to avoid & ameliorate fatigue. 4) Provide an overview of the role of volumetric imaging in radiology. 5) Describe the perceptual challenges in interpreting volumetric data. 6) Review evidence on differences in visual search between 2D & 3D image sets. 7) Define image quality and its most common metrics. 8) Present the impact of image resolution on diagnostics performance. 9) Present the impact of image noise and dose on diagnostic performance.

ABSTRACT

Medical images constitute a core portion of the information physicians utilize to render diagnostic and treatment decisions. At a fundamental level, the diagnostic process involves two aspects - visually inspecting the image (perception) and rendering an interpretation (cognition). Key indications of expert interpretation of medical images are consistent, accurate and efficient diagnostic performance, but how do we know when someone has attained the level of training required to be considered an expert? How do we know the best way to present images to the clinician in order to optimize accuracy and efficiency? The advent of digital imaging in many clinical specialties, including radiology, pathology and dermatology, has dramatically changed the way that clinicians view images, how residents are trained, and thus potentially the way they interpret image information, emphasizing our need to understand how clinicians interact with the information in an image during the interpretation process. With improved understanding we can develop ways to further improve decision-making and thus improve patient care.

Sub-Events

RC525A Impact of Fatigue on Radiologists' Performance

Participants
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ekrupin@emory.edu

LEARNING OBJECTIVES

1) Describe how fatigue impacts diagnostic accuracy. 2) Describe how fatigue impacts the efficiency with which cases are interpreted. 3) Provide ways to avoid & ameliorate fatigue.

ABSTRACT

Medical images constitute a core portion of the information physicians utilize to render diagnostic and treatment decisions. At a fundamental level, the diagnostic process involves two aspects - visually inspecting the image (perception) and rendering an interpretation (cognition). Key indications of expert interpretation of medical images are consistent, accurate and efficient diagnostic performance, but how do we know when someone has attained the level of training required to be considered an expert? How do we know the best way to present images to the clinician in order to optimize accuracy and efficiency? The advent of digital imaging in many clinical specialties, including radiology, pathology and dermatology, has dramatically changed the way that clinicians view images, how residents are trained, and thus potentially the way they interpret image information, emphasizing our need to understand how clinicians interact with the information in an image during the interpretation process. With improved understanding we can develop ways to further improve decision-making and thus improve patient care.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Elizabeth A. Krupinski, PhD - 2017 Honored Educator

RC525B Perception of Volumetric Image Data

Participants

Geoffrey D. Rubin, MD, Durham, NC (*Presenter*) Consultant, Fovia, Inc; Consultant, HeartFlow, Inc; Consultant, General Electric Company;

LEARNING OBJECTIVES

1) Understand how volumetric images acquired from CT, MRI or PET differ from more commonly studies 2-D projections such as radiographs and mammograms. 2) Discuss recent investigations focused upon unraveling the unique aspects of volumetric image perception and how they might impact diagnostic performance.

RC525C Role of Image Quality in Visual and Computational Perception

Participants
Justin B. Solomon, PhD, Durham, NC (*Presenter*) License agreement, Sun Nuclear Corporation; License agreement, 12 Sigma Technologies
Ehsan Samei, PhD, Durham, NC (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

For information about this presentation, contact:

justin.solomon@duke.edu

LEARNING OBJECTIVES

1) Define image quality and its most common metrics. 2) Present the impact of image resolution on diagnostics performance. 3) Present the impact of image noise and dose on diagnostic performance.

ABSTRACT

This talk will define basic image quality concepts such as resolution, contrast, and noise, and describe how such concepts are measured and quantified in medical images. Further, the impact of resolution, contrast, and noise on human interpretation of medical images will be discussed. Examples will be mostly focused on CT but the concepts are applicable to any modality. A special focus will be given to the relationship between the detectability of low-contrast image features and radiation dose in CT.

RC527

Comparative Effectiveness Research: Translating Science into Health Policy and Practice

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E261

HP RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jason N. Itri, MD, PhD, Winston-Salem, NC (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Detail the process for identifying high-priority areas for CER. 2) Discuss the scientific methods used in CER. 3) Describe how CER influences health policy in the era of value-based health care.

ABSTRACT

Despite various diagnostic and treatment options available to patients, practical information to help patients and providers choose the most effective options for a particular population is often not available or accessible, which contributes to regional variations in clinical practice and negatively impacts patient outcomes. Comparative effectiveness research (CER) is one of the key approaches to address this gap, designed to generate and synthesize evidence that compares the benefits and harms of alternative methods to prevent, diagnose, treat, and monitor a clinical condition, or to improve delivery of care. CER is playing an increasingly critical role in guiding health care policy and practice in order to achieve the aims of improving the health of populations, reducing the cost of healthcare, and improving the patient experience. This course will introduce participants to the key principles of CER using examples such as screening chest CT for lung cancer, lumbar spine MRI for low back pain, and imaging for breast cancer screening.

Sub-Events

RC527A NLST and Chest CT for Lung Cancer

Participants
Mitchell D. Schnall, MD, PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the conduct and results of the National Lung Cancer Screening trials. 2) Learn how a comparative effectiveness clinical trial results can impact healthcare policy. 3) Learn the limitation of a clinical trial to predict clinical impact.

Honored Educators

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RC527B Imaging for Breast Cancer Screening

Participants
Constance D. Lehman, MD,PhD, Boston, MA (*Presenter*) Research Grant, General Electric Company; Medical Advisory Board, General Electric Company

LEARNING OBJECTIVES

1) Summarize the evidence of performance of breast cancer screening imaging tests including potential benefits and harms. 2) Review the cost effective research findings for breast cancer screening imaging tests. 3) Discuss future of breast cancer screening in era of value-based health care policy.

RC527C MRI for Low Back Pain

Participants
Jeffrey G. Jarvik, MD, Seattle, WA (*Presenter*) Consultant, Wolters Kluwer nv; Co-editor, Springer Nature; Royalties, Springer Nature

For information about this presentation, contact:

jarvikj@uw.edu

LEARNING OBJECTIVES

1) Review the evidence that has led to much of imaging for low back pain being considered 'low value care'. 2) Discuss an evidence-based approach to reporting lumbar MRI findings. 3) Discuss the evidence for including epidemiological data in lumbar MRI reports.

ABSTRACT

Low back pain, an Institute of Medicine priority condition for comparative effectiveness research, is of major public health

Low back pain, an Institute of Medicine priority condition for comparative effectiveness research, is of major public health importance. Imaging is frequently performed as part of the diagnostic evaluation and is an important contributor to the cost of back pain care. Even without back pain, magnetic resonance (MR) imaging of the lumbar spine frequently reveals findings such as disc desiccation or bulging. Patients and their providers may attribute greater importance to these findings, which are often age-related, than they should, because they do not have an appropriate frame of reference in which to interpret the findings. These 'incidental' findings may initiate a cascade of events leading possibly even to surgery, without improving patient outcomes. Understanding evidence-based recommendations regarding when to obtain imaging can help to reduce inappropriate examinations that could lead to unnecessary additional procedures. Standardized nomenclature as well as inserting epidemiological benchmarks into imaging reports may also improve the process of care, reduce subsequent tests and treatments and possibly even improve patient outcomes. Inserting epidemiological benchmarks in lumbar spine imaging reports has been preliminarily shown to reduce subsequent diagnostic and therapeutic interventions, including MR and CT, opioid prescriptions, spinal injections and surgery. The rationale is that the epidemiologic data may provide a context for both physicians and patients to better interpret imaging findings. The long-term public health significance is high. Through simple, inexpensive interventions, radiologists may be able to substantially reduce unnecessary and expensive care for back pain.

Honored Educators

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RC529

The Abbreviated Liver MRI Imaging Protocol

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S102CD

GI MR OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Hero K. Hussain, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

Sub-Events

RC529A Developing Cost-Effective Abbreviated Liver MRI Protocols

Participants
Pari Pandharipande, MD, MPH, Boston, MA (*Presenter*) Research Grant, Medical Imaging & Technology Alliance

LEARNING OBJECTIVES

1) Define cost-effectiveness analysis in the context of different imaging protocols. 2) Describe a path by which abbreviated MRI protocols could improve population health outcomes.

RC529B The Abbreviated Standard Liver Protocol

Participants
Scott B. Reeder, MD, PhD, Madison, WI (*Presenter*) Institutional research support, General Electric Company; Institutional research support, Bracco Group; Founder, Calimetrix, LLC; Shareholder, Elucent Medical; Consultant, ArTara

LEARNING OBJECTIVES

1) Understand emerging strategies for limited liver MRI protocols. 2) Describe at least three examples of limited liver MRI protocols. 3) Be familiar with the challenges with implementing limited MRI protocols.

RC529C The Abbreviated Liver Protocol for the Detection of Metastasis

Participants
Angela M. Riddell, MBBS, London, United Kingdom (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Angela.Riddell@rmh.nhs.uk

LEARNING OBJECTIVES

1) Explain the essential sequences required within an abbreviated protocol for the detection of liver metastases. 2) Compare the diagnostic performance of an abbreviated protocol versus standard multiparametric liver protocol. 3) Identify pitfalls/challenges for the abbreviated liver protocol.

RC529D The Abbreviated Liver Protocol for Quantitative Evaluation of Diffuse Liver Disease

Participants
Takeshi Yokoo, MD, PhD, Dallas, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

takeshi.yokoo@utsouthwestern.edu

LEARNING OBJECTIVES

1) Develop an abbreviated protocol for quantitative evaluation of diffuse liver disease. 2) Define clinical indications for the abbreviated protocol examination. 3) Identify quantitative maps of hepatic fat, iron, and stiffness. 4) Quantitatively estimate the severity of hepatic steatosis, siderosis, and fibrosis.

RC529E The Abbreviated Liver Protocol for Screening for Hepatocellular Carcinoma Using Hepatobiliary Contrast

Participants
Bachir Taouli, MD, New York, NY (*Presenter*) Research Grant, Guerbet SA; Research Grant, Bayer AG

For information about this presentation, contact:

bachir.taouli@mountsinai.org

LEARNING OBJECTIVES

1) Review current guidelines for liver cancer screening. 2) Review the limitations of ultrasound for liver cancer screening. 3) Review gadoxetic acid-enhanced abbreviated MRI protocol and early results for liver cancer screening.

ABSTRACT

Hepatocellular carcinoma (HCC) is the 2nd leading cause of cancer-related death worldwide, and the fastest growing cause of cancer death in the USA. The most important risk factor for HCC is cirrhosis. In this presentation, we will discuss the performance of ultrasound for HCC screening and surveillance and we will review recent developments in the use of gadoxetic-enhanced abbreviated MRI protocols for HCC screening and surveillance.

RC532

Imaging Utilization, Clinical Decision Support, and Appropriateness

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E263

LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Yoshimi Anzai, MD, Salt Lake City, UT (*Moderator*) Nothing to Disclose

Sub-Events

RC532A Imaging Utilization: Past, Present, and Future

Participants
David C. Levin, MD, Philadelphia, PA (*Presenter*) Consultant, HealthHelp, LLC; Board Member, Outpatient Imaging Affiliates, LLC

For information about this presentation, contact:

david.levin@jefferson.edu

LEARNING OBJECTIVES

1) Understand the overall trends in imaging during the last 12 years. 2) Understand the trends in utilization of each of the major imaging modalities over the last 12 years. 3) Assess the various factors that might cause imaging use to increase or decrease in the coming years.

RC532B Variations in Medicare Imaging: A Data-Driven Approach

Participants
Andrew B. Rosenkrantz, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the importance from a policy perspective of recognizing sources of variation in imaging utilization. 2) Explore a spectrum of sources of variation in imaging utilization. 3) Describe associations between variation in utilization of imaging and other categories of healthcare services.

RC532C Clinical Decision Support for Radiology Order Entry: Challenges and Opportunities

Participants
Charles E. Kahn JR, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ckahn@upenn.edu

LEARNING OBJECTIVES

1) Describe the requirements of the Protecting Access to Medicare Act (PAMA). 2) Define some of the challenges of clinical decision support (CDS) for radiology order entry. 3) Explore early results using order-entry CDS. 4) Identify opportunities to use imaging CDS to improve clinical practice.

Honored Educators

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RC532D High Value Practice Academic Alliance

Participants
Pamela T. Johnson, MD, Baltimore, MD (*Presenter*) Consultant, Oliver Wyman

For information about this presentation, contact:

PamelaJohnson@jhmi.edu

LEARNING OBJECTIVES

1) Understand the barriers to value-based quality improvement. 2) Recognize the importance of cross-specialty collaboration for effective performance improvement initiatives. 3) Understand the power of cross-institutional collaboration to efficiently advance performance improvement. 4) Recognize the importance of disseminating value-based quality improvement through publication and

presentations at national meetings, with emphasis on safety outcomes data.

ABSTRACT

This session reviews strategies to effectively increase radiology value on a national scale, based on our experience with the High Value Practice Academic Alliance, a national consortium of >85 academic medical centers.

Honored Educators

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RC550

Vertebral Augmentation (Hands-on)

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E260

IR MK NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
A. Orlando Ortiz, MD, MBA, Mineola, NY (*Presenter*) Nothing to Disclose
Bassem A. Georgy, MD, MSc, San Diego, CA (*Presenter*) Consultant, Johnson & Johnson; Consultant, Merit Medical Systems, Inc; Consultant, Medtronic plc; Stockholder, Spine Solutions, Inc; ;
Allan L. Brook, MD, Bronx, NY (*Presenter*) Nothing to Disclose
Todd S. Miller, MD, Bronx, NY (*Presenter*) Nothing to Disclose
Afshin Gangi, MD, PhD, Strasbourg, France (*Presenter*) Proctor, BTG International Ltd; Proctor, Galil Medical Ltd

For information about this presentation, contact:

gangi@unistra.fr

tmiller@montefiore.org

LEARNING OBJECTIVES

1) Discuss appropriate algorithms for patient selection. 2) Review anatomic and technical considerations for vertebral augmentation. 3) Present an update of the recent advances in vertebral augmentation including sacroplasty. 4) Emphasize safety issues and how to avoid complications. 5) Understand the applications of vertebral augmentation in osteoporotic and neoplastic spine pathology. 6) Update participants with respect to advances in equipment and biomaterials.

ABSTRACT

1. Patient selection for vertebral augmentation Indications and Contraindications 2. New devices and techniques in vertebral augmentation 3. Vertebral augmentation for osteoporotic and pathologic vertebral compression fractures 4. Sacroplasty (sacral augmentation) 5. Complications avoidance 6. Efficacy Vertebral augmentation is an image-guided (fluoroscopy or CT) percutaneous procedure in which a bone needle is inserted into a painful osteoporotic or pathologic fracture within the spinal axis. Biopsy, cavity creation or lesion ablation may then be performed under imaging guidance depending on the nature of the pathology that is being treated. Subsequently a radioopaque implant, usually an acrylic bone cement, is carefully injected into the vertebra or sacral ala under imagining guidance, These procedures have been shown to provide pain relief by stabilizing the fractured vertebra or sacrum. As with any other invasive procedure, they carry a small risk (<<1%) of complication including bleeding, infection, neurovacular injury, or cement embolus. Appropriate patient seleciton and a detailed understanding of the technical aspects of the procedure along with active clinical patient follow-up are paramount to a successful outcome. This workshop will utilize short lectures, case examples and interactive audience participation in order to further explore critical topics in vertebral augmentation.

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RC552

Liver Elastography (Hands-on)

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E264

GI US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

Richard G. Barr, MD, PhD, Campbell, OH (*Presenter*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Canon Medical Systems Corporation; Research Grant, Esaote SpA; Research Grant, BK Ultrasound; Research Grant, Hitachi, Ltd
Nitin G. Chaubal, MD, MBBS, Mumbai, India (*Presenter*) Nothing to Disclose
Chander Lulla, MBBS, Mumbai, India (*Presenter*) Nothing to Disclose
Mirko D'Onofrio, MD, Verona, Italy (*Presenter*) Speaker, Bracco Group; Speaker, Siemens AG; Consultant, Siemens AG; Speaker, Hitachi, Ltd
Carlo Filice, MD, Pavia, Italy (*Presenter*) Research Grant, Shenzhen Mindray Bio-Medical Electronics Co, Ltd; Research Grant, Hitachi, Ltd; Research Grant, Esaote SpA; Research Grant, Canon Medical Systems Corporation; Speaker, Shenzhen Mindray Bio-Medical Electronics Co, Ltd
Vito Cantisani, MD, Rome, Italy (*Presenter*) Speaker, Canon Medical Systems Corporation; Speaker, Bracco Group; Speaker, Samsung Electronics Co, Ltd;
Fabrizio Calliada, MD, Pavia, Italy (*Presenter*) Research Grant, Canon Medical Systems Corporation; Speakers Bureau, Hitachi, Ltd; Speakers Bureau, Shenzhen Mindray Bio-Medical Electronics Co, Ltd
Ann E. Podrasky, MD, Miami, FL (*Presenter*) Consultant, Siemens AG
Michelle L. Robbin, MD, Birmingham, AL (*Presenter*) Consultant, Koninklijke Philips NV; Speaker, Koninklijke Philips NV;
Hisham A. Tchelepi, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Norihisa Yada, MD, Kyoto, Japan (*Presenter*) Nothing to Disclose
Laura Maiocchi, MD, Pavia, Italy (*Presenter*) Nothing to Disclose
Patrick Warren, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Maija Radzina, MD, PhD, Riga, Latvia (*Presenter*) Nothing to Disclose
Anil Chauhan, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Raffaella Lissandrin, Pavia, Italy (*Presenter*) Nothing to Disclose
Giovanna Ferraioli, MD, Pavia, Italy (*Presenter*) Speaker, Koninklijke Philips NV; Speaker, Hitachi Ltd; Speaker, Canon Medical Systems Corporation; Speaker, Shenzhen Mindray Bio-Medical Electronics Co, Ltd
Cheng Fang, MBBS,FRCR, London, United Kingdom (*Presenter*) Nothing to Disclose
Giuseppe Schillizzi, Roma, Italy (*Presenter*) Nothing to Disclose
Valerio Forte, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Gregorio Alagna, Rome, Italy (*Presenter*) Nothing to Disclose
Valeria de Soccio, JD, Rome, Italy (*Presenter*) Nothing to Disclose
Daniele Fresilli, Roma, Italy (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Improve basic knowledge and skills relevant to clinical practice in Liver elastography of the participants. 2) Teach how to practice liver elastography. 3) Show live how to do a proper examination, providing tips and tricks and updating current knowledge on different techniques. 4) Practical hands-on and slide presentation with key messages will be used.

Honored Educators

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RC553

Deep Learning: Applying Machine Learning to Multi-disciplinary Precision Medicine Data Sets

Wednesday, Nov. 28 8:30AM - 10:00AM Room: E451B

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Paula M. Jacobs, PhD, Bethesda, MD (*Moderator*) Nothing to Disclose
Maryellen L. Giger, PhD, Chicago, IL (*Presenter*) Stockholder, Hologic, Inc; Shareholder, Quantitative Insights, Inc; Shareholder, QView Medical, Inc; Co-founder, Quantitative Insights, Inc; Royalties, Hologic, Inc; Royalties, General Electric Company; Royalties, MEDIAN Technologies; Royalties, Riverain Technologies, LLC; Royalties, Mitsubishi Corporation; Royalties, Canon Medical Systems Corporation
John B. Freymann, BS, Rockville, MD (*Presenter*) Nothing to Disclose
Joel Saltz, MD, PhD, Stony Brook, NY (*Presenter*) Nothing to Disclose
Hugo Aerts, PhD, Boston, MA (*Presenter*) Stockholder, Sphera Inc

For information about this presentation, contact:

Paula.Jacobs@nih.gov

john.freymann@nih.gov

m-giger@uchicago.edu

LEARNING OBJECTIVES

1) Understand the strategy NIH National Cancer Institute is making to link clinical imaging with other existing patient-case 'metadata' archives. 2) Learn to navigate the patient-specific database silos (genetics, proteomics, clinical demographics) so as to strengthen Machine Learning research. 3) By specific use-case examples attendees will comprehend the advantage such imaging and disparate-type metadata links offer to clinically relevant cancer research.

ABSTRACT

Abstract: This didactic session will provide clinician researchers with examples of ongoing machine learning research in imaging combined with clinical and 'omics data sets, along with examples of where to find and how to link existing cancer image archive cases to other public-access stored databases that contain same-patient demographics, genetics, proteomic, and pathology images. Many of these disparate data types may be presently unfamiliar to imagers - such as mass spectroscopy data that arises from cellular proteomic analysis that propel the need for urgently forming new cross-disciplinary research teams. These datasets, often stored separately by different professional specialty teams, constitute critical complementary elements ultimately needed for reliable Machine Learning. This session pivots out from the clinical images available in the NCI Cancer Imaging Archive (TCIA) collections that acts as the point of origin for linking same-patient demographics, pathology, proteomics, and genetic data so that machine learning efforts can be more scientifically robust.

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RC554

Next Generation Reporting: Informatics to Improve the Value of Reporting

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S504AB

IN SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Arun Krishnaraj, MD, MPH, Charlottesville, VA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify unmet needs of current and future practices with regards to radiology reporting. 2) Apply existing and emerging informatics applications to improve report generation, including a focus on patient centered reporting. 3) Demonstrate an understanding of how best to apply emerging machine intelligence tools to create structured automated recommendations.

Sub-Events

RC554A The Actionable Patient Facing Report

Participants
Arun Krishnaraj, MD, MPH, Charlottesville, VA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Appreciate the current state of radiology reporting in the United States. 2) Identify areas for improvement in reporting. 3) Demonstrate an understanding of the potential of patient portals. 4) Understand how patient facing actionable reports can lead to better care through shared decision making

RC554B The Multimedia Report: Ready for Prime Time?

Participants
Cree M. Gaskin, MD, Charlottesville, VA (*Presenter*) Author with royalties, Oxford University Press; Author with royalties, Thieme Medical Publishers, Inc; Research Grant, Carestream Health, Inc;

For information about this presentation, contact:

cree@virginia.edu

LEARNING OBJECTIVES

1) Identify characteristics of an interactive multimedia radiology report. 2) Comprehend the value of improved communication that occurs with interactive multimedia reporting. 3) Describe barriers to overcome during the implementation of interactive multimedia reporting and integration of advanced reports into the electronic health record.

RC554C Interactive Reporting

Participants
Les R. Folio, MPH,DO, Bethesda, MD (*Presenter*) Institutional research agreement, Carestream Health, Inc

For information about this presentation, contact:

Les.Folio@nih.gov

LEARNING OBJECTIVES

1) Comprehend the difference between plain text and interactive multimedia radiology reports. 2) Identify characteristics and components suitable for an interactive multimedia radiology report. 3) Demonstrate objective evidence of radiology report value using interactive reports now that we can analyze click through behaviours of hyperlinked text.

ABSTRACT

For the past several years, the NIH Clinical Center has been routinely producing multimedia-enhanced interactive reports (Folio L. Multimedia Reports. Radiographics. April/ May 2018) in which radiologist reports contain hyperlinked text, directing clinicians to the corresponding image annotation (most often two-diameter measurements). Our prior studies have also demonstrated notable time savings for oncologists (three times faster) when they use the hyperlinked target lesion measurements for their patients (Folio L. RSNA 2015) as they spend significantly less time "hunting" for measurements in the previous text-only reports. Bookmark tables within our PACS (VuePACS V12, Carestream Health, Rochester, NY) contain fields where "radiologist assistants" (RAs) can label target lesions. In one ongoing study (Toscano A. SCBT.MR 2018), RAs simulate an AI workflow where target lesions are measured before radiologists open the exam for interpretation. This improves target lesion selection and measurement concordance while saving radiologists time by not having to identify or measure these lesions. Once verified, radiologists import the active annotation as a link into our report by dictating the word "hyperlink," which minimizes the potential transcription error of three sets of numbers (measurement, series and image numbers) and other metadata (e.g. x,y image and z table space, comparison of current with prior measurements for RECIST calculations, lesion measurement creator). We have followed adoption of hyperlinks since we started the capability and showed a rapid rise of use and that body radiologists use the most hyperlinks (about 80% of all CT), followed by

body MR, PET CT and nueroradiology. We also collect data on use of annotations, with two-diameter the most frequent, followed by linear, ovals then arrows (least frequent). Preliminary work indicates that two-diameter and ovals better guide bounding boxes for deep learning with the annotations directly associated with the the hyperlinked text. Lastly, we have been analyzing clinician click-through behaviors where we can objectively demonstrate report value as a function of number of clicks on linked text, thus verifying clinician interaction with radiologist reports. We can also analyze radiologists' clicks on prior report text and noted that body radiologists (for example) frequently click on these reports while dictating their interpretations.

RC554D Structured Automated Recommendations: Reporting in the Era of Artificial Intelligence

Participants
Tarik K. Alkasab, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

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RCB41

Getting Stuff Done: A Mindful Approach to Personal Productivity

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S401CD

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Puneet Bhargava, MD, Seattle, WA (*Moderator*) Nothing to Disclose
Matthew B. Morgan, MD, Sandy, UT (*Presenter*) Consultant, Reed Elsevier
Puneet Bhargava, MD, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Bhargp@uw.edu

LEARNING OBJECTIVES

1) Introduce the concept of "Getting Things Done.' Learn the concepts of Inbox Zero and other email management techniques. 2) Using tools such as note-taking applications, citation and password managers.3) Using self-inquiry techniques, review how to make meaningful and powerful changes in how we engage with technology.

Active Handout:Puneet Bhargava

http://abstract.rsna.org/uploads/2018/18001638/Productivity Primer RCB41.pdf

Honored Educators

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RCC41

Advanced Cybersecurity for Imaging Departments and Imagers: Threats, Vulnerabilities, and Best Practices

Wednesday, Nov. 28 8:30AM - 10:00AM Room: S501ABC

HP IN

CME credit is not available for this session.
ARRT Category A Credit: 1.75

Participants
Kevin McDonald, Rochester, MN (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe common imaging device vulnerabilities. 2) Explain possible patient safety impacts of cyber attacks. 3) Explain the possible institutional impacts of cyber attacks. 4) List the technical, environmental and cultural barriers in improving the cyber security of imaging devices. 5) Contrast the items in the C-I-A triad. 6) List high value cybersecurity remediation and mitigations. 7) List the steps to creating an imaging device cybersecurity program. 8) Identify available cybersecurity resources.

Sub-Events

RCC41A Medical Device Security in a Connected World

Participants
Kevin McDonald, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identity the common cybersecurity threat actors. 2) Describe the state of cybersecurity in healthcare. 3) List common catagories of security vulnerabilities. 4) Describe cybersecurity challanges with medical devices.

RCC41B Medical Device Cybersecurity and the FDA

Participants
Suzanne B. Schwartz, MD, Silver Spring, MD (*Presenter*) Nothing to Disclose

RCC41C Federal Lead for the Industrial Control Systems Vulnerability Management and Coordination

Participants
Jay Angus, Oak Brook, IL (*Presenter*)

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MSRT42

ASRT@RSNA 2018: Tips and Tricks - Radiation Dose Aspects in Oncologic CT Imaging

Wednesday, Nov. 28 9:20AM - 10:20AM Room: N230B

CT OI SQ

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Dianna D. Cody, PhD, Houston, TX (*Presenter*) In-kind support, General Electric Company; Reviewer, ACR CT accreditation program; Researcher, Gammex, Inc

LEARNING OBJECTIVES

1) Better understand 'routine' CT imaging performed in a cancer center. 2) How this particular cancer center approaches abdominal CT imaging without IV contrast. 3) Appreciate scan options for CT imaging of very large patients. 4) Comprehend implementation of dual-energy CT for oncology.

ABSTRACT

The management of CT radiation exposure for cancer patients presents a difficult dilemma. We know that each exposure has a small probability of inducing radiation damage, but we must weigh that knowledge against the fact that the patient already has cancer, and may have a reduced life expectancy as a result. Patient management decisions often hinge on a detailed appreciation of the patient's present condition, and CT can provide critical information in this respect. In our practice, the concern for short-term survival typically supersedes the long term and complex risk associated with CT dose. The concept of what is 'routine' CT imaging at our oncology center will be explored, with a focus on our most frequently performed exams and typical scan parameters. CT dose metrics will be reviewed and compared to naitonal benchmarks for several routine CT exams. Our approach to abdominal CT protocols designed for use wihtout IV contrast will be covered, as well as several options for imaging our very large cancer patients. How we have implemented dual-energy CT, and its benefits, will also be illustrated.

MSCP42

Case-based Review of Pediatric Radiology (Interactive Session)

Wednesday, Nov. 28 10:30AM - 12:00PM Room: E450B

CH GI MK NR PD

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Ricardo Restrepo, MD, Miami, FL (*Director*) Nothing to Disclose

Sub-Events

MSCP42A Pediatric Spine Disorders

Participants
Thierry Huisman, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

thuisma1@jhmi.edu

LEARNING OBJECTIVES

1) Review the unique biomechanical and imaging presentation of the developing pediatric spine. 2) Review key features of pediatric spine trauma. 3) Present a brief introduction into congenital versus acquired spine disorders.

ABSTRACT

The normal development and variations of the pediatric spinal column will be discused, age specific biomechanical properties and resultant variable patterns of accidental and non-accidental injury will be reviewed. In addition, a brief introduction will be given on differentiating acquired from congenital spine and spinal cord pathologies using a case based approach.

MSCP42B Pediatric Pulmonary Disorders

Participants
Mark C. Liszewski, MD, Bronx, NY (*Presenter*) Grant, Carestream Health, Inc; Advisory Board, Carestream Health, Inc

For information about this presentation, contact:

mliszews@montefiore.org

LEARNING OBJECTIVES

1) Describe the imaging findings of several pediatric pulmonary disorders. 2) Differentiate between disorders with similar findings. 3) Recommend appropriate management based on the imaging features.

ABSTRACT

Congenital and acquired pediatric pulmonary cases will be presented. Discussion will include: 1) description of the imaging features for each condition, 2) tips for differentiating between conditions with similar imaging findings, 3) up-to-date recommendations for management and follow-up for each condition.

MSCP42C Pediatric Head and Neck Disorders

Participants
Amy F. Juliano, MD, BOSTON, MA (*Presenter*) Nothing to Disclose

MSCP42D Pediatric Musculoskeletal Disorders

Participants
Ricardo Restrepo, MD, Miami, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ricardo.restrepo@nicklaushealth.org

LEARNING OBJECTIVES

1) Recognize normal variants in the pediatric musculoskeletal system and distinguish them from disease processes. 2) Be familiar with MR imaging findings in patients with chronic non bacterial osteomyelitis. 3) Differentiate musculoskeletal neoplasms from infections.

ABSTRACT

A series of pediatric musculoskeletal cases will be presented to illustrate:1- normal variants that can be confused with pathology2- MR imaging spectrum of chronic non bacterial osteomyelitis (CNO)3- Neoplasms that can mimic infections and viceversa

MSES42

Essentials of GI Imaging

Wednesday, Nov. 28 10:30AM - 12:00PM Room: S100AB

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

MSES42A Management of Incidental Pancreatic Cysts

Participants
Desiree E. Morgan, MD, Birmingham, AL (*Presenter*) Institutional Research Grant, General Electric Company

For information about this presentation, contact:

dmorgan@uabmc.edu

LEARNING OBJECTIVES

1) Identify typical imaging findings of cystic pancreatic lesions. 2) Be familiar with imaging evaluation and clinical management strategies for incidentally detected cystic pancreas lesions. 3) Detect and uniformly describe imaging features of pancreatic cystic lesions that indicate an increased risk for malignancy.

MSES42B Management of Incidental Liver Findings

Participants
Richard M. Gore, MD, Evanston, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

rgore@northshore.org

LEARNING OBJECTIVES

1) Understand the prevalence of incidental liver lesions in the general population as well as high risk patients. 2) Review the imaging characteristics of the most common incidental liver lesions. 3) Appreciate which liver lesions can be ignored, which lesions need to be followed, and which lesions need immediate evaluation.

MSES42C Approach to a Focal Lesion in the Cirrhotic Liver

Participants
Giuseppe Brancatelli, MD, Palermo, Italy (*Presenter*) Speaker, Bayer AG; Speaker, Guerbet SA; Advisory Committee, Guerbet SA

For information about this presentation, contact:

gbranca@yahoo.com

LEARNING OBJECTIVES

1) Describe the vascular patterns of typical and atypical hepatocellular carcinoma. 2) Identify the major and ancillary features for the diagnosis of hepatocellular carcinoma. 3) List the most common lesions occurring in the cirrhotic liver beyond hepatocellular carcinoma.

ABSTRACT

The enrolment of patients with chronic liver disease into surveillance programs has determined a steady increase in the number of small hepatic masses being detected. In addition, technological advances have improved the spatial, contrast and temporal resolution of imaging modalities allowing for higher rates of detection. However, detection and characterization of a lesion in a cirrhotic liver is oftentimes a challenging task, due to the intrinsic features of a fibrotic/cirrhotic organ and to a different epidemiology in comparison to the noncirrhotic population. When a nodular lesion is larger than 1 cm and shows enhancement in the hepatic arterial phase and washout either in the portal venous or delayed phase, it can be confidently diagnosed as HCC. However, small HCC frequently presents with atypical findings, such as lack of enhancement, lack of washout or no capsule. Furthermore, HCC <1cm grows very slowly; therefore, stability (i.e. lack of growth) over a few months does not entirely rule out malignancy, and a negative biopsy is not helpful due to the high false-negative sampling rate. In these instances, two possible options are 1) further imaging with a different technique or 2) imaging follow-up. While most lesions in a cirrhotic liver are hepatocellular, a wide array of other observations can be encountered, such as haemangioma, nodule-like arterial phase hyperenhancement, focal fibrosis, cholangiocarcinoma and metastases.

MSES42D Non-invasive Diagnosis of Liver Fibrosis: Why and How

Participants
Amir Borhani, MD, Pittsburgh, PA (*Presenter*) Consultant, Guerbet SA; Author, Reed Elsevier

For information about this presentation, contact:

borhaniaa@upmc.edu

LEARNING OBJECTIVES

1) Explain the importance of non-invasive assessment of liver fibrosis in management of different disease processes. 2) List morphologic features of advanced fibrosis on ultrasound, CT, and MRI and discuss the sensitivity and specificty of these signs. 3) Discuss different elastography techniques and their role in non-invasive assessment of liver fibrosis.

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MSRO42

BOOST: Lymphoma-Oncology Anatomy and Case-based Multidisciplinary Review (Interactive Session)

Wednesday, Nov. 28 10:30AM - 12:00PM Room: S103CD

CT MR NM OI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants

Chelsea C. Pinnix, MD, PhD, Houston, TX (*Moderator*) Research Grant, Merck & Co, Inc; Consultant, Global One Inc; Speaker, International Journal of Radiation Oncology, Biology & Physics
Jurgen Rademaker, MD, New York, NY (*Presenter*) Nothing to Disclose
Bradford Hoppe, MD, Jacksonville, FL (*Presenter*) Nothing to Disclose
Alison M. Friedmann, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Case-based review of staging and treatment response in lymphoma (CT, PET, MRI).

MSSR42

RSNA/ESR Sports Imaging Symposium: Lower Extremity Sports Injuries (Interactive Session)

Wednesday, Nov. 28 10:30AM - 12:00PM Room: E352

ER MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Laura W. Bancroft, MD, Orlando, FL (*Moderator*) Author with royalties, Wolters Kluwer nv; Speaker, World Class CME; Editor, Thieme Medical Publishers, Inc; Travel support, Thieme Medical Publishers, Inc ; ;
Andrew J. Grainger, MRCP, FRCR, Leeds, United Kingdom (*Moderator*) Consultant, Levicept Ltd; Director, The LivingCare Group;

Sub-Events

MSSR42A Sports-related Injuries of the Knee: What Does the Orthopedic Surgeon Need to Know?

Participants
Theodore T. Miller, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

millertt@hss.edu

LEARNING OBJECTIVES

1) To be able to describe features of meniscal tears, ACL tears, and cartilage abnormalities that should be included in the MRI report. 2) To be able to recognize common sports-related injury patterns of the knee.

MSSR42B Multimodality Imaging of the Foot and Ankle Injuries in the Athlete

Participants
Andrew J. Grainger, MRCP, FRCR, Leeds, United Kingdom (*Presenter*) Consultant, Levicept Ltd; Director, The LivingCare Group;

For information about this presentation, contact:

andrewgrainger@nhs.net

LEARNING OBJECTIVES

1) To appreciate the different and often contributory roles that imaging modalities have in the foot and ankle. 2) To recognize the most common ligamentous and tendon injuries in the ankle. 3) To understand how common patterns of injury relate to the mechanisms involved.

ABSTRACT

Abstract: Ankle injuries are common in many sports and the complicated anatomy of the ankle joint can be challenging the reporting radiologist. The ankle joint itself is a synovial hinge joint, but important movement for ankle function also occurs at the joints of the hind and midfoot which are also susceptible to injury. In addition to conventional radiographs, CT, MRI and ultrasound all have important roles to play in the diagnosis of foot and ankle injuries in the athlete. The ligamentous and tendon structures about the ankle are generally superficial in nature and readily amenable to assessment with ultrasound where assessment can be enhanced due to the dynamic capabilities of the technique. While MRI also demonstrates these structures, it has advantages for assessing deeper joint structures such as the chondral surfaces and bones. The complex 3d anatomy of the foot and ankle means that conventional radiographs can struggle to demonstrate bone injury which means CT also has an important role to play. This lecture will focus on the use of these imaging modalities for the assessment of acute and chronic ligamentous and tendon injury. Emphasis will be put on the mechanisms of injury and how they determine the resultant patterns of injury and the imaging appearances.

Active Handout:Andrew J. Grainger

http://abstract.rsna.org/uploads/2018/18001000/Foot&Ankle notesMSSR42B.pdf

MSSR42C Interactive Case Discussion

Participants
Theodore T. Miller, MD, New York, NY (*Presenter*) Nothing to Disclose
Andrew J. Grainger, MRCP, FRCR, Leeds, United Kingdom (*Presenter*) Consultant, Levicept Ltd; Director, The LivingCare Group;

For information about this presentation, contact:

andrewgrainger@nhs.net

LEARNING OBJECTIVES

1) To appreciate common patterns of athletic injury in the knee. 2) To become familiar with the techniques available and imaging appearances of the knee, foot and ankle athletic injury. 3) To consolidate the knowledge gained from the session with interactive cases of lower limb athletic injury.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
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RCA42

From Texture Analysis to Deep Learning for Lesion Characterization (Hands-on)

Wednesday, Nov. 28 10:30AM - 12:00PM Room: S401AB

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Kevin Mader, DPhil,MSc, Basel, Switzerland (*Moderator*) Employee, 4Quant Ltd; Shareholder, 4Quant Ltd
Kevin Mader, DPhil,MSc, Basel, Switzerland (*Presenter*) Employee, 4Quant Ltd; Shareholder, 4Quant Ltd
Barbaros S. Erdal, PhD, Columbus, OH (*Presenter*) Nothing to Disclose
Joshy Cyriac, Basel, Switzerland (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the basic principles of machine learning. 2) Learn what texture analysis is and how to apply it to medical imaging. 3) Understand how to combine texture analysis and machine learning for lesion classification tasks.

ABSTRACT

During this course, an introduction to machine learning and image texture analysis will be provided through hands on examples. Participants will use open source as well as freely available commercial platforms in order to achieve tasks such as image feature extraction, statistical analysis, building models, and validating them. Imaging samples will include both 2D and 3D datasets from a variety of modalities (CT, PET, MR). The course will begin with a brief overview of important concepts and links to more detailed references. The concepts will then be directly applied in visual, easily understood workflows where the participants will see how the images are processed, features and textures are extracted and how publication ready statistics and models can be built and tested.

RCB42

Getting Stuff Done: A Hands-on Technology Workshop to Enhance Personal Productivity (Hands-on)

Wednesday, Nov. 28 10:30AM - 12:00PM Room: S401CD

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

Puneet Bhargava, MD, Seattle, WA (*Moderator*) Nothing to Disclose
Matthew B. Morgan, MD, Sandy, UT (*Presenter*) Consultant, Reed Elsevier
Puneet Bhargava, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Amanda Lackey, MD, Springfield, MO (*Presenter*) Nothing to Disclose
Tarun Pandey, MD, FRCR, Little Rock, AR (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Bhargp@uw.edu

LEARNING OBJECTIVES

1) Introduce the concept of "Getting Things Done.' Learn the concepts of Inbox Zero and other email management techniques. 2) Using tools such as note-taking applications, citation and password managers.3) Using self-inquiry techniques, review how to make meaningful and powerful changes in how we engage with technology.

Active Handout:Puneet Bhargava

http://abstract.rsna.org/uploads/2018/17002645/Productivity Primer RCB42.pdf

Active Handout:Tarun Pandey

http://abstract.rsna.org/uploads/2018/17002645/Pandey_RSNA 2018 Productivity Exercises FINAL RCB22.pdf

Honored Educators

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RCC42

Medical 3D Printing Operations and Applications II

Wednesday, Nov. 28 10:30AM - 12:00PM Room: S501ABC

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.25

Participants
Kenneth C. Wang, MD, PhD, Ellicott City, MD (*Moderator*) Co-founder, DexNote, LLC; Software support, 3D Systems, Inc
Jonathan M. Morris, MD, Rochester, MN (*Moderator*) Nothing to Disclose

Sub-Events

RCC42A Neural Applications of 3D Printing

Participants
Edward P. Quigley III, MD,PhD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

RCC42B Establishing 3D Medical Labs at the VA

Participants
Beth A. Ripley, MD, PhD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand why training in computer technologies such as 3D modeling and 3D printing is increasingly critical to resident training. 2) Learn how to develop methods for instruction in 3D technologies. 3) Identify potential opportunities and resources for resident training.

RCC42C Cardiac Applications in 3D Medical Printing

Participants
Justin R. Ryan, PhD, SAN DIEGO, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the need for 3D printing for congenital heart disease. 2) Describe basic segmentation tools for congenital heart modeling. 3) Describe challenges and possible solutions for common issues in CHD segmentation.

RCC42D 3D Printing in Europe

Participants
Philipp Brantner, MD, Basel, Switzerland (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List several sites that leverage 3D printing in Europe. 2) Describe common use cases of 3D printing in European hospitals. 3) Explain differences in 3D printing in Europe compared to the North Americas.

RCC42E 3D Printing in Craniofacial Surgery

Participants
Jonathan M. Morris, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the Clinical Applications of 3D Printing in Craniomaxillofacial Reconstruction. 2) Discuss Simolation of Rare Events Utilizing 3D Printing. 3) Become familiar with the concept of bio-compatibility and sterilization techniques as they relate to 3D printed parts. 4) Become awere of the varied types of 3D printing technology including benefits and limitations.

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MSRT43

ASRT@RSNA 2018: Radiologist Assistants-Who We Are and How We Can Help

Wednesday, Nov. 28 10:40AM - 11:40AM Room: N230B

OT

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Joann T. Yokley, RRA,BS, Greensboro, NC (*Presenter*) Nothing to Disclose
Vicki Sanders, Wichita Falls, TX (*Presenter*) Nothing to Disclose
Travis N. Prowant, MS, RT, Richmond, VA (*Presenter*) Nothing to Disclose
Wesley Shay, New York, NY (*Presenter*) Nothing to Disclose
Paige Mebus, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mebusp@mskcc.org

LEARNING OBJECTIVES

1) Describe RA education and clinical training. 2) Identify issues with legislation, reimbursement, and supervision. 3) Identify beneficial use of RA in a variety of fluoroscopy exams, interventional procedures, interventional radiology clinic, and breast imaging centers. 4) Explain how the RA is used to enhance overall patient care, provide continuity of care, and maximize efficiency. 5) Show the satisfaction current radiologists have when employing radiologist assistants.

ABSTRACT

As radiologic technologists with advanced training in radiological procedures, image assessment, patient management and assessment, Radiologist Assistants (RAs) are physician extenders specifically designed for the medical imaging environment. RAs practice under the supervision of the radiologist: to perform non-invasive and invasive medical imaging procedures; evaluate, manage, and educate patients; communicate radiologist findings with other members of the healthcare team; and act as patient navigators for the imaging department. Due to RAs' specialized education and training, they maximize efficiency and workflow, provide quality patient care, and maintain high standards of radiation safety.

RCA43

Image to 3D Prints: How 3D Printing Works (Hands-on)

Wednesday, Nov. 28 12:30PM - 2:00PM Room: S401AB

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Beth A. Ripley, MD, PhD, Seattle, WA (*Presenter*) Nothing to Disclose
Tatiana Kelil, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Dmitry Levin, Seattle, WA (*Presenter*) Nothing to Disclose
Anish Ghodadra, MD, New Haven, CT (*Presenter*) Advisory Board, axial3D Limited

For information about this presentation, contact:

beth.ripley2@va.gov

LEARNING OBJECTIVES

1) Describe optimal CT and MRI protocols for 3D printing. 2) Explain basic software requirements for converting DICOM images to 3D-printable .STL (standard tessellation language) files. 3) Recognize some common 3D printing artifacts. 4) Apply basic 3D printed model post-processing techniques learned during the session, including UV curing and support material removal.

Honored Educators

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RCC43

AI, Radiomics, Text Mining, and More: 2018's Key Advances in Imaging Informatics

Wednesday, Nov. 28 12:30PM - 2:00PM Room: S501ABC

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Charles E. Kahn JR, MD, Philadelphia, PA (*Moderator*) Nothing to Disclose
Charles E. Kahn JR, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
William Hsu, PhD, Los Angeles, CA (*Presenter*) Research Grant, Siemens AG

For information about this presentation, contact:

ckahn@upenn.edu

LEARNING OBJECTIVES

1) Identify the year's most important advances in imaging informatics. 2) Describe the ways in which Artificial Intelligence (AI) and machine learning are impacting radiology. 3) Define how radiomics, radiogenomics, and 'big data' have added to our knowledge of radiology.

ABSTRACT

The field of imaging informatics continues to advance rapidly. Machine learning, a form of artificial intelligence (AI), has improved the ability to detect image features, make diagnoses, and assess prognosis from image data. Radiomics - which generates high-dimensionality datasets from radiology images - provides insights to support precision medicine. Novel approaches have improved sharing of images and image-derived findings with patients and clinicians. Current research efforts go beyond pixel data to integrate imaging with other biomedical data, standardize imaging workflows, and improve the quality and utility of image-derived information in clinical practice. This session reviews key advances in imaging informatics research published this past year.

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MSRT44

ASRT@RSNA 2018: Hindsight is 20/20 - The Earliest Appearance of Breast Cancer

Wednesday, Nov. 28 1:00PM - 2:00PM Room: N230B

BR OI

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Rita Gidwaney, MD, San Rafael, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review some of the key imaging features on mammography, tomosynthesis, ultrasound and MRI of detecting early breast cancer. 2) To review common pitfalls in breast imaging and how to avoid them in the future. 3) To be better equipped at handling such hindsight wisdom cases in your own practice.

ABSTRACT

This session will review how our advanced technology can help us detect the earliest signs of breast cancer, using mammography, tomosynthesis, ultrasound and MRI, but also how positioning and technique can play a huge role in cancer detection. We will examine cases and look at the pattern of how pathology develops in the breast, both malignant and benign. Common image aquisition and interpretation pitfalls will be reviewed as well. The session will also discuss ways of evaluating such cases in our practices to achieve the best patient outcomes, in spite of hindsight wisdom.

MSCT41

Case-based Review of Thoracic Radiology (Interactive Session)

Wednesday, Nov. 28 1:30PM - 3:00PM Room: S406A

CH CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Diana Litmanovich, MD, Haifa, Israel (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify CT features of benign solitary pulmonary nodules. 2) List morphologic features of solitary nodules that suggest malignancy. 3) Review current recommendations for management of incidentally-detected small lung nodules. 4) Recognize common mechanisms of intrathoracic metastatic spread with focus on pulmonary metastases. 5) Familiarize with pertinent imaging features and patterns of metastatic disease on CT. 6) Illustrate how to narrow the differential diagnosis regarding the primary site of malignancy. 7) Assess utility of imaging findings for diagnosis, prognosis and directing therapy of metastatic disease. 8) Describe intrathoracic calcification by location and identify those with characteristic morphology. 9) Identify signs of malignant pleural disease on CT examinations.

ABSTRACT

Solitary pulmonary nodules are among the most common diagnostic problems facing radiologists who interpret chest CT examinations. This component of the course will review technical considerations of CT of lung nodules, the characteristics of benign nodules and those CT features of SPNs that are concerning for malignancy. The evidence-based approach to small nodules detected incidentally on chest CT examinations will be reviewed, with a focus on the 2017 Fleischner Society guidelines for management of these lesions. Metastatic disease to the thorax is commonly encountered in clinical practice and can have a wide range of imaging manifestations. CT is typically used to detect the abnormality, guide diagnostic procedures and therapy, as well as assess treatment response. This presentation will review cases that illustrate main pathological mechanisms of metastatic spread to the chest, and imaging patterns on CT, characteristic for specific categories of primary malignancies, with focus on pulmonary metastases. Prognostic implications and available therapeutic options will be reviewed. Intrathoracic calcification is most often the result of prior granulomatous infection. Other intrathoracic calcifications will be presented by location: solitary pulmonary nodule, multiple pulmonary nodules, diffuse parenchymal involvement, lymph node and pleura. The differential diagnosis includes malignant, metabolic, occupational, and idiopathic causes often with subtle differences in morphology that can be used to correctly diagnose these conditions. Malignant pleural disease can manifest as an isolated pleural effusion, a pleural effusion with uneven pleural thickening or more rarely by presence of isolated small pleural nodules, which is named dry pleural dissemination

Sub-Events

MSCT41A Many Faces of Pulmonary Nodule

Participants
Jeffrey S. Klein, MD, Burlington, VT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jklein@rsna.org

LEARNING OBJECTIVES

1) Identify CT features of benign solitary pulmonary nodules. 2) List morphologic features of solitary nodules that suggest malignancy. 3) Review current recommendations for management of incidentally-detected small lung nodules. 4) Recognize common mechanisms of intrathoracic metastatic spread with focus on pulmonary metastases. 5) Familiarize with pertinent imaging features and patterns of metastatic disease on CT. 6) Illustrate how to narrow the differential diagnosis regarding the primary site of malignancy. 7) Assess utility of imaging findings for diagnosis, prognosis and directing therapy of metastatic disease. 8) Describe intrathoracic calcification by location and identify those with characteristic morphology. 9) Identify signs of malignant pleural disease on CT examinations.

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thickening or more rarely by presence of isolated small pleural nodules, which is named dry pleural dissemination

MSCT41B Many Faces of Metastatic Diseases to the Chest

Participants
Maya Galperin-Aizenberg, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Maya.Galperin-Aizenberg@uphs.upenn.edu

LEARNING OBJECTIVES

1) Identify CT features of benign solitary pulmonary nodules. 2) List morphologic features of solitary nodules that suggest malignancy. 3) Review current recommendations for management of incidentally-detected small lung nodules. 4) Recognize common mechanisms of intrathoracic metastatic spread with focus on pulmonary metastases. 5) Familiarize with pertinent imaging features and patterns of metastatic disease on CT. 6) Illustrate how to narrow the differential diagnosis regarding the primary site of malignancy. 7) Assess utility of imaging findings for diagnosis, prognosis and directing therapy of metastatic disease. 8) Describe intrathoracic calcification by location and identify those with characteristic morphology. 9) Identify signs of malignant pleural disease on CT examinations.

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MSCT41C Many Faces of Thoracic Calcifications

Participants
Cristopher A. Meyer, MD, Madison, WI (*Presenter*) Investor, Elucent Medical; Consultant, NIOSH Certified B-reader

For information about this presentation, contact:

cmeyer2@uwhealth.org

LEARNING OBJECTIVES

1) Identify the cause of diffuse lung parenchymal calcification based on morphology and distribution. 2) Describe the differential diagnosis for calcified mediastinal lymph nodes. 3) Be familiar with the entities of pleural plaque and pseudo-plaque in occupational exposure.

MSCT41D Many Faces of Pleural Disease

Participants
Marie-Pierre Revel, Paris, France (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify CT features of benign solitary pulmonary nodules. 2) List morphologic features of solitary nodules that suggest malignancy. 3) Review current recommendations for management of incidentally-detected small lung nodules. 4) Recognize common mechanisms of intrathoracic metastatic spread with focus on pulmonary metastases. 5) Familiarize with pertinent imaging features and patterns of metastatic disease on CT. 6) Illustrate how to narrow the differential diagnosis regarding the primary site of malignancy. 7) Assess utility of imaging findings for diagnosis, prognosis and directing therapy of metastatic disease. 8) Describe intrathoracic calcification by location and identify those with characteristic morphology. 9) Identify signs of malignant pleural disease on CT examinations.

MSES43

Essentials of Pediatric Imaging

Wednesday, Nov. 28 1:30PM - 3:00PM Room: S100AB

GI GU MK PD

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

MSES43A Pediatric Abdominal Radiography

Participants
Steven J. Kraus, MD, Cincinnati, OH (*Presenter*) Author, Reed Elsevier

For information about this presentation, contact:

steven.kraus@cchmc.org

LEARNING OBJECTIVES

1) Have an alternative, organized approach to the interpretation of the abdominal radiograph in children. 2) Detect abnormalities of the abdomen on radiographs that may not have been detected previously. 3) Have a practical differential diagnosis of abnormalities detected on abdominal radiographs in children.

ABSTRACT

Abdominal imaging in children today is very sophisticated, with advances in techniques that do not involve exposure to radiation such as Ultrasonography (US) and Magnetic Resonance Imaging (MRI), as well as techniques which do expose children to radiation, namely Computed Tomography (CT). However, with all the advances in radiologic imaging techniques today, the most commonly performed abdominal imaging exam in a large academic children's hospital is the abdominal radiograph. However, if one would poll pediatric radiologists or even general radiologists today, one would probably find that the abdominal radiograph is the least favorite exam to interpret and most radiologists would probably admit that it is the hardest exam to interpret well. Cross sectional imaging such as US, MRI, and CT are so much easier because of the detailed anatomy in 3 dimensions, 4 for US if watching real-time US clips. An organized approach to the interpretation of the abdominal radiograph with a thorough knowledge of the pathologic processes of different age groups and patient demographics is very helpful in arriving at a diagnosis or differential diagnosis in many cases and can be helpful to the referrring physicians of both inpatients and outpatients alike.

MSES43B Congenital Renal Anomalies

Participants
Katharine L. Hopkins, MD, Portland, OR (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Name ten categories of congenital renal anomaly that are likely to be encountered in general radiology practice. 2) Identify the distinguishing imaging features of up to three congenital renal anomalies in each category. 3) Develop appropriate strategies for management and follow-up of congenital renal anomalies.

MSES43C Complications of Pediatric Fractures

Participants
Arthur B. Meyers, MD, Orlando, FL (*Presenter*) Author with royalties, Reed Elsevier; Editor with royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Identify the direct and indirect imaging findings of physeal bridge formation. 2) Calculate the percentage of physeal involvement of a bridge on MRI. 3) List the indications for treatment of physeal bridges.

ABSTRACT

Fractures in skeletally immature children often involve the physis. These injuries can lead to osseous bridge formation across the physis that may cause longitudinal growth disturbances or angular deformities leading to substantial disability. Risk factors for bridge formation after an injury include: the severity of the injury, the child's growth potential, the anatomic site of the fracture and the type of fracture. Complications arising from bridge formation depend upon the location of the bridge within the physis and the anatomic location within the pediatric skeleton. Imaging of children after physeal injury is important for the diagnosis of growth arrest and for the characterization of the size and location of physeal bridges for treatment planning. There is also an important role for imaging in the evaluation of complications caused by physeal bridges and in the post treatment evaluation of these children.

MSES43D Imaging Tumors of Pediatric Spine

Participants
Laura L. Hayes, MD, Pensacola, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

laura.hayes@nemours.org

laura.hayes@nemours.org

LEARNING OBJECTIVES

1) To be able to identify and classify tumors of the pediatric spine. 2) To understand how to use and apply the knowledge gained by using advanced imaging techniques to study the pediatric spine in the setting of malignancy.

ABSTRACT

There are a wide variety of tumors involving the pediatric spine. In this session, we will review the types and imaging appearances of spinal lesions. Special attention will be given to the use of diffusion-weighted imaging of the spine in these children.

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MSRO43

BOOST: Pediatric CNS Tumors and Diagnostic Dilemmas after Radiation Therapy (Interactive Session)

Wednesday, Nov. 28 1:30PM - 2:30PM Room: S103CD

NR PD RO

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Edward Y. Kim, MD, Seattle, WA (*Moderator*) Nothing to Disclose
Kenneth Wong, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Benita Tamrazi, MD, South Pasadena, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kewong@chla.usc.edu

LEARNING OBJECTIVES

1) Discuss the basic epidemiology, diagnostic workup, and evaluation of a child with a suspected CNS tumor. 2) Select and apply the different therapeutic alternatives in radiation therapy delivery for pediatric CNS cancers. 3) Identify advanced imaging modalities to resolve diagnostic dilemmas after radiation therapy for pediatric CNS tumors.

MSSR43

RSNA/ESR Sports Imaging Symposium: Musculoskeletal Interventional Procedures (Interactive Session)

Wednesday, Nov. 28 1:30PM - 3:00PM Room: E352

ER IR MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Laura W. Bancroft, MD, Orlando, FL (*Moderator*) Author with royalties, Wolters Kluwer nv; Speaker, World Class CME; Editor, Thieme Medical Publishers, Inc; Travel support, Thieme Medical Publishers, Inc ; ;
Andrew J. Grainger, MRCP, FRCR, Leeds, United Kingdom (*Moderator*) Consultant, Levicept Ltd; Director, The LivingCare Group;

Sub-Events

MSSR43A Diagnostic and Therapeutic Injections in the Athlete: Pearls and Pitfalls

Participants
Philippe A. Peetrons, MD, Brussels, Belgium (*Presenter*) Research Consultant, Canon Medical Systems Corporation

LEARNING OBJECTIVES

1) To become familiar with the most common requests and indications for sports-related injuries. 2) The learn about technical considerations for performing MSK injections. 3) To understand reasons to delay injections or avoid certain injectables.

ABSTRACT

The main pitfall is from far an mistake in the diagnosis done before sending the patient to the ultrasound guided treatment. Good examination and looking carefully to the examinations done before is mandatory. Among pearls, some innovative technique for injecting will be shown, such as Trapezo-metacarpal joint, sternoclavicular joint, Morton's neuroma, subtalar joint, hip and shoulder joints, carpal tunnel and de Quervain tenosynovitis. Treatment of nerve injuries will also be depicted and illustrated. Some tips will be given for ganglia tretment

MSSR43B Injectables, Percutaneous Tendon Fenestration and Tenotomy: Clinical Outcomes and Current Evidence

Participants
Jon A. Jacobson, MD, Ann Arbor, MI (*Presenter*) Research Consultant, BioClinica, Inc; Advisory Board, General Electric Company; Advisory Board, Koninklijke Philips NV; Royalties, Reed Elsevier

For information about this presentation, contact:

jjacobsn@umich.edu

LEARNING OBJECTIVES

1) To be aware of the indications and benefits of available injectables used to treat sports-related injuries. 2) To learn about technical considerations for performing tendon fenestration and tenotomy. 3) To become familiar with current evidence on results of MSK procedures in the literature.

Honored Educators

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MSSR43C Interactive Case Discussion

Participants
Philippe A. Peetrons, MD, Brussels, Belgium (*Presenter*) Research Consultant, Canon Medical Systems Corporation
Jon A. Jacobson, MD, Ann Arbor, MI (*Presenter*) Research Consultant, BioClinica, Inc; Advisory Board, General Electric Company; Advisory Board, Koninklijke Philips NV; Royalties, Reed Elsevier

For information about this presentation, contact:

jjacobsn@umich.edu

LEARNING OBJECTIVES

1) To learn the targeted approach to injecting joints, ligaments, tendons and tendon sheaths. 2) To appreciate pitfalls to avoid in MSK procedures for treatment of sports-related injuries. 3) To understand evidence-based data on various MSK procedures in order to give patients realistic expectations after treatment.

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SPHA41

Hospital Administrators Symposium

Wednesday, Nov. 28 1:30PM - 4:50PM Room: S105AB

HP LM SQ

ARRT Category A+ Credits: 4.00
AMA PRA Category 1 Credits ™: 3.25

Participants
Gregory N. Nicola, MD, River Edge, NJ (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Cover a broad range of topics geared towards phyician and non-phyician hospital administrators ranging from regulatory to operational.

Sub-Events

SPHA41A Putting the Patient First in the Radiology Department

Participants
Keith D. Hentel, MD, MS, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

keh9003@med.cornell.edu

LEARNING OBJECTIVES

1) Identify potential benefits of putting patients first in the radiology department. 2) Apply new techniques and develop programs to enhance the patient experience.

ABSTRACT

Patient experience is an important part of patient centered care and increasingly important from a reimbursement perspective. Using the patient experience as a framework for operations, practices may improve operational efficiency as well as improve the value of the care provided. Examples of such efforts will be provided to illustrate how such a framework may be useful.

SPHA41B Implementing Advanced Imaging Decision Support in the Ambulatory Setting

Participants
Robert Cooke, Redding, CT (*Presenter*) Vice President, National Decision Support Company

SPHA41C Hospital Consolidation and Quality of Care

Participants
David J. Seidenwurm, MD, Carmichael, CA (*Presenter*) Shareholder, Sutter Medical Group ; Shareholder, RASMG Medical Group ; Director, RASMG Medical Group; Expert Witness, Medical Legal

LEARNING OBJECTIVES

1) Understand vertical integration. 2) Understand degrees of integration. 3) Understand the positive impact of vertical integration on quality.

ABSTRACT

Vertical integration among clinicians, payers and facilities offer opportunities to improve value in healthcare. Factors including simpler customer experience, narrow networks with aligned incentives, transparent information flows, improved patient satisfaction may contribute. Objective demonstrations of improved quality with vertical integration at the plan level suggest that this is an empirically verifiable phenomenon, not just a theoretical possibility.

SPHA41D Q&A

Participants
David J. Seidenwurm, MD, Carmichael, CA (*Presenter*) Shareholder, Sutter Medical Group ; Shareholder, RASMG Medical Group ; Director, RASMG Medical Group; Expert Witness, Medical Legal
Robert Cooke, Redding, CT (*Presenter*) Vice President, National Decision Support Company
Keith D. Hentel, MD, MS, New York, NY (*Presenter*) Nothing to Disclose

SPHA41E Quality Payment Program Little Known Facts

Participants
Wendy Lomers, MBA, Longview, TX (*Presenter*) Principal, Acclaim Radiology Management

LEARNING OBJECTIVES

1) To become aware of subtleties in the MIPS program allowing them to better understand MIPS reporting options and scoring

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SPHA41F Operational Decisions Necessary for an Effective Endovascular Stroke Program

Participants
Ramon G. Gonzalez, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the physiological changes that occur in acute stroke patients with large vessel occlusions. 2) Identify the most important variables needed to select ischemic stroke patients for endovascular thrombectomy. 3) Know the most reliable neuroimaging methods to identify the key stroke variables needed for interventional triage. 4) Review the available options for creating a hub and spoke endovascular stroke program.

SPHA41G Operationalizing Culture of Safety: Moving from Concept to Reality

Participants
Jennifer C. Broder, MD, Burlington, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jennifer.c.broder@lahey.org

LEARNING OBJECTIVES

1) List activities that help managers implement Just Culture. 2) Identify opportunities for frontline staff to engage in patient safety activities. 3) Describe how leadership can demonstrate commitment to improving patient safety.

ABSTRACT

Establishing a strong 'culture of safety' is integral to providing high quality and safe care, but how do you really make that happen in your department? This session will move beyond theory to share practical activities that can be implemented to establish and reinforce patient safety as a primary goal. Active practice of Just Culture, engagement of frontline staff, and visibility of leadership commitment to patient safety will be discussed.

SPHA41H Q&A

Participants
Ramon G. Gonzalez, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose
Jennifer C. Broder, MD, Burlington, MA (*Presenter*) Nothing to Disclose
Wendy Lomers, MBA, Longview, TX (*Presenter*) Principal, Acclaim Radiology Management

VSIO41

Interventional Oncology Series: Colon and Neuroendocrine Liver Mets

Wednesday, Nov. 28 1:30PM - 6:00PM Room: S405AB

GI IR RO

AMA PRA Category 1 Credits ™: 4.00
ARRT Category A+ Credits: 5.00

FDA Discussions may include off-label uses.

Participants
Sarah B. White, MD,MS, Philadelphia, PA (*Moderator*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, BSC; Consultant, Cook Group Incorporated
Constantinos T. Sofocleous, MD, PhD, New York, NY (*Moderator*) Consultant, General Electric Company; Consultant, Johnson & Johnson; Consultant Terumo; ; Research Support: BTG, Ethicon J&J; ; ;

LEARNING OBJECTIVES

1) Defining the role and timing of LDT in the care of patients with liver dominant metastatic neuroendocrine. 2) Determining the appropriate pre-procedural work-up for patients undergoing LDT and absolute contraindications. 3) Understand the complications and adverse events that can occur due to LDT.

Sub-Events

VSIO41-01 Surgical Resection for Colorectal Liver Metastases

Wednesday, Nov. 28 1:30PM - 1:50PM Room: S405AB

Participants
Robert E. Roses, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

VSIO41-02 Ablation for Colorectal Liver Metastases

Wednesday, Nov. 28 1:50PM - 2:10PM Room: S405AB

Participants
Constantinos T. Sofocleous, MD, PhD, New York, NY (*Presenter*) Consultant, General Electric Company; Consultant, Johnson & Johnson; Consultant Terumo; ; Research Support: BTG, Ethicon J&J; ; ;

For information about this presentation, contact:

sofoclec@mskcc.org

LEARNING OBJECTIVES

- Optimal Use of Ablation in the treatment of colon cancer liver metastases- Evidence based use of thermal ablation- Review of recent literature and guidelines- Clinical and technical Considerations- Impact of Technique on outcomes- Comparisons to surgery- Genetic consideration in ablation technique- Alternative image guided therapies when Ablation with margins is not feasible

VSIO41-03 The Role of MicroRNA-196a-5p/IκBa/NFKB in Transitional Area Tumor Rapid Progress After Radiofrequency Ablation of Colorectal Liver Metastases and Mechanism Research

Wednesday, Nov. 28 2:10PM - 2:20PM Room: S405AB

Participants
He Xin, Shenyang, China (*Presenter*) Nothing to Disclose

PURPOSE

To research the mechanism of the transitional area tumor rapid:progress after radiofrequency ablation of colorectal liver metastases.

METHOD AND MATERIALS

1. Establish a single metastatic colon cancer model in BALB/c nude mice liver, draw materials after RFA. 2. The basis express of miR-196a in different CRC cells; The influence of miR-196a to proliferation,migration and EMT of CRC cells; The influence of NF-KB to EMT of CRC cells; MiR-196a impacts migration of CRC cells through NF-KB.

RESULTS

High expression of the miR-196a in the experimental group of animal model; In the cell experiment, high expression of the miR-196a in the CRC cells, miR-196a promotes proliferation,migration and EMT of CRC cells, we verify the targeted relationship of miR-196a and IKBA by Dual-Luciferase, MiR-196a promotes migration of CRC cells through NF-KB.

CONCLUSION

We verify that MicroRNA-196a-5p/IKBA/NFKB promotes transitional area tumor rapid:progress after radiofrequency ablation of

We verify that MicroRNA-196a-5p/IKBA/NFKB promotes transitional area tumor rapid:progress after radiofrequency ablation of colorectal liver metastases, this project research results will help to reveal the core factor of the transitional area tumor rapid:progress after RFA of colorectal liver metastases, put forward targeted intervention treatment method and targets, it has great significance to improve the overall prognosis and survival rate of colorectal cancer liver metastases.

CLINICAL RELEVANCE/APPLICATION

This project research results will help to reveal the core factor of the transitional area tumor rapid:progress after RFA of colorectal liver metastases, put forward targeted intervention treatment method and targets, it has great significance to improve the overall prognosis and survival rate of colorectal cancer liver metastases.

VSIO41-04 SBRT for Colorectal Liver Metastases

Wednesday, Nov. 28 2:20PM - 2:50PM Room: S405AB

Participants
Mary U. Feng, MD, San Francisco, CA (*Presenter*) Self: Consultant, Varian, Inc and RefleXion Medical Inc; Spouse (Felix Feng, MD), Advisory Boards Dendreon, Janssen, Bayer, Sanofi, Ferring, EMD Serono, Medivation/Astellas, Blue Earth Diagnostics, Progenics; Spouse, honorarium Clovis

For information about this presentation, contact:

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LEARNING OBJECTIVES

To review outcomes for SBRTTo describe the logistics of SBRTTo describe the patient experience with SBRT

VSIO41-05 Comparing Survival Outcomes of Radioembolization for Liver Metastases from Right versus Left-Sided Colon Cancer

Wednesday, Nov. 28 2:50PM - 3:00PM Room: S405AB

Participants
Ronald A. Mora, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Ahmed Gabr, MD, MBBCh, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Rehan Ali, MBBS, Forest Park, IL (*Abstract Co-Author*) Nothing to Disclose
Ali Al Asadi, BS, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Samdeep Mouli, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Ahsun Riaz, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Riad Salem, MD, MBA, Chicago, IL (*Abstract Co-Author*) Research Consultant, BTG International Ltd; Research Grant, BTG International Ltd; Consultant, Eisai Co, Ltd; Consultant, Exelixis, Inc; Consultant, Bristol-Myers Squibb Company; Consultant, Dove;
;
Robert J. Lewandowski, MD, Chicago, IL (*Abstract Co-Author*) Consultant, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Advisory Board, ABK Biomedical Inc; Advisory Board, Accurate Medical; Consultant, C. R. Bard, Inc;

For information about this presentation, contact:

ronald.mora@northwestern.edu

PURPOSE

Advanced stage presentation with earlier hepatic metastases and worse prognosis has been reported for right-sided colorectal carcinoma (CRC) compared to left-sided CRC. In this study, we aimed to compare survival outcomes in patients with left vs. right-sided metastatic colorectal cancer (mCRC) to the liver treated with Yttrium-90 radioembolization (Y90).

METHOD AND MATERIALS

With IRB approval, we searched our prospectively acquired database for patients with mCRC to the liver treated with glass microsphere radioembolization between 2003-2014. Overall survival (OS) was calculated from the dates of primary colon cancer diagnosis, development of hepatic metastasis and Y90 treatment. Survival plots were estimated using Kaplan-Meier Method. Log-rank test was used to compare the survival of right vs left-sided mCRC

RESULTS

120 patients had left-sided CRC and 61 had right-sided CRC. Mean age was 59 (95% CI: 57-61) years in left sided vs. 62 (95% CI 60-66) in right sided mCRC patients (P= 0.04). There was no statistical difference in time to development of hepatic metastases among left sided (15 months) vs. right sided (16 months) mCRC (P=0.1). There was a significant difference in time from date of liver metastases to Y90 for left sided (21 months) vs. right sided (13 months) (P=0.002). OS (95%CI) from date of diagnosis of primary CRC was 53 (47-63) vs. 37 (26-66) months for left and right mCRC respectively (P=0.1). OS (95%CI) from the time of development of hepatic metastasis was 48 (39-54) months for left sided vs. 24 (20.6-40.5) months for right sided CRC (P= 0.0093). OS (95%CI) from the date of first Y90 treatment was 14 (10.6-16) and 8.6 (4.5-14.3) months for the left and right mCRC, respectively (P=0.06). In patients with tumor burden <25%, median OS (95%CI) was 14.5 (13-22.5) and 11.5 (5.5-20) months for left and right mCRC respectively (P=0.2).

CONCLUSION

There is significant clinical interest in outcomes of mCRC depending on side of origin. Given the limitations of lead-time bias, as well as the possibility of an underpowered analysis, we are unable to demonstrate an OS difference from Y90 by side. Further work is underway.

CLINICAL RELEVANCE/APPLICATION

OS benefits may be demonstrated if earlier diagnoses of mCRC is made and there may be possibility of survival difference due to radioembolization depending on the site of origin.

VSIO41-06 PRO: Y90 Only in Salvage Setting. My Data Do Not Support Earlier Administration Outside of a Clinical Trial!

Wednesday, Nov. 28 3:00PM - 3:20PM Room: S405AB

Participants
James Thomas, MD, Milwaukee, WI (*Presenter*) Nothing to Disclose

VSIO41-07 CON: Y90 Can Be Given in Earlier Line in Selected Patients: Choosing Your Data!

Wednesday, Nov. 28 3:20PM - 3:40PM Room: S405AB

Participants
Robert J. Lewandowski, MD, Chicago, IL (*Presenter*) Consultant, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Advisory Board, ABK Biomedical Inc; Advisory Board, Accurate Medical; Consultant, C. R. Bard, Inc;

For information about this presentation, contact:

r-lewandowski@northwestern.edu

LEARNING OBJECTIVES

1) Review contemporary data for radioembolization in mCRC. 2) Understand potential benefits of combining systemic therapy + radioembolization. 3) Consider scenarios where radioembolization may be useful early in disease course for mCRC.

VSIO41-08 Discussion/Rebuttal

Wednesday, Nov. 28 3:40PM - 4:00PM Room: S405AB

VSIO41-09 Survival of Patients with Non-Resectable, Chemotherapy-Resistant Colorectal Liver Metastases Undergoing Conventional Lipiodol-Based Transarterial Chemoembolization (cTACE) Prior to Thermal Ablation: Palliative versus Neoadjuvant Intention

Wednesday, Nov. 28 4:00PM - 4:10PM Room: S405AB

Participants
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Presenter*) Nothing to Disclose
Maximilian Lahrsow, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Tatjana Gruber-Rouh, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Nour-Eldin A. Nour-Eldin, MD,PhD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Nagy N. Naguib, MD, MSc, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

T.Vogl@em.uni-frankfurt.de

PURPOSE

To determine overall (OS) and progression-free survival (PFS) for conventional transarterial chemoembolization (cTACE) alone and in combination with percutaneous thermal ablation in patients with non-resectable, chemotherapy-resistant colorectal cancer liver metastases (CRLM).

METHOD AND MATERIALS

The study included 452 patients undergoing 2,654 repetitive conventional transarterial chemoembolization (cTACE) treatments of CRLM. 233 patients had palliative treatment using only cTACE, and 219 patients had neoadjuvant treatment with cTACE and subsequent thermal ablation (either microwave ablation or laser-induced thermotherapy). The chemotherapeutic agents used in either single, double or triple combination included Mitomycin C, Gemcitabine, Irinotecan, and Cisplatin. Several factor were analyzed to determine their prognositc value regarding OS and PFS.

RESULTS

Palliative use of cTACE resulted in a median OS and PFS of 12.6 and 5.9 months, whereas the neoadjuvant use of cTACE showed a median OS and PFS of 25.8 and 10.8 months, respectively. The differences in OS and PFS between the two groups were statistically significant ($p<0.001$). Extrahepatic metastases were a significant prognostic factor in OS and PFS of the palliative and neoadjuvant group. In addition, number, location, and mean size of metastases were significant prognostic factors for OS and PFS in the neoadjuvant group. Sex, primary tumor location, T- and N-parameters of the TNM staging system, time of appearance of liver metastases, ablation method, and patient age did not have a significant impact on OS and PFS in either patient group. The most distinct response to cTACE was observed in metastases that were treated with a triple combination of chemotherapy ($p=0.021$).

CONCLUSION

cTACE is an effective treatment option in advanced non-resectable CRLM. Chemoembolization followed by ablation further increases survival rates. A triple combination of chemotherapy improves response to cTACE.

CLINICAL RELEVANCE/APPLICATION

Triple combination of chemotherapy in cTACE followed improves the clinical outcome of patients with CRLM in both the neoadjuvant and palliative group.

VSIO41-10 Systemic Therapies for NET

Wednesday, Nov. 28 4:30PM - 4:50PM Room: S405AB

Participants
Emily Bergsland, MD, San Francisco, CA (*Presenter*) Institutional research support, Lexicon Pharmaceuticals, Inc Institutional research support, Merck & Co, Inc Institutional research support, Novartis AG Consultant, Ipsen SA Consultant, Lexicon Pharmaceuticals, Inc

LEARNING OBJECTIVES

1) Review the epidemiology and classification of gastroenteropancreatic neuroendocrine tumors (GEPNETS). 2) Discuss the value of somatostatin analogs for the treatment of GEPNETS. 3) Summarize the role of additional systemic treatment options, including peptide receptor radionuclide therapy, for metastatic GEPNETs. 4) Examine commonly applied treatment algorithms for advanced GEPNETS.

VSIO41-11 PRRT for NET

Wednesday, Nov. 28 4:50PM - 5:10PM Room: S405AB

Participants
Lisa Bodei, MD, PhD, New York, NY (*Presenter*) Consultant, AAA; Consultant, Ipsen SA; Speaker, AAA

LEARNING OBJECTIVES

On successful completion of this activity, participants should be able to describe (A) the technique, efficacy and tolerability profile of Peptide Receptor Radionuclide Therapy (PRRT) with 177Lu-DOTATATE therapy in neuroendocrine tumors (NETs); (B) the role and appropriate use of PRRT in NET management; and (C) special uses of PRRT and new perspectives.

VSIO41-12 High-Quality Imaging and Dosimetry of Yttrium-90 (90Y) Radioembolization Using a SiPM-Based PET/CT Scanner

Wednesday, Nov. 28 5:10PM - 5:20PM Room: S405AB

Participants
Heying Duan, Stanford, CA (*Presenter*) Nothing to Disclose
Mohamed H. Khalaf, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Lucia Baratto, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Daniel Y. Sze, MD, PhD, Stanford, CA (*Abstract Co-Author*) Consultant, Amgen Inc; Consultant, AstraZeneca PLC; Consultant, Bristol-Myers Squibb Company; Consultant, BTG International Ltd; Consultant, Eisai Co, Ltd; Consultant, Embolx, Inc; Consultant, W. L. Gore & Associates, Inc; Consultant, Johnson & Johnson; Consultant, Terumo Corporation; Medical Advisory Board, Boston Scientific Corporation; Medical Advisory Board, Koli Medical; Medical Advisory Board, Radguard Medical, Inc; Shareholder, Confluent Medical; Shareholder, Proteus Digital Health
Shyam Srinivas, MD, PhD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Andrei Iagaru, MD, Emerald Hills, CA (*Abstract Co-Author*) Research Grant, General Electric Company

For information about this presentation, contact:

heying@stanford.edu

PURPOSE

Yttrium-90 radioembolization (RE) is a treatment modality for hepatic malignancies. Personalized dosimetry aims for maximum treatment and low toxicity. Dose calculation methods are based on empirical evidence with regards to efficacy and safety, but do not take radiation absorbed dose in tumor or normal liver tissue into account. We assessed the accuracy for distribution and dosimetry and compared absorbed dose in tumor and normal liver tissue in pre- and post-therapy imaging. Furthermore, image quality of 90Y post RE scans using a SiPM-based PET/CT was compared to standard of care pre-therapy 99mTc MAA SPECT/CT.

METHOD AND MATERIALS

We analyzed 99mTc MAA SPECT/CT and 90Y PET/CT images using SurePlan (MIM) software. Tumor volume and normal liver tissue were contoured on the pre-therapy diagnostic CT and then registered to 99mTc MAA SPECT/CT and 90Y PET/CT respectively. Image quality was evaluated using the 5-point Likert scale by two experienced nuclear medicine physicians.

RESULTS

Eleven patients were treated with a median administered activity of 2.73 GBq. Mean tumor dose in 99mTc MAA SPECT/CT was 81.8 Gy versus 83.82 Gy in 90Y PET/CT. There was no significant difference between Tumor-SPECT/CT and Tumor-90Y PET/CT doses ($t = -.335$, $p=0.740$). On average, Tumor-SPECT/CT scores were 2 Gy lower than tumor-90Y PET/CT doses (95% CI [-20, 15]). For normal liver tissue, a mean dose of 26.8 Gy was found in the 99mTc MAA SPECT/CT images and 18.6 Gy for 90Y PET/CT ($t= 1.260$, $p=0.236$). On average, normal liver tissue doses in 99mTc MAA SPECT/CT were 8 Gy higher than 90Y PET/CT doses (95% CI [-6, 22]). For 90Y PET/CT imaging, the best image quality was found at 20 min scan time (Likert-Scale 4.5 ± 0.5) vs. 15 min Likert-Scale 4 ± 0.6 and 10 min Likert-Scale 2 ± 0.6.

CONCLUSION

Our preliminary data show excellent image quality from digital 90Y PET/CT at a reduced scan time of 20 minutes. MIM software computed no significant divergent tumor or normal liver tissue doses for 99mTc MAA SPECT/CT or 90Y PET/CT. However, more patients have to be evaluated to confirm these findings. The faster imaging time may allow for inclusion of 90Y PET/CT in routine clinical workflows.

CLINICAL RELEVANCE/APPLICATION

The faster imaging time on digital 90Y PET/CT with excellent image quality may allow inclusion of it in routine clinical workflows.

VSIO41-13 Arterially Directed Therapy for Metastatic Neuroendocrine Tumor

Wednesday, Nov. 28 5:20PM - 5:40PM Room: S405AB

Participants
Sarah B. White, MD,MS, Philadelphia, PA (*Presenter*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, BSC; Consultant, Cook Group Incorporated

LEARNING OBJECTIVES

The objective of this lecture is improve knowledge of mNET patients in the following areas: I. Initial clinical assessment a. Optimal imaging modalities i. CT vs. MRI b. Eligibility for and timing of liver directed therapy i. ECOG status, % tumor burden, tumor vascularity ii. Bilioenteric manipulation II. Conventional Transarterial Chemoembolization (cTACE) a. Drug/oil emulsion with particle embolic III. Drug Eluting Bead Transarterial Chemoembolization (DEB-TACE) a. Micron sized beads loaded with Doxorubicin IV. Radioembolization a. Safety and efficacy b. Complications V. Post treatment care and follow-up a. Post-embolization syndrome i. Clinical management b. Timing of follow-up imaging

VSIO41-14 Tumor Board Cases

Wednesday, Nov. 28 5:40PM - 6:00PM Room: S405AB

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104th Scientific Assembly and Annual Meeting
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MSRT45

ASRT@RSNA 2018: CT Colonography - The New Kid on the Block

Wednesday, Nov. 28 2:20PM - 3:20PM Room: N230B

CT GI

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Travis N. Prowant, MS, RT, Richmond, VA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the vital role of CT Colonography (CTC) in colorectal cancer screening for the US population. 2) Explain aspects and procedural details of a single-center CTC program managed by a radiologist assistant. 3) Examine departmental resources required to establish and develop a CTC program. 4) Justify the use of a radiologist assistant to enhance involvement of radiologists in being at the forefront of colorectal screening in a safe, efficient and cost-effective manner.

ABSTRACT

Although technically not new in terms of how long CT Colonography (CTC) has been performed, it is potentially new to the procedural realm of the Radiologist Assistant (RA). Through routine practice analysis of Radiologist Assistant work in the United States, a variety of common fluoroscopic examinations have been identified as less commonly performed in recent years such as the barium enema, which has traditionally been considered the "gold standard" for colon screening in Radiology. In 2016, the US Preventive Services Task Force approved CTC as a colorectal screening option available to patients in what was viewed as a truly under-utilized preventive health strategy. To that end, the American Gastroenterological Association, the American College of Radiology and the American Cancer Society have also approved CTC use with equivalent sensitivity to optical colonoscopy for detecting significant colorectal polyps or cancers. CTC is a minimally invasive, patient-centric, low-dose CT examination of the colon that can be performed without the use of sedation and minimal risk of perforation or side effect and has been proven to increase adherence rates and attracts more patients that may have otherwise not chosen to get screened. As a physician extender that can safely and successfully perform and manage the CTC from start to finish, the Radiologist Assistant is uniquely poised to enhance the patient experience and, in the meantime, allow the radiologist to tend to critical interpretations and other physician-specific duties. The Radiologist Assistant can be a vital part of colorectal screening programs around the country. Involve one today!

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RCA44

Advanced AI Tools for Radiologist-driven Mining of Imaging and Hospital-based Data Sets for Developing and Testing Hypothesis from Clinical Practice (Hands-on)

Wednesday, Nov. 28 2:30PM - 4:00PM Room: S401AB

AI IN RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

FDA Discussions may include off-label uses.

Participants
Jaron Chong, MD, Montreal, QC (*Moderator*) Nothing to Disclose
Dimitris Mitsouras, PhD, Boston, MA (*Moderator*) Research Grant, Canon Medical Systems Corporation;
An Tang, MD, Montreal, QC (*Presenter*) Research Consultant, Imagia Cybernetics Inc; Speaker, Siemens AG; Speaker, Eli Lilly and Company
Leonid Chepelev, MD, PhD, Ottawa, ON (*Presenter*) Nothing to Disclose
Adnan M. Sheikh, MD, Ottawa, ON (*Presenter*) Nothing to Disclose
Betty Anne Schwarz, PhD, Ottawa, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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dmitsouras@alum.mit.edu

LEARNING OBJECTIVES

1) Understand how to use NLP based tools in the clinical setting. 2) Interact with the AI to improve its training potential. 3) Assess those properties of data needed for optimized AI training. 4) Make conclusions regarding evidence for a biomarker in a particular data set.

ABSTRACT

This course fills a large unmet educational gap in hands-on learning using real clinical data set and active Deep Learning software. Hands-on actual clinical data will be accessed by clinical arenas that are well recognized by RSNA attendees and for which there is data and applications that will be available in a cloud-based format. The entirety of the program will run on RSNA computers already available for hands-on courses.

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RCC44

Cinematic Rendering: Principles, Pearls, and Clinical Applications

Wednesday, Nov. 28 2:30PM - 4:00PM Room: S501ABC

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Elliot K. Fishman, MD, Baltimore, MD (*Moderator*) Institutional Grant support, Siemens AG; Institutional Grant support, General Electric Company; Co-founder, HipGraphics, Inc
Steven P. Rowe, MD, PhD , Baltimore, MD (*Presenter*) Research funded, Progenics Pharmaceuticals, Inc
Elliot K. Fishman, MD, Baltimore, MD (*Presenter*) Institutional Grant support, Siemens AG; Institutional Grant support, General Electric Company; Co-founder, HipGraphics, Inc
Linda C. Chu, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

efishman@jhmi.edu

lindachu@jhmi.edu

LEARNING OBJECTIVES

1) Understand the principles of cinematic rendering and how it differs from classic 3D techniques like volume rendering and maximum intensity projection (MIP) techniques. 2) Understand the potential role of cinematic rendering in applications ranging from oncology to trauma to vascular imaging. 3) Understand the role of cinematic rendering in specific applications in the pancreas, liver, kidneys and cardiovascular imaging.

ABSTRACT

Cinematic Rendering (CR) represents an advance in volume visualization with a high fidelity display of CT data. The technique has evolved with the introduction of faster GPU's at a lower cost and these GPU;s being used for medical imaging. In this refresher course we will discuss the basic principles of Cinematic Rendering and its advantages over classic volume rendering (VR) and maximum intensity projection technique (MIP). Case studies illustrating the advantages and disadvantages of each techniques will be discussed and illustrated. We will also discuss the range of current clinical applications focusing on oncology (pancreas, liver, kidney, small bowel, musculoskeletal trauma, cardiothoracic imaging and vascular imaging.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Elliot K. Fishman, MD - 2012 Honored EducatorElliot K. Fishman, MD - 2014 Honored EducatorElliot K. Fishman, MD - 2016 Honored EducatorElliot K. Fishman, MD - 2018 Honored Educator

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MSRO44

BOOST: Advanced Techniques in Image-guided Therapy (Interactive Session)

Wednesday, Nov. 28 3:00PM - 4:15PM Room: S103CD

CT MR NM RO

AMA PRA Category 1 Credits ™: 1.25
ARRT Category A+ Credits: 1.50

Participants
Theodore S. Hong, MD, Boston, MA (*Presenter*) Nothing to Disclose
Susanna I. Lee, MD,PhD, Boston, MA (*Presenter*) Editor, Wolters Kluwer nv
Homer A. Macapinlac, MD, Houston, TX (*Presenter*) Nothing to Disclose
Peter Balter, PhD, Houston, TX (*Presenter*) Research Grant, Varian Medical Systems, Inc; Research Grant, RaySearch Laboratories AB

For information about this presentation, contact:

slee0@mgh.harvard.edu

LEARNING OBJECTIVES

1) Explain and apply modern CT and MR imaging technologies and PET tracers for treatment planning of solid malignancies in the chest, abdomen and pelvis. 2) Explain and apply the modern techniques in radiotherapy safely and effectively in the chest, abdomen and pelvis.

ABSTRACT

The last decade has seen emergence of important advances in locoregional cancer therapy. Use of functional imaging and advanced radiatiotherapy often integrated with targeted chemotherapy have improved patient outcomes. This course will present the underlying principles in diffusion MRI, novel MR contrast agents, PET-MR and dual energy CT. PET tracers to be discussed are F-18 FDG, widely used for most solid tumors; C-11 choline/F-18 Fluciclovine for prostate cancer and Ga-68-DOTATATE for neuroendocrine tumors. Advanced radiotherapy techniques such as Image Guided Radiotherapy (IGRT), Intensity Modulated Radiation Therapy (IMRT), and Stereotactic Body Radiation Therapy (SBRT) using image guidance with X-ray, CT, MRI and PET will be described.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Susanna I. Lee, MD,PhD - 2013 Honored Educator

SPOR41

AOSR-RSNA Joint Symposium

Wednesday, Nov. 28 3:00PM - 4:30PM Room: S504AB

HN NR OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

SPOR41A Imaging Landmarks: Primary Tumor Evaluation

Participants
Hugh D. Curtin, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Hugh_Curtin@meei.harvard.edu

LEARNING OBJECTIVES

1) Assess bone involvment and understand its significance in tumor assessment. 2) Understand the assessment of perineural spread using the second division of the trigeminal as a model. 3) Understand the special considerations at various subsites including retromolar trigone, tonsillar pillar, and larynx.

ABSTRACT

Most tumors of the head and neck are identified by clinical examination. This is particularly true of squamous cell carcinoma of the mucosa. Imaging is done to identify deep extension. This includes assessment of bone invasion which has a very important role in determining therapy. Extension of tumor along nerves or perineural spread carries tumor beyond potential resection margins and is important in radiation planning. Assessment of perineural spread uses fat pads located at various foramina as well as abnomrality of a foramen itself. Fat is usually present at the exit of skull base foramina as well as at more peripheral foramina such as the infraorbital foramen, mandibular foramen etc. CSF is usually located at the endocranial end of a foramen. In larynx cancer spread into the paraglottic space and involvment of the cartilage is important in planning therapy. This session will explore basic principles and imaging advantages and disadvantages in various types of tumor analysis

SPOR41B Staging the Lymph Nodes

Participants
Hiroya Ojiri, MD, Tokyo, Japan (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ojiri@jikei.ac.jp

LEARNING OBJECTIVES

1) To stage regional lymph nodes in patients with head and neck cancer by standard morphological criteria. 2) To explain strengths and weakness of each criterion in assessment of metastatic nodal diseases. 3) To combine morpho-functional information to maximize benefits of multimodality imaging approach.

ABSTRACT

Regional nodal metastasis is the most important negative prognosticator in patients with head and neck cancer. It's, therefore, very important to assess as reliably as possible if the patient has regional metastatic disease by imaging. We need to combine morphofunctional information to obtain the best results because imaging is based on morphological as well as functional criteria. These will be explained in the lecture.

SPOR41C Post Treatment Surveillance

Participants
Barton F. Branstetter IV, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List the goals of surveillance imaging for recurrent head and neck cancer. 2) Describe the advantages and disadvantages of different surveillance modalities and frequencies. 3) Apply the NIRADS scheme to surveillance scans in the setting of head and neck cancer.

ABSTRACT

Patients with squamous cell carincoma of the head and neck undergo extensive clinical surveillance to detect recurrent tumor as soon as possible. Radiologic surveillance is also of critical importance, but the details, including frequency, timing, and modality, not universally agreed upon. This lecture will delineate the goals of radiologic surveillance, review the literature on the subject, and discuss new tools to assist radiologists who interpet these scans.

SPOR41D Special Considerations in Nasopharynx Carcinoma

Participants
Vincent F. Chong, MD, FRCR, Singapore, Singapore (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To identify the pertient anatomy of nasopharynx relevant to tumor mapping. 2) To describe the pathways tumor spread. 3) To apply appropriate radiological examinations for accurate staging.

MSCT42

Case-based Review of Thoracic Radiology (Interactive Session)

Wednesday, Nov. 28 3:30PM - 5:00PM Room: S406A

CH ER

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Diana Litmanovich, MD, Haifa, Israel (*Director*) Nothing to Disclose

Sub-Events

MSCT42A Thoracic Emergencies

Participants
Sanjeev Bhalla, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

sanjeevbhalla@wustl.edu

LEARNING OBJECTIVES

1) To use cases to highlight an approach to embolic disease. 2) To use cases to discuss the acute aortic syndromes. 3) To review other conditions which may manifest with acute chest pain.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Sanjeev Bhalla, MD - 2014 Honored EducatorSanjeev Bhalla, MD - 2016 Honored EducatorSanjeev Bhalla, MD - 2017 Honored EducatorSanjeev Bhalla, MD - 2018 Honored Educator

MSCT42B Large Airway Disorders

Participants
Phillip M. Boiselle, MD, Boca Raton, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

pboiselle@health.fau.edu

LEARNING OBJECTIVES

1) Apply a pattern-based approach to enhance accurate detection, characterization and diagnosis of a variety of benign and malignant large airway disorders. 2) Recognize normal variants which may mimic large airways diseases. 3) Understand the importance of carefully inspecting the large airways on CT scans.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Phillip M. Boiselle, MD - 2012 Honored Educator

MSCT42C Cystic Lung Disease

Participants
Theresa C. McLoud, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn to distinguish cystic lung disease from bronchiectasis and emphysema. 2) Recognize specific features of different cystic disease entities. 3) Understand the common complications, other systemic findings and prognosis of each of the entities discussed.

MSCT42D Adult Manifestations of Congenital Lung Disease

Participants
Diane C. Strollo, MD, Gibsonia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the spectrum of congenital lung abnormalities that may manifest in adulthood. 2) Understand developmental abnormalities of tracheobronchial tree, to include anomalous branching, such as bronchial atresia, and airway malformations such as

congenital lobar emphysema and congenital pulmonary airway malformation. 3) Review etiologies of intra- and extra-lobar sequestration and partial anomalous pulmonary venous return. 4) Discuss characteristic imaging findings and clinical management.

MSES44

Essentials of Genitourinary Imaging

Wednesday, Nov. 28 3:30PM - 5:00PM Room: E450A

GU

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

MSES44A Management of Incidental Renal Findings

Participants
Brian R. Herts, MD, Cleveland, OH (*Presenter*) Grant, Siemens AG

For information about this presentation, contact:

hertsb@ccf.org

LEARNING OBJECTIVES

1) Define an incidental renal mass. 2) Understand the features of a renal mass that should be evaluated before recommending further evaluation or management. 3) Describe the best options for further evaluation on an incompletely characterized incidental renal mass.

ABSTRACT

Renal masses are common and often detected as an incidental finding on cross-sectional imaging studies. While most incidental renal masses are benign cysts, the majority of renal cell carcinomas are also incidental findings; therefore it is important to correctly identify potential renal cell carcinomas, but not unnecessarily image benign lesions. The management of the incidental renal lesion is based on the features of a fully characterized mass, indentification of reliably benign features, or of indeterminate features that need further evaluation before management can be recommended. This presentation will review the features that allow us to make these determinations, based on the type of imaging available at the time of the detection of the incidental renal mass. The utility of MR, active surveillance and percutaneous biopsy in the management of incidental renal masses will also be discussed.

MSES44B Management of Incidental Adrenal Findings

Participants
William W. Mayo-Smith, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

wmayo-smith@bwh.harvard.edu

LEARNING OBJECTIVES

1) Describe frequency of adrenal incidentalomas. 2) Explain advances in imaging techniques to differentiate benign from malignant adrenal tumors. 3) Describe 2017 American College of Radiology Adrenal Incidentaloma Algorithm.

ABSTRACT

Review the ACR Adrenal Incidental Findings Algorithm

MSES44C Management of Incidental Adnexal Findings

Participants
Susan M. Ascher, MD, Washington, DC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

aschers@gunet.georgetown.edu

LEARNING OBJECTIVES

1) Comprehend the importance of Adnexal Incidentalomas and the rationale for having a vetted approach to manage them. 2) Apply accepted algorithms for the management of Adnexal Incidentalomas. 3) Analyze the data for adherence to published recommendations to include methods for improvement.

MSES44D First Trimester Emergencies: Where is the Baby?

Participants
Katherine M. Richman, MD, La Jolla, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kmrichman@ucsd.edu

LEARNING OBJECTIVES

1) Know the criteria to call a nonviable pregnancy. 2) Know the algorithm for pregnancy of unknown location. 3) Know the appearance of a variety of ectopic pregnancies.

ABSTRACT

The course discusses the types of first trimester emergencies a radiologist may encounter including ectopic pregnancies, molar pregnancies, completed and in progress spontaneous abortions, fetal demise, and pregnancy of unknown location.

MSSR44

RSNA/ESR Sports Imaging Symposium: Postoperative Imaging of Sports Injuries (Interactive Session)

Wednesday, Nov. 28 3:30PM - 5:00PM Room: E352

ER MR MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Laura W. Bancroft, MD, Orlando, FL (*Moderator*) Author with royalties, Wolters Kluwer nv; Speaker, World Class CME; Editor, Thieme Medical Publishers, Inc; Travel support, Thieme Medical Publishers, Inc ; ;
Andrew J. Grainger, MRCP, FRCR, Leeds, United Kingdom (*Moderator*) Consultant, Levicept Ltd; Director, The LivingCare Group;

For information about this presentation, contact:

andrewgrainger@nhs.net

Sub-Events

MSSR44A Postoperative Shoulder MRI after Instability Surgery

Participants
Laura W. Bancroft, MD, Orlando, FL (*Presenter*) Author with royalties, Wolters Kluwer nv; Speaker, World Class CME; Editor, Thieme Medical Publishers, Inc; Travel support, Thieme Medical Publishers, Inc ; ;

For information about this presentation, contact:

laura.bancroft.md@flhosp.org

LEARNING OBJECTIVES

1) To become familiar with the expected and abnormal MR imaging findings after labral repair. 2) To learn about the postoperative imaging features after capsular shift/capsulorrhaphy. 3) To appreciate normal imaging and complications after remplissage and Laterjet/Bristow procedures.

MSSR44B ACL Reconstruction and Cartilage Repair

Participants
Claudia Weidekamm, MD, Napier, New Zealand (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the common and uncommon ACL reconstruction techniques. 2) To appreciate the expected and abnormal MR imaging findings after ACL reconstruction. 3) To understand common cartilage repair techniques, and corresponding normal and abnormal postoperative MRIs.

ABSTRACT

The aim of ACL reconstruction is to stabilize the knee and prevent chondral and meniscal injuries, which are sequelae of anteroposterior translation and are associated with early osteoarthritis. The idea of the double-bundle ACL graft was to restore normal joint kinematics by anatomic reconstruction of the anteromedial and the posterolateral bundle of the original ACL. This was expected to improve clinical outcomes and restore anterior and rotational knee stability. The single-bundle technique, however, causes less osseous defects and is still a popular technique. Complications, such as ACL graft failure, impingement, cyclops lesion, arthrofibrosis, and patellar inferior syndrome, are discussed.The second part of this presentation will illustrate cartilage repair techniques and imaging findings. The radiologist must be familiar with the different cartilage repair procedures and characteristics in cartilage imaging to evaluate long-term progression or failure. Abnormal postoperative findings include hypertrophic filling, incomplete integration of the transplant into the surrounding cartilage, or subchondral defects, osteophytes, cysts, and persistent bone marrow edema and joint effusion.

MSSR44C Interactive Case Discussion

Participants
Laura W. Bancroft, MD, Orlando, FL (*Presenter*) Author with royalties, Wolters Kluwer nv; Speaker, World Class CME; Editor, Thieme Medical Publishers, Inc; Travel support, Thieme Medical Publishers, Inc ; ;
Claudia Weidekamm, MD, Napier, New Zealand (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

laura.bancroft.md@flhosp.org

claudia.schueller-weidekamm@meduniwien.ac.at

LEARNING OBJECTIVES

1) To become familiar with the diagnostic features of failed ACL reconstructions. 2) To understand the imaging features of intact

1) To become familiar with the diagnostic features of failed ACL reconstructions. 2) To understand the imaging features of intact and failed cartilage repair.

ABSTRACT

Postoperative imaging after ACL or cartilage repair is indicated in patients with ongoing pain/instability or repetitive injury. Radiography remains the initial imaging modality; however, further assessment with CT or MRI is recommended. With a clear emphasis on MRI, we will review normal postoperative findings and complications after ACL reconstructions and cartilage repair. The case discussion will cover the most significant pathologies and pitfalls, and normal postoperative findings will be illustrated.

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MSRT46

ASRT@RSNA 2018: Toward True Professionalism - Becoming Your 'True Self'

Wednesday, Nov. 28 3:40PM - 4:40PM Room: N230B

PR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Philip P. Kennedy, Saint John, NB (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

philip.kennedy@horizonnb.ca

LEARNING OBJECTIVES

1) Identify factors contributing to the current accelerating decline in professionalism in health care professions across North America. 2) Compare professionalism traits and characteristics with traits and characteristics of self-actualizing individuals. 3) Define ego as the 'false-self'. 4) Explain how the false-self arises and why egotism is the single most important inhibiting factor to self-actualization and the development of true professionalism traits and characteristics. 5) Define the 'true-self' as consciousness and the sense of beingness that accompanies it. 6) Apply personal growth strategies toward self-actualization and the development of true professionalism traits and characteristics.

ABSTRACT

Health care is in the midst of a professionalism crisis. Professionalism is on an accelerating decline across all professions in North America, indicating that current efforts toward teaching and promoting professionalism simply are not working. Therefore new strategies for understanding, teaching, and promoting professionalism in educational institutions as well as in the workplace are needed. This presentation proposes new strategies for defining and understanding professionalism, and suggests ways of effectively facilitating the development of true and enduring professionalism traits and characteristics in individuals.

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MSRO49

BOOST: eContouring (Spinal SBRT)

Wednesday, Nov. 28 4:30PM - 5:30PM Room: S104B

CT NR RO

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Simon S. Lo, MD, Seattle, WA (*Presenter*) Editor, Springer Nature;
Kristin J. Redmond, MD, MPH, Baltimore, MD (*Presenter*) Research support, Elekta AB; Research support, Accuray Incorporated; Speaker, Accuray Incorporated; Travel support, Accuray Incorporated; Consultant, Medtronic plc
William T. Yuh, MD, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

simonsmlo@gmail.com

LEARNING OBJECTIVES

1) Describe consensus CTV delineation for spine metastases in intact vertebra based on the extent of gross disease. 2) Describe consensus CTV delineation for post-operative spine SBRT including the imaging series most valuable in the contouring process. 3) Describe optimal spinal cord delineation. 4) Explain when CT myelogram may be important in treatment planning for SBRT for spinal metastases.

ABSTRACT

To perform stereotactic body radiotherapy for spinal metastases safely and effectively, proper target delineation based on patterns of failure and practice guidelines and proper spinal cord contouring are paramount. This session will provide guidance for contouring.

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RCA45

Creating Patient-Specific Anatomical Models for 3D Printing and AR/VR (Hands-on)

Wednesday, Nov. 28 4:30PM - 6:00PM Room: S401AB

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Nicole Wake, PhD, New York, NY (*Presenter*) In-kind support, Stratasys, Ltd
Amy E. Alexander, MSc, Rochester, MN (*Presenter*) Nothing to Disclose
Andy Christensen, BS, Littleton, CO (*Presenter*) Consultant, Integrum AB; Board Member, Integrum AB; Stockholder, Somaden LLC
Peter C. Liacouras, PhD, Bethesda, MD (*Presenter*) Nothing to Disclose
Jane S. Matsumoto, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Todd Pietila, MBA, Plymouth, MI (*Presenter*) Employee, Materialise NV

For information about this presentation, contact:

nicole.wake@med.nyu.edu

LEARNING OBJECTIVES

1) Classify various image post-processing and 3D modeling software programs for enabling 3D printing or AR/VR applications. 2) Explain the workflow to create patient-specific 3D anatomical models from medical images. 3) Identify and apply image segmentation techniques used to create 3D anatomical models, including thresholding, region growing, and manual editing. 4) Describe and apply image post-processing techniques and 3D design principles required to save models in appropriate file formats (i.e. STL or OBJ). 5) Interface with 3D printing software or AR/VR devices.

ABSTRACT

Advanced image data visualization in the form of 3D printing and AR/VR continues to expand in clinical settings. In order to generate patient-specific models for 3D printing or AR/VR, image data must first be segmented and converted to virtual 3D models which represent the intended anatomy of interest. The RSNA 3D Printing Special Interest Group has adopted a position statement reflecting the FDA recommendation that FDA-cleared software is used when 3D models are created for clinical applications. This course covers the use of industry-standard FDA-cleared software (Mimics InPrint, Materialise, NV) for the design and fabrication of patient-specific 3D models. Cranio-maxillofacial and renal case examples will be shown. Once the virtual 3D models have been created, users will learn how to prepare these files for 3D printing and AR/VR. In order to aid with the hands-on course, an extensive training manual will be provided before the meeting. It is highly recommended that participants review the training manual to optimize the experience at the workstation.

Active Handout:Nicole Wake

http://abstract.rsna.org/uploads/2018/18020329/Handouts_RC-45 RCA45.pdf

RCC45

Informatics Strategic Planning and Execution: How-To's and Lessons Learned

Wednesday, Nov. 28 4:30PM - 6:00PM Room: S501ABC

IN LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Christopher J. Roth, MD, Raleigh, NC (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn how to create an effective imaging IT and informatics strategic plan that will align practice and health system operations, infrastructure, capabilities, human resources, and provider governance around future direction. 2) Understand how your strategic plan can incorporate cross cutting themes like revenue, care quality, branding, and innovation in areas such as EHR image enablement, image exchange, clinical decision support, procurement, and IT security.

ABSTRACT

Since almost all of radiology based in IT and informatics today, having a broad and multifaceted imaging informatics strategic plan is necessary. An imaging IT and informatics strategic plan requires alignment between the goals of your practice - private or academic - and your health system, and your department and health system IT teams. Strategic plan creation is however complex and time consuming work. This session will provide time saving how-tos and lessons learned from private practice and academic radiology departments who have successfully deployed an imaging informatics strategy.

Sub-Events

RCC45A Private Practice Informatics Strategy Development

Participants
Syed Furqan Zaidi, MD, El Segundo, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

syed.zaidi@radpartners.com

LEARNING OBJECTIVES

1) Discuss data analytic tools to measure clinical quality and outcomes. 2) Identify data mining strategies to build the radiology department's quality platform. 3) Describe the use of data mining to engage in population health management.

ABSTRACT

The purpose of this session is to educate radiologists about data analytics tools available for use, along with data mining strategies. The application of data mining to demonstrate the value and impact of radiology on downstream quality and utilization in healthcare will be discussed. Private practice strategies to use analytics as a strategic differentiator as well as defining the role of radiology in population health management, will be discussed.

RCC45B Radiology Department Informatics Strategy Development

Participants
Cree M. Gaskin, MD, Charlottesville, VA (*Presenter*) Author with royalties, Oxford University Press; Author with royalties, Thieme Medical Publishers, Inc; Research Grant, Carestream Health, Inc;

For information about this presentation, contact:

cree@virginia.edu

LEARNING OBJECTIVES

1) Identify major radiology informatics issues that may warrant a strategic plan. 2) Apply radiology departmental informatics strategies which have been successful at other institutions.

RCC45C Enterprise Imaging Informatics Strategy Development

Participants
Christopher J. Roth, MD, Raleigh, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand methods for gathering and aligning individual and department imaging informatics needs with enterprise wide Goals, Strategies, Key Initiatives, Outcomes, Future States, Dependencies and Risks. 2) Review some strategic planning frameworks applicable to health systems wishing to pursue image capture, storage, indexing, EHR distribution, viewing, exchange, analytics, and governance for the spectrum of enterprise imaging content they own.

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SPDL41

Neuro and MSK (Case-based Competition)

Wednesday, Nov. 28 4:30PM - 6:00PM Room: E451B

MK NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Bayer AG; Advisory Board, Bayer AG; Advisory Board, Aidoc Ltd; Advisory Board, EnvoyAI; Advisory Board, Inference Analytics
Omer A. Awan, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Gregory L. Katzman, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Neety Panu, MD, FRCPC, Ottawa, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be introduced to a series of neuroradiology and musculoskeletal radiology case studies via an interactive team game approach designed to encourage 'active' consumption of educational content. 2) Use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) Receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. *This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.*

ABSTRACT

The extremely popular audience participation educational experience, Diagnosis Live!, is an expert-moderated session featuring a series of interactive case studies that will challenge radiologists' diagnostic skills and knowledge. The session features a lively, fast-paced game format: participants will be automatically assigned to teams who will then use their personal mobile devices to test their knowledge in a fast-paced session that will be both educational and entertaining. After the session, attendees will receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance.

SPSC41

Controversy Session: Marginally Operable Stage I Non-small Cell Lung Cancer: Cut or Shoot (Surgery vs Radiation)?

Wednesday, Nov. 28 4:30PM - 6:00PM Room: E353C

CH RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Candice A. Johnstone, MD, Milwaukee, WI (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

cjohnstone@mcw.edu

Sub-Events

SPSC41A Evaluation of Suspicious Lung Nodule: Can Diagnostic Imaging Confidently Diagnose Non-small Cell Lung Cancer?

Participants
Michelle S. Ginsberg, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To discuss imaging features of lung cancer and ability to accurately diagnose lung cancer. 2) To describe CT features of lepidic predominant adenocarcinoma that correlate with invasiveness on pathology.

SPSC41B Case for Surgical Resection

Participants
David W. Johnstone, Milwaukee, WI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

djohnstone@mcw.edu

LEARNING OBJECTIVES

1) Appraise the current data supporting surgical resection for early stage non-small cell carcinoma of the lung. 2) Understand the definitions of sublobar resection and lobectomy. 3) Compare outcomes between surgical resection and radiation therapy for early stage non-small cell carcinoma. 4) Appraise ongoing clinical trials comparing radiation to surgical resection for early stage lung cancer.

SPSC41C Case of Stereotactic Body Radiotherapy

Participants
Gregory Videtic, MD, FRCPC, Cleveland, OH (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

videtig@ccf.org

LEARNING OBJECTIVES

1) To discuss the approach to the radiographically suspicious lung nodule. 2) To discuss the management options including surgery and radiotherapy to address the suspicious nodule. 3) To discuss the evidence to support radiotherapy in the form of SBRT for the suspicious nodule.

ABSTRACT

TO discuss the clinically controversial question: 'Marginally operable stage I NSCLC:cut or shoot (surgery vs. radiation)?' A diagnostic radiologist will discuss the management approach for the radiographically suspicous lung nodule. A thoracic surgeon will discuss the role of surgery. A thoracic radiation oncologist will discuss the role for lung stereotactic body radiotherapy (SBRT).

SPSC43

Controversy Session: CT or MRI after Equivocal Appendix Visualization on Pediatric Ultrasound?

Wednesday, Nov. 28 4:30PM - 6:00PM Room: N226

CT GI MR PD US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Geetika Khanna, MD, MS, Iowa City, IA (*Moderator*) Nothing to Disclose

Sub-Events

SPSC43A CT for Appendicitis

Participants
Andrew T. Trout, MD, Cincinnati, OH (*Presenter*) Author, Reed Elsevier; Research Grant, Siemens AG; Research Grant, Canon America Medical Systems Corporation; Board Member, Joint Review Committee on Educational Programs in Nuclear Medicine Technology; Travel support, Koninklijke Philips NV; Consultant, Guerbet SA

For information about this presentation, contact:

andrew.trout@cchmc.org

LEARNING OBJECTIVES

1) Examine the evidence for CT for acute appendicitis in children. 2) Debate the role of CT versus other modalities for imaging of appendicitis in children. 3) Define the optimal imaging strategy for appendicitis in their practice.

SPSC43B MRI for Appendicitis

Participants
Michael S. Gee, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

msgee@mgh.harvard.edu

LEARNING OBJECTIVES

1) To learn indications for MRI in pediatric appendicitis evaluation. 2) To apply knowledge of current literature on MRI performance for pediatric appendicitis diagnosis. 3) To analyze technical and patient-related considerations for performance of MRI in children for appendicitis evaluation.

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SPSC44

Controversy Session: Gadolinium for MR Examination: To Give or Not to Give

Wednesday, Nov. 28 4:30PM - 6:00PM Room: N228

MR NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Yoshimi Anzai, MD, Salt Lake City, UT (*Moderator*) Nothing to Disclose
Max Wintermark, MD, Lausanne, Switzerland (*Moderator*) Advisory Board, General Electric Company; Consultant, More Health; Consultant, Magnetic Insight; Consultant, Icometrix; Consultant, Nines;

LEARNING OBJECTIVES

1) To learn the biological mechanism of GBCAs deposition in brain. 2) To understand implications of GBCAs deposition in patients. 3) To review the consensus recommendation for the clinical and research use of GBCAs. 4) To discuss how radiologists communicate with referring physicians and patients.

ABSTRACT

There has been emerging evidence of brain deposition of Gadolinium-based contrast agents (GBCAs) in patients who had received multiple doses of GBCAs in a dose-dependent manner. It has raised safety concern among imaging community, particularly for patients who regularly receive GBCAs. It is yet to be known if there are clinically significant manifestations or symptoms caused by brain deposition of GBCAs. Use of GBCAs on MRI help diagnose, evaluate, and differentiate various diseases. In this controversy session, we have four distinguished experts in this field to discuss i) the biological mechanism and of GBCAs deposition, ii) the current practice within and outside of the United States, and iii) how practicing radiologists should communicate the issue with referring physicians and patients.

Sub-Events

SPSC44A Gadolinium Deposition: Mechanism and Bio-distribution

Participants
Robert J. McDonald, MD,PhD, Rochester, MN (*Presenter*) Consultant, General Electric Company; Research Grant, General Electric Company; Consultant, Bracco Group

SPSC44B How Does Gadolinium Get to the Other Side of the Blood Brain Barrier

Participants
Emanuel Kanal, MD, Pittsburgh, PA (*Presenter*) Consultant, Medtronic plc; Investigator, Bracco Group; Royalties, Guerbet SA; Consultant, Koninklijke Philips NV

For information about this presentation, contact:

ekanal@pitt.edu

LEARNING OBJECTIVES

1) Identify the structure of the blood brain barrier and the blood CSF barrier and the major anatomical and functional differences between them. 2) Describe possible pathways for gadolinium to get to the other side of the blood brain barrier, which is supposedly a functional barrier that it does not cross. 3) Identify similarities and differences among the available GBCA in clinical neuroradiologic use today in neurologic bio-distribution and toxicity.

ABSTRACT

In the past few years there has been much attention focused on the fact that minute amounts of gadolinium remain, and can be found, within the brain, bones, and other tissues of patients who receive gadolinium based contrast agents (GBCA), even years after their last administration. Many questions have been raised concerning such residual gadolinium, including whether or not there are toxic effects of such retention, the molecular form(s) in which the residual gadolinium is found, and possible similarities or differences that might exist between the various GBCA. Among the unresolved questions associated with gadolinium retention in the brain concerns the seemingly paradoxical observation that these neuroradiologic GBCA do not cross an intact blood brain barrier (BBB.) However, several histologic studies have now found residual gadolinium in the brain parenchyma, which of course is on the other side of the BBB. If intravenously administered GBCA do not cross an intact BBB, then how, on these autopsy studies, did they get to the brain parenchyma in which they have been detected? This presentation will attempt to address this issue and provide possible explanations that might simultaneously shed light on the normal physiologic pathways GBCA traverse even in patients with normal renal function - and of which many may have been heretofore unaware.

SPSC44C Gadolinium Deposition in the Brain: Use Caution, But Don't Panic

Participants
Vikas Gulani, MD, PhD, Cleveland, OH (*Presenter*) Research support, Siemens AG; Licensed Technology, Siemens Healthineers - both myself and my spouse. MR Fingerprinting, on which we are both inventors, has been licensed by Siemens.

LEARNING OBJECTIVES

1) To understand the similarities and differences between Nephrogenic Systemic Fibrosis (NSF) and the Gadolinium deposition phenomenon. 2) To understand the clinical implications of the deposition of Gadolinium in tissues.

ABSTRACT

Gadolinium deposition in the brain after use of gadolinium based contrast agents has been documented extensively in the literature. Class based differences in the deposition phenomenon have also been discussed. However, to date, no harm from the deposition has been documented. There are parallels and differences between the controversies surrounding this phenomenon and the radiological community's prior experience with Nephrogenic Systemic Fibrosis (NSF). In this brief talk, I will try to put the deposition phenomonen in this broader context.

SPSC44D Gadolinium Deposition in the Brain: What Radiologists Can Do to Help Patients and Referrals?

Participants
Max Wintermark, MD, Lausanne, Switzerland (*Presenter*) Advisory Board, General Electric Company; Consultant, More Health; Consultant, Magnetic Insight; Consultant, Icometrix; Consultant, Nines;

For information about this presentation, contact:

max.wintermark@gmail.com

LEARNING OBJECTIVES

1) To review practical tips on protocoling MRI studies with or wihtout gadolinium. 2) To discuss how to address patients' questions about gadolinium. 3) To review how to collaborate efficiently with referring physicians around MRI studies involving gadolinium.

Honored Educators

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SPSC44E Panel Discussion

SPSC45

Controversy Session: CTA or MRA?

Wednesday, Nov. 28 4:30PM - 6:00PM Room: E353A

CT MR VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

FDA Discussions may include off-label uses.

Participants
Vincent B. Ho, MD,MBA, Bethesda, MD (*Moderator*) Institution, In-kind support, General Electric Company
Martin R. Prince, MD,PhD, New York, NY (*Moderator*) Patent agreement, General Electric Company; Patent agreement, Hitachi, Ltd; Patent agreement, Siemens AG; Patent agreement, Canon Medical Systems Corporation; Patent agreement, Koninklijke Philips NV; Patent agreement, Nemoto Kyorindo Co, Ltd; Patent agreement, Bayer AG; Patent agreement, Lantheus Medical Imaging, Inc; Patent agreement, Bracco Group; Patent agreement, Mallinckrodt plc; Patent agreement, Guerbet SA;

LEARNING OBJECTIVES

1) Discuss CTA and MRA methods and techniques for optimized vascular imaging in clinical practice. 2) Debate the advantages and disadvantages of CTA and MRA in clinical practice. 3) Recommend the application of CTA or MRA for common challenging clinical scenarios.

Sub-Events

SPSC45A MRA

Participants
Scott B. Reeder, MD, PhD, Madison, WI (*Presenter*) Institutional research support, General Electric Company; Institutional research support, Bracco Group; Founder, Calimetrix, LLC; Shareholder, Elucent Medical; Consultant, ArTara
Robert R. Edelman, MD, Evanston, IL (*Presenter*) Nothing to Disclose
J. Paul Finn, MD, Los Angeles, CA (*Presenter*) Speakers Bureau, Bayer AG; Scientific Advisory Board, AMAG Pharmaceuticals, Inc

For information about this presentation, contact:

redelman999@gmail.com

SPSC45B CTA

Participants
Elliot K. Fishman, MD, Baltimore, MD (*Presenter*) Institutional Grant support, Siemens AG; Institutional Grant support, General Electric Company; Co-founder, HipGraphics, Inc
W. Dennis Foley, MD, Milwaukee, WI (*Presenter*) Research Consultant, General Electric Company
Geoffrey D. Rubin, MD, Durham, NC (*Presenter*) Consultant, Fovia, Inc; Consultant, HeartFlow, Inc; Consultant, General Electric Company;

For information about this presentation, contact:

dfoley@mcw.edu

Honored Educators

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RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

SPDL50

Neuro Nightmares: Headscratchers from Overnight (Case-based Competition)

Thursday, Nov. 29 7:15AM - 8:15AM Room: E451B

CT MR NR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Vadim Spektor, MD, New York, NY (*Presenter*) Nothing to Disclose
Nazmus Sakib, MD, Newark, NJ (*Presenter*) Nothing to Disclose
William B. Zucconi, DO, Madison, CT (*Presenter*) Nothing to Disclose
Yair Levy, Newark, NJ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Analyze traumatic and non-traumatic emergent neuroradiology imaging. 2) Interpret neuroradiologic diagnoses using multimodality and case based approach. 3) Integrate critical pathophysiological and clinical issues of each clinical scenario. 4) Optimize technical parameters needed for image interpreation.

ABSTRACT

Imaging plays a critical role in assessing patients with acute neurologic symptoms. Every patient with neurologic symptoms will have some form of cross-sectional neurologic exam, CT or MRI. Large proportion if not majority of acute neurologic patients present after normal daytime hours. Radiology residents are often asked to provide the first line diagnosis in complicated and often confusing neurologic cases and initial treatment is often based on resident interpretation of these exams. We are presenting a collection of challenging Neuro cases that presented overnight in our emergency rooms.

SPSC50

Controversy Session: In Stenotic Vascular Disease, Diameter Stenosis is All that Matters

Thursday, Nov. 29 7:15AM - 8:15AM Room: E350

MR NR VA

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
David A. Saloner, PhD, San Francisco, CA (*Moderator*) Nothing to Disclose

Sub-Events

SPSC50A Why do Neurologists use Diameter to Decide on Intervention?

Participants
Wade S. Smith, MD,PhD, San Francisco, CA (*Presenter*) Consultant, Stryker Corporation; Data Safety Monitoring Board, Stryker Corporation

SPSC50B Geometric Morphology in Stenotic Disease: Challenges Associated with Measuring Diameters

Participants
Giles Roditi, FRCR, Glasgow, United Kingdom (*Presenter*) Consultant, Canon Medical Systems Corporation

SPSC50C Imaging Beyond the Lumen: The True Risk Features of Atherosclerotic Disease

Participants
Chun Yuan, PhD, Seattle, WA (*Presenter*) Research Grant, Koninklijke Philips NV; ;

For information about this presentation, contact:

cyuan@u.washington.edu

LEARNING OBJECTIVES

1) To define the need for imaging atherosclerotic lesions. 2) To describe current approaches for vessel wall and atherosclerosis imaging. 3) Examine key imaging findings that help to detect high risk atherosclerotic lesions.

SPSH50

Hot Topic Session: Beyond FDG: Advancing PET Imaging of the Human Disease

Thursday, Nov. 29 7:15AM - 8:15AM Room: E353A

CA MI NR NM

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Chadwick L. Wright, MD,PhD, Lewis Center, OH (*Moderator*) Nothing to Disclose
Katherine A. Zukotynski, MD, Ancaster, ON (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To highlight topics related to advances in Cardiovascular PET, Neuro PET and Oncologic PET with FDA approved radiotracers other than FDG. 2) To address myocardial perfusion and atherosclerosis imaging, amyloid imaging, and oncologic imaging.

Sub-Events

SPSH50A New PET Technologies and Acquisition Approaches

Participants
Michael V. Knopp, MD, PhD, Columbus, OH (*Presenter*) Nothing to Disclose

SPSH50B Molecular Imaging of Heart Diseases

Participants
Sharmila Dorbala, MD,MPH, Boston, MA (*Presenter*) Research Grant, Astellas Group

LEARNING OBJECTIVES

1) List clinically available novel PET radiotracers for imaging cardiovascular diseases. 2) Discuss emerging cardiac applications using radiotracers targeting amyloid fibrils, somatostatin receptors and microcalification.

URL

SPSH50C Non-FDG PET Tracers for Molecular Brain Imaging

Participants
Satoshi Minoshima, MD, PhD, Salt Lake City, UT (*Presenter*) Consultant, Hamamatsu Photonics KK; Research Grant, Hitachi, Ltd; Research Grant, Nihon Medi-Physics Co, Ltd;

SPSH50D Molecular Imaging of Cancer: Where Are We Going?

Participants
Peter L. Choyke, MD, Rockville, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

pchoyke@nih.gov

LEARNING OBJECTIVES

1) Familiarize participants with several new promising PET agents for cancer imaging. 2) Discuss new technologies that will enable the development of similar agents in the near future. 3) Describe opportunities and barriers to broader use of Molecular Imaging in Cancer.

ABSTRACT

Several new PET agents have been developed that promise to revolutionize the way cancer is diagnosed. Agents targeting the somatostatin receptor for neuroendocrine tumors and PSMA for prostate cancers are changing the way these diseases are managed. However, these agents took a long time to develop and even now are not fully available. New small molecule discovery technologies promise to greatly speed up the development of future agents. Many of these are also compatible with targeted radionuclide therapy. The future of this field is exciting and there is much work to be done.

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MSRT51

ASRT@RSNA 2018: Working Together to Create 3D Printed Models in Medicine

Thursday, Nov. 29 8:00AM - 9:00AM Room: N230B

IN OT

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Lincoln Wong, MD, Omaha, NE (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

3d@childrensomaha.org

LEARNING OBJECTIVES

1) Appreciate how 3D printing is being used in medicine. 2) Understand the teamwork needed to run a hospital-based print lab. 3) Develop a workflow from image acquisition to printing 3D models.

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RCA51

Prostate MRI (Hands-on)

Thursday, Nov. 29 8:00AM - 10:00AM Room: S401AB

GU MR

AMA PRA Category 1 Credits ™: 2.00
ARRT Category A+ Credits: 2.25

Participants
Jelle O. Barentsz, MD, PhD, Nijmegen, Netherlands (*Presenter*) Advisor, SPL Medical BV
Daniel J. Margolis, MD, Los Angeles, CA (*Presenter*) Consultant, Blue Earth Diagnostics Ltd
Roel D. Mus, MD, Groesbeek, Netherlands (*Presenter*) Nothing to Disclose
Joyce G. Bomers, Arnhem, Netherlands (*Presenter*) Nothing to Disclose
Jurgen J. Futterer, MD, PhD, Nijmegen, Netherlands (*Presenter*) Research Grant, Siemens AG
Rianne R. Engels, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Renske L. van Delft, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Michiel Sedelaar, MD, PhD, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Antonio C. Westphalen, MD, Mill Valley, CA (*Presenter*) Scientific Advisory Board, 3DBiopsy, Inc;
Geert M. Villeirs, MD, PhD, Ghent, Belgium (*Presenter*) Nothing to Disclose
Leonardo K. Bittencourt, MD, PhD, Rio De Janeiro, Brazil (*Presenter*) Nothing to Disclose
Vibeke B. Logager, MD, Herlev, Denmark (*Presenter*) Nothing to Disclose
Joseph J. Busch, MD, Chattanooga, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Renske.vandelft@radboudumc.nl

LEARNING OBJECTIVES

1) Understand the Pi-RADS v2 Category assessment to detect and localize significant cancer for both peripheral zone and transitional zone lesions. 2) Recognize benign pathology like inflammation and BPH and to differentiate these from significant prostate cancers.

ABSTRACT

In this Hands-On Workshop, the participants will be able to review up to 47 multi-parametric MRI cases with various prostatic pathology using a dedicated workstation. Focus will be on the overall assessment of PI-RADS v2 category, which enables them to score the probability of the presence of a significant cancer in patients with elevated PSA and/or clinical suspicion. All cases are from daily non-academic practice, and have various levels of difficulty. The cases include: easy and difficult significant peripheral-transition- and central zone cancers, inflammation, BPH, and the most common pitfalls. Internationally renowned teachers will guide the participants during their PI-RADS v2 scoring. There will be 50 workstations available. The coursebook can be found at: https://tinyurl.com/rsna2018 Please note: To guarantee the best learning experience we can only allow 100 people in the room. First come, first serve.

Active Handout:Renske Lian van Delft

http://abstract.rsna.org/uploads/2018/16002006/Workshop RSNA 2018 Coursebook small RCA.pdf

MSCN51

Case-based Review of Neuroradiology (Interactive Session)

Thursday, Nov. 29 8:30AM - 10:00AM Room: S406A

NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Pina C. Sanelli, MD, Manhasset, NY (*Director*) Research funded, Siemens AG;

LEARNING OBJECTIVES

1) Identify the application of basic anatomic, pathologic, and physiologic principles to specific disease processes, and diagnostic and therapeutic procedures in neuroimaging. 2) Analyze imaging and therapeutic techniques and apply this knowledge to protocol development, patient management and safety. 3) Compare indications and contraindications of specific imaging procedures in Neuroradiology.

ABSTRACT

Learning Objectives: The learner will be able to: 1. Identify the application of basic anatomic, pathologic, and physiologic principles to specific disease processes, and diagnostic and therapeutic procedures in neuroimaging. 2. Analyze imaging and therapeutic techniques and apply this knowledge to protocol development, patient management and safety. 3. Compare indications and contraindications of specific imaging procedures in Neuroradiology.

Sub-Events

MSCN51A Brain: Is that Mass a Tumor?

Participants
Pina C. Sanelli, MD, Manhasset, NY (*Presenter*) Research funded, Siemens AG;

LEARNING OBJECTIVES

1) Identify the application of basic anatomic, pathologic, and physiologic principles to specific disease processes, and diagnostic and therapeutic procedures in neuroimaging. 2) Analyze imaging and therapeutic techniques and apply this knowledge to protocol development, patient management and safety. 3) Compare indications and contraindications of specific imaging procedures in Neuroradiology.

MSCN51B Brain: White Matter Lesions - Making Sense of the Mess

Participants
Anne G. Osborn, MD, Salt Lake Cty, UT (*Presenter*) Author, Reed Elsevier;

For information about this presentation, contact:

anne.osborn@hsc.utah.edu

LEARNING OBJECTIVES

1) Make a reasonable (i.e., a clinically useful) differential diagnosis for T2/FLAIR brain parenchymal hyperintensities by listing which key questions to consider. 2) Understanding what's common and what's not. 3) Learning how to use anatomy and patterns to narrow the differential diagnosis of these nonspecific 'white spots' we so commonly see on brain MRs.

ABSTRACT

There are at least 50 different recognized causes of discrete T2/FLAIR hyperintensities in the brain parenchyma. In this presentation we will 'make sense of 'the mess" by learning what key questions to ask and understanding what's common (only 9 or 10 things really are). We will present a pattern-based anatomical approach that will allow us to narrow differential diagnoses to useful, clinically-actionable information.

MSCN51C Spine: There's So Much More than Degenerative Disease

Participants
Jeffrey G. Jarvik, MD, Seattle, WA (*Presenter*) Consultant, Wolters Kluwer nv; Co-editor, Springer Nature; Royalties, Springer Nature

For information about this presentation, contact:

jarvikj@uw.edu

LEARNING OBJECTIVES

1) Review the findings for conditions that frequently motivate primary care providers to order spine imaging. 2) Discuss differential diagnosis including the perspective of primary care provider.

ABSTRACT

When primary care providers order an imaging study of the lumbar spine, they are often more interesting in excluding low probability but high consequence conditions such as tumor or infection than identifying a degenerative pain generator. In this talk I will review cases that are typical of the types of entities which primary care providers are trying to rule-out.

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MSCN51D Spine Imaging and Interventions: What You Should Know but May Not

Participants
Christie M. Lincoln, MD, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Christie.Lincoln@bcm.edu

LEARNING OBJECTIVES

1) To assess the spine and cord for imaging abnormalities that necessitate further angiographic or interventional pain procedure. 2) To review the latest literature of the case-based presentation to understand our role as diagnosticians in the healthcare team.

ABSTRACT

Spine imaging can provide a plethora of information that may or may not necessitate clinical management. As diagnosticians, we need to be aware of the diagnoses that warrant an angiographic or interventional pain procedure. Through this case-based presentation, we will review the latest literature in spine interventions to update the value we can provide as part of the healthcare team.

MSCS51

Case-based Review of Musculoskeletal Radiology (Interactive Session)

Thursday, Nov. 29 8:30AM - 10:00AM Room: S100AB

MK US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Stacy E. Smith, MD, Boston, MA (*Director*) Nothing to Disclose

Sub-Events

MSCS51A Shoulder

Participants
Laura W. Bancroft, MD, Orlando, FL (*Presenter*) Author with royalties, Wolters Kluwer nv; Speaker, World Class CME; Editor, Thieme Medical Publishers, Inc; Travel support, Thieme Medical Publishers, Inc ; ;

For information about this presentation, contact:

laura.bancroft.md@flhosp.org

LEARNING OBJECTIVES

1) Review essential imaging characteristics of post-traumatic and sports-related shoulder injuries. 2) Review salient multimodality imaging features of various shoulder pathologies in a case based format.

MSCS51B Soft Tissue Lesions

Participants
Stacy E. Smith, MD, Boston, MA (*Presenter*) Nothing to Disclose

MSCS51C MSK Ultrasound

Participants
Akira M. Murakami, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe anatomy, pathology and US appearances of MSK cases outlining use of dynamic imaging and doppler. 2) Identify potential pitfalls. 3) Describe how other imaging modalities are complimentary to MSK Ultrasound.

ABSTRACT

The presentation will be a case based approach to review ultrasound appearances of common musculoskeletal pathologies of the upper and lower extremity including the use of dynamic imaging and doppler. Potential pitfalls will be reviewed as well as the importance of other imaging modalities and how they are complimentary to ultrasound.

MSCS51D Spine Lesions

Participants
Glenn C. Gaviola, MD, Boston, MA (*Presenter*) Nothing to Disclose

MSES51

Essentials of Breast Imaging

Thursday, Nov. 29 8:30AM - 10:00AM Room: S406B

BR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

MSES51A Missed Lesions in Mammography: How to Improve Performance

Participants
Athina Vourtsi, MD, Athens, Greece (*Presenter*) Consultant, General Electric Company; Educator, ABUS

LEARNING OBJECTIVES

1) Identify the most common factors that may lead to missed breast cancers. 2) Apply the appropriate steps when interpreting mammography. 3) Enhance skills in order to avoid the possibility of missing a suspicious lesion.

MSES51B Update on Ductal Carcinoma in Situ

Participants
Cecilia L. Mercado, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the imaging characteristics of ductal carcinoma in situ as detected on various imaging modalities. 2) Identify the risk factors for the development of ductal carcinoma in situ. 3) Discuss the various treatment recommendations for ductal carcinoma in situ as supported by the recent multiple randomized controlled trials.

MSES51C Management of Non-simple Breast Cysts

Participants
A. Thomas Stavros, MD, San Antonio, TX (*Presenter*) Advisor, Devicor Medical Products, Inc Advisor, General Electric Company Advisor, SonoCine, Inc Owner, Ikonopedia, LLC Medical Director, Seno Medical Instruments, Inc

For information about this presentation, contact:

atstavros@gmail.com

LEARNING OBJECTIVES

1) To understand the histologic bases for the appearances of cysts that are not simple. 2) To know the differences between 'suspicious' complex cystic and solid masses and non-suspicious benign complicated cysts. 3) To be aware of ancillary ultrasound modality and dynamic maneuver contributions to distinguishing suspicious from non-suspicious non-simple cysts. 4) To know when to use interventional procedures and which to use. 5) To know how pre-test probability (screening vs. diagnosis) affects interpretation and when to apply the rule of multiplicity.

ABSTRACT

As a general rule, most non-simple breast cysts are part of the benign fibrocystic spectrum and have little risk of being malignant. Malignant breast cysts are uncommon and cystic malignancies usually look more like necrotic or hemorrhagic solid masses than benign appearing cysts. Nevertheless, needs a systematic approach to evaluation of non-simple breast cysts in order not to miss the uncommon cystic malignancy. We present an algorithmic approach to evaluating non-simple breast cysts that is derived from the mammographic and solid mass algorithms, where we look for suspicious features first. If there are no suspicious findings, we then look for definitively benign findings. If we cannot find benign findings, we look for probably benign features, and failing that, classify the lesion as suspicious and obtain histology. We show the histologic basis for echogenic cyst fluid and a variety of benign and malignant excrescences that cause a cyst to appear to be non-simple. We discuss the difference between complicated cysts and complex cystic and solid masses in appearances and risk. We show how Doppler can help us assess complex cystic and solid masses and complex clustered microcysts. We discuss the need for histologic rather than cytologic assessment of suspicious cystic breast masses. We show the appearances of acutely and chronically inflamed cysts before and after aspiration, how Doppler can help this assessment, and how these appearances differ from those of malignant cysts, and the need for gram stain and culture, but not cytology. We present a variety of definitively benign appearances for non-simple breast cysts such as scintillating echoes, fat fluid-levels, fluid-debris levels, milk of calcium, calcium oxalate crystals, and skin cysts, and present maneuvers to improve their assessment. We also discuss the complicated cyst that has fluid so echogenic that it simulates a solid nodule, such as a fibroadenoma, and a variety of methods of further evaluating such cysts, including shear wave and strain elastography and aspiration. Finally, we discuss the rule of multiplicity and how multiple similar appearing non-simple cysts can be downgraded to BI-RADS 2, especially during supplemental screening ultrasound for women with dense breasts on mammography.

Active Handout:A. Thomas Stavros

http://abstract.rsna.org/uploads/2018/18000959/06 BUS of cysts that MSES51C.pdf

MSES51D Breast Anatomy and Physiology

Participants
Ellen B. Mendelson, MD,MA, Chicago, IL (*Presenter*) Advisory Board, Delphinus Medical Technologies, Inc; Speaker, Siemens AG; Advisory Board, Seno Medical Instruments, Inc; ; ;

LEARNING OBJECTIVES

1) Describe the anatomic composition of the adult breast. 2) Correlate physiology with specific pathologic occurrences in young, pregnant, and lactating women. 3) Assess the value of whole breast US in management of bilateral benign-appearing masses.

RC601

Practical HRCT of the Lung (Interactive Session)

Thursday, Nov. 29 8:30AM - 10:00AM Room: N228

CH CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Daria Manos, MD, FRCPC, Halifax, NS (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

daria.manos@nshealth.ca

LEARNING OBJECTIVES

1) Identify and distinguish common and important CT patterns of diffuse and interstitial lung disease. 2) Understand the clinical importance of HRCT pattern recognition, the overlap between patterns and the key imaging features to help avoid diagnostic error. 3) Use clinical context to tailor HRCT differential diagnosis. 4) Describe an approach to diffuse airspace disease detected on CT chest. 5) List 3 common causes of acute diffuse airspace disease. 6) List 3 common causes of chronic diffuse airspace disease. 7) Accurately identify the common and important features of cystic lung disease on HRCT. 8) Recognize distinguishing features from other mimics of cystic lung disease on HRCT. 9) Use clinical context and other ancillary findings to tailor HRCT differential diagnosis.

Sub-Events

RC601A Approach to Nodular Patterns

Participants
Daria Manos, MD, FRCPC, Halifax, NS (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

daria.manos@nshealth.ca

LEARNING OBJECTIVES

1) Identify and distinguish common and important CT patterns of diffuse and interstitial lung disease. 2) Understand the clinical importance of HRCT pattern recognition, the overlap between patterns and the key imaging features to help avoid diagnostic error. 3) Use clinical context to tailor HRCT differential diagnosis.

RC601B Diffuse Airspace Disease: Practical Tips

Participants
Elsie Nguyen, MD, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

elsie.nguyen@uhn.ca

LEARNING OBJECTIVES

1) Describe an approach to diffuse airspace disease detected on CT chest. 2) List 3 common causes of acute diffuse airspace disease. 3) List 3 common causes of chronic diffuse airspace disease.

RC601C Cystic Lung Disease: What Are You Missing?

Participants
Judith L. Babar, MBChB, Thriplow, United Kingdom (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

judith.babar@addenbrookes.nhs.uk

LEARNING OBJECTIVES

1) Accurately identify the common and important features of cystic lung disease on HRCT. 2) Recognize distinguishing features from other mimics of cystic lung disease on HRCT. 3) Use clinical context and other ancillary findings to tailor HRCT differential diagnosis.

RC601D Fibrotic Lung Disease: Not Always UIP

Participants
Susan J. Copley, MD, FRCR, London, United Kingdom (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

sue.copley1@nhs.net

LEARNING OBJECTIVES

1) Accurately identify the common and important features of fibrotic lung disease on HRCT. 2) Describe the common and important HRCT features of UIP. 3) Recognize distinguishing features of other patterns of fibrotic lung disease on HRCT.

RC602

Image Perception and Radiology Education

Thursday, Nov. 29 8:30AM - 10:00AM Room: S403B

ED

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

ekrupin@emory.edu

LEARNING OBJECTIVES

1) Understand the importance of image perception in resident education. 2) Appreciate the potential role of perceptual training in radiographic image interpretation. 3) Improve understanding of the role of image perception and radiology litigation.

ABSTRACT

Medical image perception has a long history in radiology, including an emphasis on training and education. This aspect is especially important as it impacts current and future learners (residents and fellows) as well as those out of training but gaining experience through everyday clinical interpretation. This course will focus on three important aspects of training and image perception: the importance of image perception in resident education; the potential role of perceptual training in radiographic image interpretation; and the role of image perception and radiology litigation.

Sub-Events

RC602A Medical Image Perception and Its Importance in Resident Education

Participants
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ekrupin@emory.edu

LEARNING OBJECTIVES

1) Understand the importance of image perception in resident education. 2) Appreciate the potential role of perceptual training in radiographic image interpretation. 3) Improve understanding of the role of image perception and radiology litigation.

ABSTRACT

Medical image perception has a long history in radiology, including an emphasis on training and education. This aspect is especially important as it impacts current and future learners (residents and fellows) as well as those out of training but gaining experience through everyday clinical interpretation. This course will focus on three important aspects of training and image perception: the importance of image perception in resident education; the potential role of perceptual training in radiographic image interpretation; and the role of image perception and radiology litigation.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Elizabeth A. Krupinski, PhD - 2017 Honored Educator

RC602B Perceptual Training in Radiographic Image Interpretations

Participants
William Auffermann, MD, PhD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

william.auffermann@hsc.utah.edu

LEARNING OBJECTIVES

1) Identify the types of perceptual errors that occur during medical image interpretation. 2) Examine how tailored training algorithms for image evaluation can help avoid these perceptual errors.

RC602C Image Perception and Radiology Litigation

Participants
Leonard Berlin, MD, Wilmette, IL (*Presenter*) Nothing to Disclose

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lberlin@live.com

RC603

Cardiac Imaging for Transcatheter Intervention Planning

Thursday, Nov. 29 8:30AM - 10:00AM Room: S103CD

CA CT IR MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Joe Y. Hsu, MD, Los Angeles, CA (*Moderator*) Nothing to Disclose

Sub-Events

RC603A Cardiac CT Acquisition: Protocol Optimization

Participants
Brian B. Ghoshhajra, MD, Waban, MA (*Presenter*) Research Grant, Siemens Healthcare USA;

RC603B Planning TAVR and Mitral Interventions

Participants
Jonathon A. Leipsic, MD, Vancouver, BC (*Presenter*) Speakers Bureau, General Electric Company; Speakers Bureau, Edwards Lifesciences Corporation; Consultant, Heartflow, Inc; Consultant, Circle Cardiovascular Imaging Inc; Consultant, Edwards Lifesciences Corporation; Consultant, Neovasc Inc; Consultant, Samsung Electronics Co, Ltd; Consultant, Koninklijke Philips NV; Consultant, Arineta Ltd; Consultant, Pi-Cardia Ltd;

For information about this presentation, contact:

jleipsic@providencehealth.bc.ca

LEARNING OBJECTIVES

1) Review the data supporting the utility and clinical efficacy of transcatheter interventions. 2) Discuss the role of CT for procedural planning and device selection. 3) Review how CT can be used to help improve clinical outcomes.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Jonathon A. Leipsic, MD - 2015 Honored Educator

RC603C Cardiac MRI and CT for Arrhythmia Treatment

Participants
Stefan L. Zimmerman, MD, Ellicott City, MD (*Presenter*) Project consultant, Siemens Healthcare; Research grant, American Heart Association;

For information about this presentation, contact:

stefan.zimmerman@jhmi.edu

LEARNING OBJECTIVES

1) Learn how non-invasive imaging with cardiac MRI and CT are used in the evaluation of patients with cardiac arrhythmias. 2) Understand how MRI and CT can be used for imaging of the arrhythmia substrate and pre-procedural planning. 3) Comprehend the role of non-invasive imaging for sudden cardiac death risk stratification and decisions related to ICD placement.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Stefan L. Zimmerman, MD - 2012 Honored EducatorStefan L. Zimmerman, MD - 2015 Honored Educator

RC604

Musculoskeletal Series: Musculoskeletal Interventions

Thursday, Nov. 29 8:30AM - 12:00PM Room: E353C

IR MK

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

Participants
Theodore T. Miller, MD, New York, NY (*Moderator*) Nothing to Disclose
William E. Palmer, MD, Boston, MA (*Moderator*) Nothing to Disclose
Kenneth S. Lee, MD, Madison, WI (*Moderator*) Grant, General Electric Company Research support, SuperSonic Imagine Research support, Johnson & Johnson Consultant, Echometrix, LLC Royalties, Reed Elsevier
Robert S. Campbell, MBBCh, Liverpool, United Kingdom (*Moderator*) Nothing to Disclose

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Active Handout:Robert SD Campbell

http://abstract.rsna.org/uploads/2018/18000807/Shoulder Intervention_Campbell RC604.pdf

Sub-Events

RC604-01 Spine

Thursday, Nov. 29 8:30AM - 8:55AM Room: E353C

Participants
William E. Palmer, MD, Boston, MA (*Presenter*) Nothing to Disclose

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wpalmer@mgh.harvard.edu

LEARNING OBJECTIVES

1) Correlate symptoms with MRI findings. 2) Explain pain generators on MRI. 3) Describe role of corticosteroid injection.

RC604-02 Hip/Knee

Thursday, Nov. 29 8:55AM - 9:20AM Room: E353C

Participants
Theodore T. Miller, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

millertt@hss.edu

LEARNING OBJECTIVES

1) Be able to describe the clinical uses of sonographically guided interventions of the hip and knee. 2) Be able to describe technique of sonographically guided interventions of the hip and knee.

RC604-03 3-Tesla MR-Guided MR Arthrography of the Shoulder: Technical Performance, Patient Experience, and Comparative Efficiency

Thursday, Nov. 29 9:20AM - 9:30AM Room: E353C

Awards
Student Travel Stipend Award

Participants
Ethan Dyer, McDonough, GA (*Presenter*) Nothing to Disclose
Moustafa Abou Areda, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Bao Chau Ly, BS,MS, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Janice A. Wang, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jan Fritz, MD, Baltimore, MD (*Abstract Co-Author*) Research Grant, Siemens AG; Scientific Advisor, Siemens AG; Scientific Advisor, Alexion Pharmaceuticals, Inc; Speaker, Siemens AG

For information about this presentation, contact:

ifritz9@ihmi.edu

PURPOSE

Direct shoulder MR arthrography typically requires image-guided joint injections before MRI. However, the coordination of rooms and teams can be time-consuming or may not be possible at outpatient sites, in which case MR-guided MR arthrography may be advantageous. Therefore, we evaluated the performance of MR-guided MR arthrography at 3-Tesla.

METHOD AND MATERIALS

Following IRB-approval and informed consent, 154 patients (average age, 36; range, 13-77) undergoing MR-guided shoulder MR arthrography with a 3T wide-bore MRI system were prospectively included. Patients underwent MRI, MR-guided glenohumeral injection, and MR arthrogram as a single session procedure. The injections were performed by fellow or attending physicians. Outcome variables included technical success, extracapsular contrast leakage, procedure times, major complications, and patient experience obtained through a postprocedural questionnaire. Efficiency was assessed by comparison with procedural times of 50 recent fluoroscopy-guided MR arthrography procedures, consisting of injection and subsequent mixed MRI and MR arthrography. We used unpaired t-test and a $p<0.05$ significance level.

RESULTS

MR-guided shoulder arthrography was technically successful in 152/154 (99%) patients, whereas in 2/154 patients the procedure was prematurely terminated due to patient discomfort and inability to achieve intra-articular puncture. 10/152 (7%) procedures had mild extra-articular contrast leakage. There were no major complications. The procedure was tolerated well with low rates of moderate nausea (3%), moderate pain (7%), severe pain (2%), and no higher-grade claustrophobia, flashes, or heat sensations. MR-guided MR arthrography required a total of 87 (53-140) min including MRI [39 (16-59) min], MR-guided injection [28 (9-77) min], and MRA [16 (4-27) min]. In comparison, fluoroscopy-guided MR-arthrography required a total time of 104 (51 -158) min ($p<0.001$).

CONCLUSION

3-Tesla MR-guided MR arthrography of the shoulder is clinically feasible and affords high technical accuracy, as well as favorable safety profile and efficiency, which may supersede traditional fluoroscopy-guided MR arthrography.

CLINICAL RELEVANCE/APPLICATION

3-Tesla MR-guided shoulder MR arthrography is safe, accurate, and can eliminate delays between and coordination of traditional MR arthrography caused by fluoroscopy-guided injection and MRI.

RC604-04 Percutaneous CT Guided Bone Biopsy For Suspected Osteomyelitis: Diagnostic Yield and Impact on Patient's Treatment Change and Recovery

Thursday, Nov. 29 9:30AM - 9:40AM Room: E353C

Participants
Diana Hoang, Dallas, TX (*Presenter*) Nothing to Disclose
Stephen Fisher, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Avneesh Chhabra, MD, Dallas, TX (*Abstract Co-Author*) Consultant, ICON plc; Author with royalties, Wolters Kluwer nv; Author with royalties, Jaypee Brothers Medical Publishers Ltd

For information about this presentation, contact:

avneesh.chhabra@utsouthwestern.edu

PURPOSE

To evaluate the utility of percutaneous CT guided bone biopsy (PCBB) for suspected osteomyelitis (OM) and their eventual impact in the management of osteomyelitis in a consecutive series of patients in a tertiary care hospital system. Our hypothesis was that the yield of PCBB is not high and it changes the diagnostic plan only in a minority of cases.

METHOD AND MATERIALS

A chart review was performed of patients who received a PCBB for suspected OM from years 2012-2018. Patient demographics, location, ulcer grade, signs of toxemia, serology, wound and blood cultures, bone biopsy and cross-sectional imaging results were recorded. Diagnostic yield of the PCBB was determined from the histology as the primary event and secondarily, its role in influencing the final treatment plan and patient recovery were evaluated.

RESULTS

115 patients, mean age 50.86 ± 14.49 yrs, male to female ratio 2.4:1 were included. The locations were sacrum/ischium (49/115, 43%), spine (35/115, 30%), extremities (32/115, 28%), and chest wall (2/115, 1.7%). Clinical findings included 40/115 (35%) had toxemia and 67/115 (58%) had ulcers, of which 49/50 (98%) were high grade. 17/111 (15%), 64/74 (86%), and 86/98 (88%) had an elevated WBC, CRP, and sedimentation rate, respectively. 22/91 (24%) had a positive blood culture and all 23/23 had a positive wound culture. MRI, CT, and SPECT-CT were available in 103/114 (90%), 8/114 (7%), and 7/114 (6%), respectively. On imaging, definitive and possible OM were reported in 83% and 14%, respectively, with 1.7% as no OM. Only 24/115 (21%) had a positive bone biopsy culture of which 19/24 contained organisms not shown in blood or wound cultures. Notably, 5/55 (9%) bone cultures showed organisms already present in other cultures. Only 10/24 (42%) total positive bone cultures impacted the treatment plan. Conversely, 45/91 (49%) cases that had a negative bone culture resulted in an altered treatment plan solely on basis of other findings. During follow-up of both types of cases- 19/22 (79%) with positive bone cultures and 55/79 (70%) with negative bone cultures, improved.

CONCLUSION

Despite positive cross-sectional findings of OM, image directed CT guided bone biopsies produce a low yield in final culture and have low impact in changing the treatment plan or in patient recovery

CLINICAL RELEVANCE/APPLICATION

CT guided bone biopsies play a limited role in the final diagnosis of osteomyelitis or impacting patient management.

RC604-05 CT-guided Discitis-Osteomyelitis Biopsies: Needle Gauge and Microbiology Results

Thursday, Nov. 29 9:40AM - 9:50AM Room: E353C

Participants
Jad S. Husseini, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Brooks Applewhite, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Nathaniel D. Mercaldo, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Joao Rafael T. Vicentini, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Sandra B. Nelson, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Frank J. Simeone, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Connie Y. Chang, MD, Boston, MA (*Presenter*) Nothing to Disclose

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cychang@mgh.harvard.edu

PURPOSE

To compare the microbiology results and needle gauge for CT-guided biopsies of suspected acute discitis-osteomyelitis.

METHOD AND MATERIALS

All CT-guided biopsies performed for suspected acute discitis-osteomyelitis between May 2014 and December 2017 were reviewed. Biopsy location, needle type and gauge, microbiology, pathology, and clinical and imaging follow-up were obtained through chart review. Descriptive statistics were computed for all demographic and biopsy characteristics. Logistic regression analyses were used to quantify the association between a correct test result and needle gauge. Odds ratios and 95% confidence intervals were computed using the full cohort to summarize accuracy and using those with confirmed acute discitis-osteomyelitis infection to summarize sensitivity.

RESULTS

A total of 79 (age: 55 ± 19 years; 26 (33%) F; 1 (1%) cervical, 18 (23%) thoracic, 60 (76%) lumbar) biopsies were performed. There were 37 (47%) bone/disc biopsies, 30 (38%) disc only biopsies, 9 (11%) bone only biopsies, and 3 (4%) paravertebral soft tissue biopsies. There were 14 (18%) 12 gauge (G) biopsies, 12 (15%) 13 G biopsies, 21 (27%) 14 G biopsies, and 32 (41%) 16+ G biopsies. True disease status (infection) was determined via either pathology findings (64, 82%) or clinical and imaging follow up (15, 18%). The overall accuracy and sensitivity of the CT-guided biopsies were 82% (95% CI: 73-91) and 74% (60-87), respectively. The estimates by gauge were [accuracy, sensitivity]: 12 G, [79 (49-95), 82 (48-98)]; 13 G, [58 (28-85), 56 (21-86)]; 14 G, [48 (26-70), 45 (23-68)]; 16+ G, [53(35-71), 42 (23-63)]. The odds ratios of 12 vs 13+, 12 and 13 vs 14+, and 12 to 14 vs 16+ G needle biopsies were 3.3 (0.9-15.8), 2.2 (0.8-6.1), and 1.3 (0.5-3.2), respectively. Similar estimates of obtaining positive microbiology results among disease positive patients were 5.4 (1.3-37.6), 3.0 (1.0-9.9), and 1.8 (0.7-5.1), respectively.

CONCLUSION

The odds of having an accurate microbiology result were 5.4 (1.3-37.6) times higher among disease positive patients. These results suggest that the use of a larger gauge biopsy needle may increase the likelihood of culturing the causative microorganism for CT-guided biopsies of acute discitis-osteomyelitis.

CLINICAL RELEVANCE/APPLICATION

Using a lower gauge biopsy needle needle to obtain a larger core sample may help to culture the causative organism in discitis-osteomyelitis.

RC604-06 Foot/Ankle

Thursday, Nov. 29 9:50AM - 10:10AM Room: E353C

Participants
Joel S. Newman, MD, Boston, MA (*Presenter*) Consultant, Pfizer Inc

LEARNING OBJECTIVES

1) Apply specific arthographic techniques to large and small joints of the foot and ankle, with emphasis on the subtalar joint and smaller articulations of the midfoot and forefoot. 2) Contrast fluoroscopic and ultrasound guided techniques for joint interventions at the foot. 3) Review a variety of ultrasound-guided interventions at the soft-tissues of the foot and ankle for the purposes of pain management, emphasizing tendon sheath and bursa injections . 4) Contrast varied anatomic approaches for ultrasound-guided injection of the interdigital webspaces at the toes for Morton Neuroma.

RC604-07 Elbow/Wrist

Thursday, Nov. 29 10:20AM - 10:40AM Room: E353C

Participants
Kenneth S. Lee, MD, Madison, WI (*Presenter*) Grant, General Electric Company Research support, SuperSonic Imagine Research support, Johnson & Johnson Consultant, Echometrix, LLC Royalties, Reed Elsevier

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Understand the clinical indications of interventions involving the elbow and wrist. 2) Describe the interventional techniques involved in diagnosing and/or treating common elbow and wrist pathology.

RC604-08 Technical Feasibility of Electromagnetic Fusion Imaging-Guided Spinal Bone Biopsies

Thursday, Nov. 29 10:40AM - 10:50AM Room: E353C

Participants
Giovanni Mauri, MD, Milan, Italy (*Abstract Co-Author*) Consultant, Esaote SpA
Domenico Albano, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Carmelo Messina, MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Angelo Corazza, MD, Genova, Italy (*Abstract Co-Author*) Nothing to Disclose
Santi Rapisarda, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Luca Maria Sconfienza, MD, PhD, Milano, Italy (*Presenter*) Travel support, Bracco Group; Travel support, Esaote SpA; Travel support, ABIOGEN PHARMA SpA; Speakers Bureau, Fidia Pharma Group SpA

For information about this presentation, contact:

io@lucasconfienza.it

PURPOSE

Electromagnetic fusion imaging is an established modality to perform interventional procedures around the body. However, this modality has never been tested in the spine. Our aim was to test the technical feasibility of electromagnetic fusion imaging-guided spinal bone biopsies.

METHOD AND MATERIALS

Between February and March 2018, nine patients (four males, mean age 4712 years) referred to our radiology unit of a tertiary orthopaedic center to undergo a bone biopsy of the spine. Lesions were located in the sacrum (n=3), vertebral body (n=3), intervertebral disc (n=3). Patients were placed prone on CT table (64 slice, Siemens, Germany), an external fiducial marker was placed in the relevant area and image volume was acquired. DICOM dataset was then loaded on a US system (Twice, Esaote, Italy) equipped with a GPS-based electromagnetic navigation unit and a needle-tracking system. Bone biopsy was then performed with standard procedure using CT and fusion guidance for the first six cases and fusion guidance only in the last three. For every procedure, we recorded the elapsed time between local anesthesia and specimen withdrawal, the number of CT passes, complications, specimen adequacy. We compared the elapsed times and number of CT passes with similar previous cases performed with standard CT-guided procedures.

RESULTS

Mean elapsed time for the first six cases was 455 minutes, while for cases performed using fusion imaging only was 307 minutes (P=0.061). In similar previous cases performed with standard CT-guided procedures, elapsed time was 446 minutes (P=0.809) and 454 minutes (P=0.05), respectively. Median number of CT passes for the first six cases was 7.5 (IQR 5.75-8.25) while it was 3 (3-3) for cases performed using fusion imaging only. In similar previous cases performed with standard CT-guided procedures, median number of CT passes was 6 (5-7.25) (P=0.219) and 8 (7-8) (P=0.042), respectively. No complications occurred and all specimens were adequate.

CONCLUSION

Although on a small series and after initial testing, electromagnetic fusion imaging-guided spine biopsy seems to be feasible and may reduce the procedural time and the number of CT passes, thus also reducing radiation administration.

CLINICAL RELEVANCE/APPLICATION

Electromagnetic fusion imaging-guided spine biopsy seems to be promising in reducing procedure time and amount of radiations administered to patients.

RC604-09 Clinical and Patient-Reported Outcomes After Image-Guided Intra-Articular Therapeutic Hip Injections in Patients with Osteoarthritis Related Hip Pain: A Retrospective Study

Thursday, Nov. 29 10:50AM - 11:00AM Room: E353C

Participants
William Walter, MD, New York, NY (*Presenter*) Nothing to Disclose
Craig Bearison, New York, NY (*Abstract Co-Author*) Nothing to Disclose
James Slover, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Heather T. Gold, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Soterios Gyftopoulos, MD, Scarsdale, NY (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

william.walter@nyumc.org

PURPOSE

To evaluate change in patient reported outcomes (PROs) scores for patients undergoing image-guided intraarticular therapeutic hip steroid injections for pain management and assess potential correlation of outcomes with patient- and injection-specific factors.

METHOD AND MATERIALS

We performed a retrospective medical record review of consecutive patients undergoing treatment for hip pain who completed PRO surveys from 10/2011-09/2017 at an outpatient orthopedic surgery clinic. Patients underwent steroid hip injection and completed PRO assessments: EuroQol-5 domain (EQ5D), EQ5D visual analog scale, and the hip disability and osteoarthritis outcome (HOOS), before injection and within 1-6 months post-injection. Pre- and post-injection PRO scores were compared. Time to repeat injection and hip surgery was recorded. Available imaging was reviewed for degree of osteoarthritis. Statistical methods included exact Wilcoxon signed rank test to assess score differences and Spearman correlation, and Kruskal-Wallis, and exact Mann-Whitney tests to assess correlation of PRO scores with patient and injection-specific factors.

RESULTS

In the 144 patients who met our inclusion criteria, there was no significant change from pre-injection to post-injection in the EQ5D (p=0.210), EQ5D visual analog scale (p=0.293), average HOOS (p=0.562) or total HOOS (p=0.459) scores. Forty patients (27.8%)

underwent hip arthroplasty within 1 year of the injection. Weakly positive correlation was found between number of days from injection to surgery and change in EQ-5D (r=0.29, p=0.023) and average (r=0.36, p=0.008) and total HOOS (r=0.40, p=0.003) scores. No other significant correlations between PRO score change and patient- or injection-specific factors, including radiographic degree of osteoarthritis, were detected.

CONCLUSION

We demonstrated no significant change in EQ5D or HOOS scores measured before intra-articular therapeutic hip injections compared with 1-6 months after injection. While our results should temper expectations for symptom improvement, further study is required to systematize PRO collection and identify predictive factors or patient subsets most likely to benefit from these injections.

CLINICAL RELEVANCE/APPLICATION

Image-guided therapeutic injections may not significantly change quality of life among patients with osteoarthritis-related hip pain, as measured by PROs.

RC604-10 Ultrasound-Guided Aspiration of Hematomas: Safety, Efficacy and Relationship to Sonographic Appearance

Thursday, Nov. 29 11:00AM - 11:10AM Room: E353C

Awards
Student Travel Stipend Award

Participants
Edward S. Yoon, MD, New York, NY (*Presenter*) Nothing to Disclose
Theodore T. Miller, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Susan C. Lee, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

yoone@hss.edu

PURPOSE

To evaluate the safety and efficacy of ultrasound-guided aspiration of musculoskeletal hematomas. To determine whether the age of hematomas correlates with their sonographic appearance, and if the appearance predicts the ease of aspiration.

METHOD AND MATERIALS

With IRB approval, we searched our radiology database between 1/01/2008 - 9/28/2017, for hematoma aspirations performed by a single senior musculoskeletal radiologist specializing in musculoskeletal ultrasound. We reviewed the echogenicity of the collection (hypoechoic, heterogeneous, complex, echogenic), age of the hematoma, aspiration amount and aspirate consistency/quality, whether lavage was performed, needle gauge, location, complications, and amount of decompression categorized as minimal (<25% decompression), moderate (25-75%), and complete (>75%). Electronic medical records were reviewed to determine the clinical outcome and any complications.

RESULTS

67 patients (32 females/35males, 16-80 years old) had US-guided hematoma aspirations. 47 patients returned for clinical follow-up with no infections and all reporting symptomatic relief. Hematoma locations included intramuscular, intrabursal, and intraarticular. Of the 67 hematomas, 34 were lavaged with saline or lidocaine which improved the aspiration. The amount of decompression ranged from: minimal (8/67), moderate (18/67), and complete (41/67). Of the completely decompressed hematomas, (6/41,13%) were hypoechoic, (23/41,47%) heterogeneous, (18/41,40%) complex, and (0/41) echogenic. Of the moderately decompressed hematomas, (0/18) were hypoechoic, (10/18,56%) heterogeneous, (8/18,44%) complex, and (0/18) echogenic. Of the minimally decompressed hematomas, (1/8,13%) were hypoechoic, (4/8,50%) heterogeneous, (2/8,25%) complex, and (1/8,13%) echogenic. Age of hematomas in 45/67 patients ranged from 1-90 days with an average of 11 days. Ordinal logistic regression showed no significant correlation between echotexture (p=0.075) or the age of the hematoma with ease of aspiration (p=0.085).

CONCLUSION

Ultrasound-guided hematoma aspiration is a safe and effective treatment. There is no correlation between the echogenicity of the hematoma, age of the hematoma, and ease of aspiration/amount of decompression.

CLINICAL RELEVANCE/APPLICATION

Hematoma aspiration is a safe procedure. The age and sonographic appearance of the hematoma do not predict the ease of aspiration.

RC604-11 Shoulder

Thursday, Nov. 29 11:10AM - 11:35AM Room: E353C

Participants
Robert S. Campbell, MBBCh, Liverpool, United Kingdom (*Presenter*) Nothing to Disclose

Active Handout:Robert SD Campbell

http://abstract.rsna.org/uploads/2018/18000812/Shoulder Intervention_Campbell_RSNA_2018RC604-11.pdf

LEARNING OBJECTIVES

1) The clinical Indications for undertaking shoulder intervention. 2) The techniques for performing shoulder interventions. 3) The evidence base that supports the use of shoulder interventions.

RC604-12 Ablative Techniques

Thursday, Nov. 29 11:35AM - 12:00PM Room: E353C

Participants
Travis J. Hillen, MD, Saint Louis, MO (*Presenter*) Consultant, Biomedical Systems; Consultant, Medtronic plc

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LEARNING OBJECTIVES

1) Discuss the mutliple different ablation modalities and common uses for each. 2) Indications and techniques for benign musculoskeletal tumor ablation. 3) Indications and techniques for malignant tumor ablation. 4) Indications and techniques for thermoprotection with ablation. 5) Contraindications and potential complications to tumor ablation.

RC605

Traumatic Brain Injury

Thursday, Nov. 29 8:30AM - 10:00AM Room: E352

ER NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Apostolos J. Tsiouris, MD, New York, NY (*Moderator*) Consultant, BioClinica, Inc; Consultant, ICON plc; Consultant, PAREXEL International Corporation

Sub-Events

RC605A Imaging and Subconcussive Impacts in Youth Sports

Participants
Joseph A. Maldjian, MD, Dallas, TX (*Presenter*) Consultant, BioClinica, Inc; Consultant, Koninklijke Philips NV

For information about this presentation, contact:

Joseph.Maldjian@UTSouthwestern.edu

LEARNING OBJECTIVES

1) Discuss impact exposure in youth and high school football. 2) Recognize the imaging correlates of head impact. exposure. 3) Identify how risks can be reduced.

RC605B 'Don't Miss' Lesions in Traumatic Brain Injury

Participants
Yvonne W. Lui, MD, New York, NY (*Presenter*) Research collaboration, Siemens AG; Advisor, Bold Brain Ventures

LEARNING OBJECTIVES

1) Understand the anatomy of head trauma. 2) Know indications for Brain MRI in the setting of trauma. 3) Be aware of new techniques in imaging for concussion.

RC605C Neuroimaging of Military TBI

Participants
Gerard Riedy, MD, PhD, Bethesda, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify unique characteristics of military TBI compared to civilian TBI. 2) Understand advanced imaging MRI techniques application to military TBI. 3) Recognize the potential uses and limitations of these techniques for chronic mild TBI in the US military.

RC606

Imaging of the Head & Neck Glands: Thyroid, Parathyroid, and Salivary Glands (Interactive Session)

Thursday, Nov. 29 8:30AM - 10:00AM Room: E450B

HN NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

For information about this presentation, contact:

shatzkes@hotmail.com

Sub-Events

RC606A Salivary Gland Disease

Participants
Claudia F. Kirsch, MD, New York, NY (*Presenter*) Stockholder, ABIOMED, Inc; Stockholder, LeMaitre Vascular, Inc; Stockholder, Becton, Dickinson and Company; Royalties, Informa plc;

For information about this presentation, contact:

cfekirsch@gmail.com

LEARNING OBJECTIVES

1) Define the radiographic features of salivary tissue and cross-sectional imaging techniques utilized to image salivary tissue with Computed Tomography (CT) and Magnetic Resonance Imaging (MRI). 2) Classify and compare the radiographic features of salivary diseases arising from infectious, inflammatory or neoplastic etiologies. 3)Describe key radiographic features allowing for differentiation of salivary gland pathology.

ABSTRACT

The purpose of this course is to define the normal and pathologic radiographic features of salivary tissue utilzing cross-sectional imaging techniques such as Computed Tomography (CT) and Magnetic Resonance Imaging (MRI). After attending this course the attendee should have a better awareness of how to classify and compare the radiographic features of salivary pathology occuring from infectious, inflammatory or neoplastic etiologies.

RC606B Imaging Work-up of Hyperparathyroidism

Participants
Jenny K. Hoang, MBBS, Durham, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jennykh@gmail.com

LEARNING OBJECTIVES

1) Discuss rationale for imaging for hyperparathyroidism. 2) Review essential anatomy and embryology of the parathyroid glands. 3) Describe the role of the different imaging modalities and typical and atypical imaging findings.

Active Handout:Jenny K. Hoang

http://abstract.rsna.org/uploads/2018/18000456/Imaging for hyperparathyroidism RC606B.pdf

RC606C TI-RADS and the Incidental Thyroid Nodule

Participants
Ashley H. Aiken, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ashley.aiken@emoryhealthcare.org

LEARNING OBJECTIVES

1) Discuss the incidence, significance and natural history of incidental thyroid nodules and differentiated thyroid cancer respectively. 2) Know the current literature and best practice recommendations for further imaging evaluation (US) and FNA of the incidental thyroid nodule.3) Understand the lexicon and risk categories of TI-RADS in order to provide evidence based recommendations for thyroid nodule management based on sonographic features.

ABSTRACT

Thyroid nodules are extremely common, with approximately 50% at autopsy. Most of these nodules are less than a centimeter. Thyroid cancer is also common, but not nearly as common as thyroid nodules, with approximately 2-5% at autopsy. Thyroid cancer incidence is on the rise without a significant change in mortality rate. There is evidence that a rising incidence of sub centimeter papillary thyroid cancer results from increased detection on CT. In the past several years, ACR has published a series of white

papers to guide the management of these extremely common incidental thyroid nodules. This presentation will review the current literature and suggest some practical guidelines to help radiologists decide how to report these nodules. Current evidence suggests that a stratification approach, incorporating aggressive imaging findings, age younger than 35-40 years, and a 15-mm cutoff for triaging work-up, may reduce this excess work-up of benign ITNs while capturing the same proportion of thyroid malignancies. Ultrasound is the study of choice for the evaluation of an intrathyroidal mass or nodule. CT has no signs that help to differentiate malignant from benign thyroid nodules, and is therefore not the study of choice. Templates should be easily understandable with numerical scores for levels of suspicion and have linked management recommendations which reflect a multidisciplinary consensus approach. The consensus for next management steps opens avenues for direct patient reporting and highlights the radiologist's added value in patient care. These templates also produce data minable reports which will pave the way to address optimal surveillance imaging algorithms and timing, imaging accuracy, reader performance, inter-observer variability, etc.The goal of ACR TI-RADS is to provide practitioners with evidence- based recommendations for the management of thyroid nodules on the basis of sonographic features that can be applied to every lesion. The ACR TI-RADS committee has produced three ACR white paper publications: Management guidelines for incidental thyroid nodules, thyroid ultrasound reporting lexicon and a standardized risk stratification system called TI-RADS (Thyroid Imaging, Reporting and Data system). The lexicon outlines the evaluation of thyroid nodules according to composition, echogenicity, shape, size, margins and echogenic foci, and the risk stratification system based on this lexicon directs management.

Active Handout:Ashley Hawk Aiken

http://abstract.rsna.org/uploads/2018/18000457/incidentalthyroid RC606C.pdf

RC606D Imaging Thyroid Cancer

Participants
Yoshimi Anzai, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

yoshimi.anzai@hsc.utah.edu

LEARNING OBJECTIVES

1) To understand how imaging can be used for diagnostic work-up for patients with thyroid cancer. 2) To discuss various imaging options for evaluation of thyroid cancer. 3) To learn new AJCC TNM staging changes for thyroid cancer.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Yoshimi Anzai, MD - 2014 Honored Educator

RC607

Chronic Pelvic Pain: Added Value of MRI in Endometriosis, Fibroids, and Pelvic Floor Relaxation

Thursday, Nov. 29 8:30AM - 10:00AM Room: S402AB

GU MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Susan M. Ascher, MD, Washington, DC (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Improve knowledge of the economic and psychosocial impact of chronic pelvic pain. 2) Review the indications and MRI imaging protocols for endometriosis. 3) Recognize the MRI appearance of endometriosis. 4) Review the epidemiology and clinical presentations of leiomyomas. 5) Review current treatment options for symptomatic leiomyomas. 6) Recognize the MRI appearance of leiomyomas to include differentiating them from other myometrial masses. 7) Review common surgical interventions for stress urinary incontinence and pelvic organ prolapse. 8) Describe the MRI technique for imaging synthetic material in the pelvic floor. 9) Recognize normal and abnormal MRI appearances of synthetic materials used in pelvic floor dysfunction.

Sub-Events

RC607A Overview: Why is this Subject Important?

Participants
Susan M. Ascher, MD, Washington, DC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC607B Endometriosis: Pearls and Pitfalls

Participants
Elizabeth A. Sadowski, MD, Madison, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC607C Leiomyomas: Pre- and Post-procedural Imaging - More Than a Roadmap

Participants
Yuliya Lakhman, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC607D Slings and Meshes: Guide to MR Imaging of Pelvic Floor Following Surgical Repair

Participants
Gaurav Khatri, MD, Dallas, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

gaurav.khatri@utsouthwestern.edu

LEARNING OBJECTIVES

1) Review common surgical interventions for stress urinary incontinence and pelvic organ prolapse. 2) Describe the MRI technique for imaging synthetic material in the pelvic floor. 3) Recognize normal and abnormal MRI appearances of synthetic materials used in pelvic floor dysfunction.

Active Handout:Gaurav Khatri

http://abstract.rsna.org/uploads/2018/18000692/Khatri_ RSNA 2018_MRI of Pelvis After Surgical Repair_HANDOUT RC607D.pdf

RC608

Emergency Radiology Series: Current Imaging of the Acute Abdomen

Thursday, Nov. 29 8:30AM - 12:00PM Room: E451B

ER GI GU OB

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants
John J. Hines Jr, MD, Huntington, NY (*Moderator*) Nothing to Disclose
Douglas S. Katz, MD, Mineola, NY (*Moderator*) Nothing to Disclose
Mariano Scaglione, MD, Castel Volturno, Italy (*Moderator*) Nothing to Disclose
Ferco H. Berger, MD, Toronto, ON (*Moderator*) Nothing to Disclose

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ferco.berger@sunnybrook.ca

LEARNING OBJECTIVES

1) To understand the rational use of plain film, US, CT and MR in the acute abdomen. 2) To evaluate the imaging modalities in the appropriate clinical contest.

Sub-Events

RC608-01 Uncommon Acute Conditions of the Small Bowel

Thursday, Nov. 29 8:30AM - 9:05AM Room: E451B

Participants
Vincent M. Mellnick, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Utilize plain film, CT and MRI to identify and characterize acute conditions of the small bowel. 2) Identify uncommon conditions of the small bowel that result in obstruction, ischemia, inflammation, and hemorrhage including Meckel's diverticula, angioedema, small bowel tumors, and foreign bodies. 3) Differentiate between surgical and nonsurgical causes of acute small bowel pathology. 4) Assist referring clinicians to guide management.

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RC608-02 Identification of Pneumoperitoneum on Chest Radiographs Using Deep Learning

Thursday, Nov. 29 9:05AM - 9:15AM Room: E451B

Participants
Paul H. Yi, MD, Baltimore, MD (*Presenter*) Nothing to Disclose
Tae Kyung Kim, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jinchi Wei, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Ji Won Shin, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Tae Soo Kim, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Gregory D. Hager, PhD, MSc, Baltimore, MD (*Abstract Co-Author*) Co-founder, Clear Guide Medical LLC CEO, Clear Guide Medical LLC
Susan C. Harvey, MD, Lutherville, MD (*Abstract Co-Author*) Consultant, Hologic, Inc Consultant, IBM Corporation
Haris I. Sair, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Ferdinand K. Hui, MD, Richmond, VA (*Abstract Co-Author*) Speakers Bureau, Terumo Corporation Speakers Bureau, Penumbra, Inc Stockholder, Blockade Medical Inc
Cheng Ting Lin, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Pneumoperitoneum is a critical finding which can be missed at the periphery of chest radiographs (CXRs). The purpose of this study

was to develop and test the performance of deep convolutional neural networks (DCNNs) for the automated detection of pneumoperitoneum on CXRs.

METHOD AND MATERIALS

We obtained 148 de-identified frontal view CXRs consisting of 74 abnormal CXRs with and 74 control CXRs without pneumoperitoneum (50% each). Ground-truth classification was performed by 2 board-certified radiologists. The CXRs were randomly split into training (70%), validation (10%), and test (20%) datasets. The training and validation datasets were augmented 30x using multiple rotations, flipping, random cropping, and non-rigid deformation. The ResNet-18 DCNN pretrained on ImageNet was then trained and validated using these augmented images. Receiver operating characteristic (ROC) curves with area under the curve (AUC) and standard diagnostic measures were used to evaluate the DCNN's performance on the test dataset.

RESULTS

The DCNN had an AUC of 0.98 and accuracy of 98% for distinguishing between the presence and absence of pneumoperitoneum on the test dataset. The DCNN was incorrect in 1 of the 25 test cases (false negative), which was correctly interpreted by a thoracic radiologist. Sensitivity and specificity were 100% and 96%, respectively.

CONCLUSION

Even with a small training set, our DCNN has very high accuracy for automated identification of pneumoperitoneum on CXRs, which may help expedite radiologist review of CXRs with potentially-life threatening findings.

CLINICAL RELEVANCE/APPLICATION

Deep convolutional neural networks can automatically detect pneumoperitoneum with near-perfect accuracy, thus potentially expediting diagnosis of potentially-life threatening condition.

RC608-03 Utility of Biphasic Multi-Detector Computed Tomography in Suspected Acute Mesenteric Ischemia in the Emergency Department

Thursday, Nov. 29 9:15AM - 9:25AM Room: E451B

Participants
Prasaanthan Gopee-Ramanan, MD, Hamilton, ON (*Presenter*) Nothing to Disclose
Michael N. Patlas, MD,FRCPC, Hamilton, ON (*Abstract Co-Author*) Nothing to Disclose
Bharadwaj Pindiprolu, BSC, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Douglas S. Katz, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose

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patlas@hhsc.ca

PURPOSE

To retrospectively evaluate the utility of biphasic multi-detector computed tomography (MDCT) with arterial and portal venous phases for the depiction of suspected acute mesenteric ischemia (AMI) in emergency department (ED) patients.

METHOD AND MATERIALS

An IRB-approved retrospective review of all adult patients who underwent an emergency biphasic IV contrast-enhanced 64-MDCT examination of the abdomen and pelvis due to clinical suspicion for AMI over a five-year period at a single institution was performed. Extracted data included demographics, initial clinical presentations, laboratory tests (serum lactate level), MDCT findings, and subsequent management (operative vs. non-operative).

RESULTS

225 patients underwent biphasic MDCT for suspected occlusive AMI between 10/1/2011 and 31/7/2016. 200/225 patients were negative for AMI, with the main alternative findings in descending order of prevalence including no significant abnormalities (98), non-specific colitis (24), small bowel obstruction (12), and acute cholecystitis (8). 25/225 patients [mean age 73.5 years; age range 48 to 94 years; 13 men and 12 women] had MDCT findings positive for bowel ischemia (yield of 11.1%). On MDCT, 18/25 (72%) had an occlusive arterial etiology for AMI (splanchnic vessel thrombus/severe stenosis, and associated ischemic changes of the bowel), 2/25 (8%) had an occlusive venous etiology (venous thrombus and associated bowel ischemia), and 5/25 (20%) had non-occlusive AMI (bowel ischemia with normal vessels). Of the patients with MDCT positive for AMI, 14/25 (56%) were surgically managed. 12/14 (85.7%) had surgically-proven occlusive arterial AMI, and 1/14 (7.1%) had surgically-proven occlusive venous AMI. 20/25 (80%) patients with positive MDCT findings of AMI also had an elevated serum lactate level, including 14/18 (77.8%) patients with arterial occlusive AMI on MDCT, 2/2 (100%) with venous occlusive AMI on MDCT, and 4/5 (80%) with non-occlusive AMI on MDCT. There were no false-positive scans, to our knowledge.

CONCLUSION

Biphasic MDCT demonstrated low but not trivial yield (11.1%) for the depiction of suspected acute mesenteric ischemia in the ED, but was particularly low for occlusive venous AMI (0.9%).

CLINICAL RELEVANCE/APPLICATION

Biphasic MDCT had a low yield for the depiction of venous acute mesenteric ischemia in our retrospective series. The portal venous phase can potentially be eliminated from CT examinations performed for suspected AMI.

Honored Educators

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RC608-04 Complicated Sigmoid Volvulus: Identification of the High Risk Patients Necessitating Emergent Surgery

Thursday, Nov. 29 9:25AM - 9:35AM Room: E451B

Participants
Subin Heo, Suwon, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hye Jin Kim, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Bohyun Kim, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Bracco Group
Jimi Huh, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jei Hee Lee, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jai Keun Kim, MD, PhD, Suwonsi, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

hjkotter@gmail.com

PURPOSE

This study aims to determine which clinical, laboratory, or computed tomography (CT) findings can help to accurately identify complicated sigmoid volvulus requiring surgery instead of endoscopic detorsion in the emergency setting.

METHOD AND MATERIALS

We performed a retrospective study of data from cohort of 51 patients admitted for sigmoid volvulus in the emergency department from January 2003 to July 2017. These patients attempted initial endoscopic detorsion after CT. Contrast-enhanced CT findings were retrospectively reviewed by two radiologists in consensus. Clinical and laboratory findings were also analyzed to evaluate the complicated sigmoid volvulus defined as irreversible bowel ischemia to necrosis requiring surgery. The reference standard for complicated sigmoid volvulus was based on surgery and follow-up endoscopic findings. Patients were categorized with complicated and simple sigmoid volvulus group. The characteristics of the two groups were compared using chi-square or Fisher exact tests. Univariate and multivariate analyses were performed to identify the risk factors predicting the complicated sigmoid volvulus.

RESULTS

Of 51 study patients, 11 patients (21.6%) were found to have complicated sigmoid volvulus, whereas 40 patients (78.4%) had simple sigmoid volvulus. Univariate analysis revealed three CT findings of reduced bowel wall enhancement, increased bowel wall thickness (> 2.2 mm), and mesenteric vein thrombosis, as well as two laboratory findings of elevated C-reactive protein and lactate levels were significantly associated with complicated sigmoid volvulus. In multivariate analysis, two CT findings of reduced bowel wall enhancement (HR, 20.2; 95% CI: 1.8, 220.4) and increased bowel wall thickness (HR, 11.9: 95% CI: 2.5, 57.8) and one clinical finding of low systolic blood pressure (< 90 mmHg [HR, 66.8, CI: 4.5, 984.3]) were identified as independent predictive factors of complicated sigmoid volvulus.

CONCLUSION

CT findings of reduced bowel wall enhancement and increased bowel wall thickness together with low systolic blood pressure can predict the complicated sigmoid volvulus necessitating surgery instead of colonoscopic detorsion as a primary emergency treatment of choice.

CLINICAL RELEVANCE/APPLICATION

CT findings of reduced bowel wall enhancement and increased bowel wall thickness and low systolic blood pressure can predict the complicated sigmoid volvulus necessitating emergent surgery.

RC608-05 Imaging of the Acute Abdomen in Pregnancy

Thursday, Nov. 29 9:35AM - 10:10AM Room: E451B

Participants
Gabriele Masselli, MD, Rome, Italy (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

gabriele.masselli@uniroma1.it

LEARNING OBJECTIVES

1) To discuss the current evidence-based recommendations regarding radiation dose concerns, the use of iodinated and gadolinium-based contrast agents, and the comparative advantages and drawbacks of multimodality imaging (ultrasound, CT, and MRI) during pregnancy. 2) To understand how to diagnose the most common causes of acute abdominal pain in pregnancy. 3) To review the imaging features of various pathologies which may present as acute abdominal pain during pregnancy.

RC608-06 Characteristics of Appendicoliths That Lead to Perforated Appendicitis in Patients Undergoing Laparoscopic Appendectomy

Thursday, Nov. 29 10:10AM - 10:20AM Room: E451B

Participants
Mustafa B. Chaudhry, MBBS, Karachi, Pakistan (*Presenter*) Nothing to Disclose
Muhammad S. Khan, MBBS, Karachi, Pakistan (*Abstract Co-Author*) Nothing to Disclose
Asad Shakil, Karachi, Pakistan (*Abstract Co-Author*) Nothing to Disclose
Wasim A. Memon I, MBBS, Karachi, Pakistan (*Abstract Co-Author*) Nothing to Disclose
Muhammad T. Siddiqui, Karachi, Pakistan (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

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PURPOSE

Appendicoliths (AL) are associated with an increased incidence of acute appendicitis. Our purpose is to determine the number, shape, density and a more proximal location of AL in the appendix that lead to perforated appendicitis (PA).

METHOD AND MATERIALS

A retrospective review of charts, of patients who underwent preoperative CT scan, had appendicitis with AL, followed by laparoscopic appendectomy from 01/2008-12/2015, was completed. Patients were divided into two groups; PA and non-perforated appendicitis (NPA). AL was divided into 2 groups according to its density; high-density AL (HDA) with >200 Hounsfield unit (HU) density and low-density AL (LDA), <200 HU. CTGA was done using radiological parameters including appendix diameter, wall thickness, intraluminal and extraluminal air, periappendiceal fat stranding and fluid, caecal wall thickening, and abscess formation. A normal appendix is considered Grade 0, and most severe, perforated appendix with abscess and pneumoperitoneum on CT was graded as Grade V. The number, density and position of the AL were ascertained and studied in relation to PA on laparoscopy.

RESULTS

Overall 100 patients were included, mean age was 28.8±11.9 years with 74 patients being males. 23 patients were in PA group and 77 in NPA group. Significantly greater proportion of patients in the PA group had; appendicolith location at the base [PA vs NPA: 14(36%) vs 25(32%) p-value 0.04], rounded lamellated type of appendicolith [PA vs NPA: 13(56%) vs 19(24.6%) p-value 0.04], higher CTGA between III-V [PA vs NPA: 15(82%) vs 38(49%) p-value 0.015], increased width of appendiceal lumen [PA vs NPA: 15.5±3.5 mm vs 13.1±8.9 mm) p-value 0.009] and thickness of appendiceal wall [PA vs NPA: 4.8±1.7 mm vs 4.1±1.4 mm) p-value 0.05]. The multiplicity of appendicoliths, HDA and post-op infectious complications were not significantly associated between groups. On multivariate analysis, no significant association was noted, due to small sample size.

CONCLUSION

High CTGA, rounded lamellated shape appendicoliths, and proximal location of AL at appendix base are more likely to cause perforated appendicitis. However, studies with large sample size are needed to establish the true characteristics of appendicoliths resulting in PA.

CLINICAL RELEVANCE/APPLICATION

High clinical suspicion must be observed for patients who have equivocal clinical signs for PA but have appendicoliths with these characteristics on CT and higher CTGA.

RC608-07 Evaluation of an AI-based Detection of Acute Findings in Abdominal CTs: Towards an Automated Work List Prioritization of Routine CT Exams

Thursday, Nov. 29 10:20AM - 10:30AM Room: E451B

Participants
David J. Winkel, MD, Basel, Switzerland (*Presenter*) Nothing to Disclose
Tobias Heye, MD, Basel , Switzerland (*Abstract Co-Author*) Nothing to Disclose
Thomas Weikert, MD, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Daniel Boll, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Bram Stieltjes, MD,PhD, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

davidjean.winkel@usb.ch

PURPOSE

To test the diagnostic performance of a deep learning-based triage system for the detection acute findings in abdominal computer tomography (CT) examinations.

METHOD AND MATERIALS

Using a RIS/PACS search engine, we obtained 100 consecutive abdominal CTs with at least one of the following findings: free-gas, free-fluid or fat-stranding and 100 control cases with absence of the listed findings. The CT data was analyzed using a convolutional neural network algorithm trained for detection of these findings on an independent sample. The validation of the results was performed on a web-based feedback system by one radiologist without prior knowledge of image findings through visual confirmation and in comparison with the original report. Measures of diagnostic accuracy were then calculated.

RESULTS

194 cases were included in the analysis, 6 excluded because of technical problems during the extraction of the DICOM datasets from the local PACS. Overall, the algorithm achieved a 93% sensitivity (91/98, 7 FN) and 97% specificity (93/96, 3 FP) in the detection of acute abdominal findings. Intraabdominal free gas was detected with a 92% sensitivity (54/59) and a 93% specificity (39/42), free fluid with a 85% sensitivity (68/80) and a 95% specificity (20/21) and fat stranding with a 81% sensitivity (42/50) and a 98% specificity (48/49). False-positive results were due to streak artifacts, partial volume effects and a misidentification of a diverticulum (each n = 1).

CONCLUSION

The algorithm's autonomous detection of acute pathological abdominal findings demonstrated a high diagnostic performance, enabling guidance of the radiology workflow towards prioritization of abdominal CT examinations with acute life threatening conditions

CLINICAL RELEVANCE/APPLICATION

Artificial Intelligence has the potential to become a key component in the radiology workflow optimization and empowers prioritization of urgent exams performed in a routine setting, thus enabling faster diagnosis, prompt communication and timely treatment.

RC608-08 Frequency Selective Nonlinear Blending in Computed Tomography for Diagnosis of Acute Gangrenous

Cholecystitis

Thursday, Nov. 29 10:30AM - 10:40AM Room: E451B

Awards
Trainee Research Prize - Resident

Participants
Ricarda Schwarz, Tuebingen, Germany (*Presenter*) Nothing to Disclose
Malte N. Bongers, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Hendrik Ditt, Forchheim, Germany (*Abstract Co-Author*) Employee, Siemens AG
Clemens Hinterleitner, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Konstantin Nikolaou, MD, Tuebingen, Germany (*Abstract Co-Author*) Advisory Panel, Siemens AG; Speakers Bureau, Siemens AG; Speaker Bureau, Bayer AG
Hans Bosmuller, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Marius Horger, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

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PURPOSE

To assess the potential benefit of frequency selective nonlinear blending (F-NLB) of contrast-enhanced CT-image (CECT) data for differentiation between gangrenous cholecystitis (GC) and acute non-gangrenous cholecystitis (AC) by comparison with conventional linear blending (LB) and histology.

METHOD AND MATERIALS

The local ethics committee approved this retrospective data analysis. We evaluated a total of 39 patients (26 men, mean age 67.8 ± 14.6 years) with clinical signs of acute cholecystitis that were referred to CECT for diagnosis and underwent subsequently surgery for cholecystitis. In average there were 4.7 days ± 4.1 days between CECT and surgery. Macroscopic evaluation of the resected gallbladders (GB) focused on the presence of focal or diffuse GB-wall necrosis, ulcera and perforation compatible with gangrenous cholecystitis. Cases with GB-perforation were assigned also to this group. CECT-image (portal-venous phase) data was evaluated by two radiologists in two different reading sessions using LB and F-NLB.

RESULTS

Histology yielded 31 GC and 8 AC. According to LB and F-NLB, cholecystitis was classified 7 GC and 32 AC and 29 GC and 10 AC, respectively. Recognition of GC reached significance only for F-NLB. 77% of GC were missed by LB. Sensitivity/specificity/PPV/NPV for LB for diagnosis of GC was 22.6%/100%/100%/25% and for F-NLB was 80.6%/50%/86.2%/40%.

CONCLUSION

F-NLB is superior to LB for early assessment of GC showing great agreement with histology.

CLINICAL RELEVANCE/APPLICATION

The main challenge for the radiologist in this emergency setting consists of making the difference between the GC and AC as accurate as possible in order to guide the surgeon in choosing the right treatment strategy (surgery vs. systemic antibiotics) and for the former to indicate the best operative approach (laparoscopic vs. open cholecystectomy). The former treatment strategy of systemic antibiotics or even external percutaneous drainage of GB may be indicated in elderly patients presenting with severe comorbidities, but only in case that they have no GC. At this point, enhancing diagnostic accuracy by increasing tissue contrast in the gallbladder wall between ischemic and non-ischemic areas might solve this dilemma.

RC608-09 Imaging of the Acute Non-pregnant Pelvis

Thursday, Nov. 29 10:55AM - 11:30AM Room: E451B

Participants
Christine O. Menias, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

menias.christine@mayo.edu

LEARNING OBJECTIVES

1) Review the Imaging features in common emergent female pelvic conditions on Ultrasound, CT and MR. 2) Discuss the role of MRI in female Pelvic Emergencies and the practical issues involved. 3) Highlight common pitfalls and differential diagnoses in acute GYN conditions. 4) Emphasize the imaging features that should not be overlooked in acute GYN conditions.

Honored Educators

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RC608-10 Usefulness of Diffusion-Weighted Magnetic Resonance Imaging on Comparison with Dynamic Contrast-enhanced Magnetic Resonance Images and Doppler Ultrasonography in Detection and Management of Testicular Torsion

Thursday, Nov. 29 11:30AM - 11:40AM Room: E451B

Participants
Balaji Jeevanandham, MBBS,MD, Chennai, India (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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PURPOSE

To compare the usefulness of diffusion-weighted magnetic resonance imaging with dynamic contrast enhanced magnetic resonance images and Doppler ultrasonography in detection and its usefulness in managementof testicular torsion

METHOD AND MATERIALS

This was a prospective study over a period of 2 years and 9 months with 78 patients were included in the study. Patients with acute scrotal pain and clinical suspicion of testicular torsions were included in the study. Patients who were known cases of epididymo-orchitis were excluded in the study. These patients were evaluated initially with ultrasound and Doppler examinations. Then the patients were imaged in Magnetic resonance imaging including T2, T2*, Diffusion weighted and Dynamic contrast enhanced images. Informed consents were obtained from the patients. Approval was obtained from institutional review board and local ethical committee.

RESULTS

Diagnostic quality images of diffusion weighted, ADC maps and Dynamic contrast subtracted images were obtained in 78 patients. In23 cases of testicular torsion as evidenced by flat curve in dynamic contrast enhanced images, the mean ADC values were significantly lower than that of the nonaffected testes (0.650 ± 0.216 vs. 1.017 ± 0.165 × 10-3 mm2/sec, $P < 0.05$). In other scrotal disorders ($n = 42$), there was no significant difference in the mean ADC value of the testes between the affected and nonaffected side ($P = 0.625$). In rest 13 cases no significant abnormality detected in both testes. The ADC value of affected-to-nonaffected testes ratio was significantly lower in cases testicular torsion than that in other scrotal disorders ($P < 0.05$).

CONCLUSION

In conclusion, this study has demonstrated that most cases of acute scrotum could be evaluated on the ADC map based on diffusion-weighted images using a 3.0 T MR system. Although diffusion-weighted imaging of the scrotum is still in the investigative stage, it can allow for the detection of testicular torsion without any use of contrast media.

CLINICAL RELEVANCE/APPLICATION

Diffusion-weighted imaging of scrotum with ADC measurements of testis can detect testicular torsion without any use of contrast media and is problem solving in equivocal cases which were difficult to dianose in Doppler ultrasonograph

RC608-11 Shortcuts Lead to Failure or Success? Analysis of the Diagnostic Accuracy of an Abbreviated MRCP Protocol in the Emergency Department

Thursday, Nov. 29 11:40AM - 11:50AM Room: E451B

Awards
Student Travel Stipend Award

Participants
David Tso, MD, Boston, MA (*Presenter*) Nothing to Disclose
Renata R. Almeida, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Mohammad Mansouri, MD, MPH, Framingham, MA (*Abstract Co-Author*) Nothing to Disclose
Anand M. Prabhakar, MD, Somerville, MA (*Abstract Co-Author*) Nothing to Disclose
Ali S. Raja, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Michael H. Lev, MD, Boston, MA (*Abstract Co-Author*) Consultant, General Electric Company; Institutional research support, General Electric Company; Stockholder, General Electric Company; Consultant, MedyMatch Technology, Ltd; Consultant, Takeda Pharmaceutical Company Limited; Consultant, D-Pharm Ltd
Efren J. Flores, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To determine the clinical utility and diagnostic accuracy of an abbreviated MRCP (A-MRCP) protocol in evaluating patients visiting the emergency department for suspected biliary obstruction.

METHOD AND MATERIALS

This is a retrospective study evaluating adult patients (Age 18 years and over) visiting a quaternary care, urban academic Level 1 trauma center between January 1, 2016 and December 31, 2017, who were imaged with MRCP while in the ED for suspected biliary obstruction. Patients were scanned with either the A-MRCP protocol consisting of 6 sequences, or the conventional MRCP (C-MRCP) protocol, consisting of 18 sequences. Findings of the A-MRCP studies were correlated with available subsequent ERCP. Other pertinent non-biliary findings were documented.

RESULTS

116 ED patients were scanned on the dedicated ED MRI scanner. Of those patients, 85 patients were scanned with the A-MRCP protocol (45.9% male, mean 57.4 years, median 57 years). The mean scan time for the A-MRCP protocol was 34 minutes,

significantly lower compared to the C-MRCP of 61 minutes ($p < 0.0001$). Only 1 study was prematurely aborted due to patient discomfort. The remainder of the studies were of diagnostic quality. 44.7% of patients received subsequent (diagnostic or therapeutic) ERCP (mean follow-up time [FU] 3 days), where the A-MRCP protocol identified 86.8% of the findings with a sensitivity of 85%, specificity of 88.9%, PPV 89.5%, NPV 84.2% using ERCP as the gold standard for the detection of biliary obstruction. A subsequent C-MRCP was acquired in 7.1% of cases for further characterization of lesions or equivocal findings (Mean FU time 66 days). Common non-biliary findings from the A-MRCP scans included pancreatic pathologies (21.1% of cases), most commonly pancreatitis (12.9%) or malignancy (8.2%). Hepatic findings were seen in 17.6% of cases and included cirrhosis (10.6%), solid liver lesions (4.7%), and abscesses (2.4%).

CONCLUSION

In the ED, abbreviated MRCP protocols for the evaluation of biliary obstruction significantly decreases the time to accurately diagnose biliary obstruction and can facilitate disposition of these patients.

CLINICAL RELEVANCE/APPLICATION

Abbreviated MR protocols have the potential to facilitate expedited management and disposition of patients in the ED while maintaining a high diagnostic accuracy.

RC608-12 Turning Around Cancer: Oncologic Imaging and Implications for Emergency Radiology Workflow

Thursday, Nov. 29 11:50AM - 12:00PM Room: E451B

Awards
Student Travel Stipend Award

Participants
Marc D. Succi, MD, Boston, MA (*Presenter*) Patent agreement, Frequency Therapeutics, LLC; Patent agreement, AugMI Labs, Inc; Stockholder, 2 Minute Medicine
Brian J. Yun, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Ravi V. Gottumukkala, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
McKinley Glover IV, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jonathan Sonis, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Stephen C. Dorner, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Benjamin A. White, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Michael H. Lev, MD, Boston, MA (*Abstract Co-Author*) Consultant, General Electric Company; Institutional research support, General Electric Company; Stockholder, General Electric Company; Consultant, MedyMatch Technology, Ltd; Consultant, Takeda Pharmaceutical Company Limited; Consultant, D-Pharm Ltd
Ali S. Raja, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anand M. Prabhakar, MD, Somerville, MA (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

Oncology patients comprise a substantial portion of the patient population served by academic hospitals. As a result, academic ED radiology departments are performing an increasing number of oncologic imaging studies, including non-acute staging studies to assess disease status. We assessed how performing and reading non-acute oncologic examinations affects ED radiology workflow and turnaround time (TAT), as defined by the time from imaging start to final signed radiologist interpretation.

METHOD AND MATERIALS

We retrospectively identified all patients on whom computed tomography (CT) was performed and interpreted in a quaternary hospital ED during the period from February 2016 to September 2017. Any CT exam order history containing cancer descriptors were included. Subsequently, chart review was performed, with assessment of free text entered by ordering physicians to determine if CT indication was related to acute presentation. All CTs performed for routine acute ED indications, and not primarily oncologic staging, were excluded. A matched cohort of routine ED CT exams during the same period was identified. We then performed a multivariate log-transformed linear regression to compare TATs.

RESULTS

Following adjustment for age and CT imaging code, oncologic CTs were independently associated with an increased log TAT compared to the log time to interpretation for routine ED CTs (114.5 mins (IQR 112) versus 69 mins (IQR 67), respectively, $p<0.0001$). Average age, examination duration, time from initial order to scan completion, and time from scan completion to image availability in PACS did not significantly differ between the oncologic imaging group and the matched non-oncologic cohort.

CONCLUSION

Non-acute oncologic staging CTs in the ED are associated with a significantly longer TAT compared to routine ED CT examinations. This has important implications for how hospitals, especially quaternary care institutions, can improve workflow and reduce TATs by triaging non-acute oncologic imaging examinations to non-ED imaging divisions.

CLINICAL RELEVANCE/APPLICATION

Oncology patients who present to the emergency department (ED) are frequently imaged. We assessed the impact of non-acute oncologic imaging performed in the ED on emergency radiology workflow.

RC609

Imaging of the Esophagus, Stomach, and Small Bowel

Thursday, Nov. 29 8:30AM - 10:00AM Room: E351

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Judy Yee, MD, Bronx, NY (*Moderator*) Research Grant, EchoPixel, Inc; Research Grant, Koninklijke Philips NV;

Sub-Events

RC609A Imaging of Gastroesophageal Reflux and Complications

Participants
Cheri L. Canon, MD, Birmingham, AL (*Presenter*) Royalties, The McGraw-Hill Companies

For information about this presentation, contact:

ccanon@uabmc.edu

LEARNING OBJECTIVES

1) Describe radiographic findings in gastroesophageal reflux disease.

RC609B Imaging Following Bariatric Procedures

Participants
Laura R. Carucci, MD, Richmond, VA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the expected postoperative radiologic appearance following commonly performed bariatric surgical procedures for morbid obesity. 2) Describe and recognize common complications and potential pitfalls following these bariatric procedures.

RC609C Diagnosing and Reporting of Small Bowel Crohn's Disease

Participants
Joel G. Fletcher, MD, Rochester, MN (*Presenter*) Grant, Siemens AG; Consultant, Medtronic plc; ;

For information about this presentation, contact:

fletcher.joel@mayo.edu

LEARNING OBJECTIVES

1) Understand SAR/AGA recommendations for the utilization of CT and MR enterography in small bowel Crohn's disease. 2) Review the unifying morphologic construct describing Crohn's enteric inflammation. 3) Review imaging findings that differentiate non-specific small bowel inflammation from active inflammatory Crohn's disease. 4) Understand imaging findings that indicate moderate to severe active inflammatory Crohn's disease, including intramural edema, ulcerations, restricted diffusion, and mural thickening. 5) Understand the standardized SAR/AGA impressions to be used for CT and MR entrography in describing active inflammatory Crohn's disease and its stricturing and penetrating complications. 6) Review the difference between transmural response and transmural healing at CT and MR enterography and understand its prognostic significance.

RC609D Recognizing Internal Hernias

Participants
Lawrence C. Chow, MD, Stanford, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lchow@stanford.edu

LEARNING OBJECTIVES

1) Recognize the most common types of internal hernias associated with congenital fossae. 2) Recognize the most common types of post-surgical internal hernias. 3) Describe universal imaging features associated with internal hernias. 4) Discuss key anatomic relationships specific to the most common types of internal hernias.

Active Handout:Lawrence C. Chow

http://abstract.rsna.org/uploads/2018/18000684/Internal Hernias_LChow_RSNA2018 RC609.pdf

RC610

Liver and Biliary Tree, Including Doppler, Contrast, and Elastography

Thursday, Nov. 29 8:30AM - 10:00AM Room: S102CD

GI US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

RC610A Liver Doppler Ultrasound

Participants
Mark E. Lockhart, MD, Birmingham, AL (*Presenter*) Author, Oxford University Press; Author, JayPee Brothers Publishers; Editor, John Wiley & Sons, Inc; Deputy Editor, Journal of Ultrasound in Medicine

LEARNING OBJECTIVES

1) Describe the technique of hepatic Doppler ultrasound and methods to improve study quality. 2) Review qualitative and quantitative criteria for diagnosing vascular abnormalities in ultrasound Doppler examinations of the liver.

ABSTRACT

This presentation will initially describe the liver Doppler ultrasound examination with emphasis on techniques to improve study quality. Subsequently, normal Doppler waveforms and threshold values will be reviewed. A variety of abnormal liver Doppler findings will then be discussed in the context of several disease processes. A significant portion of the presentation will revolve around vascular abnormalities associated with liver diseases and evaluation of TIPS shunts will be addressed. Brief discussion of how diagnostic criteria apply to complications of liver transplantation will also be covered.

RC610B Liver Tumors: The Fundamentals of Interpretation with Contrast-enhanced Ultrasound

Participants
Stephanie R. Wilson, MD, Calgary, AB (*Presenter*) Equipment support, Koninklijke Philips NV; Equipment support, Siemens AG; Equipment support, Samsung Electronics Co, Ltd; Research support, Koninklijke Philips NV; Research support, Lantheus Medical Imaging, Inc; Speaker, Samsung Electronics Co, Ltd

For information about this presentation, contact:

stephanie.wilson@ahs.ca

LEARNING OBJECTIVES

1) Provide specific diagnoses of focal over masses based on the CEUS arterial phase imaging patterns. 2) Predict malignancy based on the changes in enhancement occurring in the portal venous phase. 3) Appreciate the advantages afforded by dynamic real time imaging for CEUS showing enhancement regardless of its timing or duration.

RC610C Liver Elastography

Participants
Paul S. Sidhu, MRCP, FRCR, London, United Kingdom (*Presenter*) Speaker, Koninklijke Philips NV; Speaker, Bracco Group; Speaker, Hitachi, Ltd; Speaker, Siemens AG; Speaker, Samsung Electronics Co, Ltd; Advisory Board, Samsung Electronics Co, Ltd; Advisory Board, Itreas Ltd

For information about this presentation, contact:

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LEARNING OBJECTIVES

1) Understand the concept of liver fibrosis grading and the implications for healthcare management. 2) Review the basis for the assessment of liver fibrosis using elastography, with emphasis on the different techniques. 3) Understand the differences in the techniques and the variability in measurement assessment. 4) Achieve and overview of the need and position of this technique in clinical care.

ABSTRACT

An overview of liver ultrasound elastography, with emphasis on the techniques, clinical application and limitations of the technique.

RC610D Gallbladder and Biliary Disease

Participants
Robin P. Goldenson, MD, MPH, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the utility of Ultrasound to assess the gallbladder and biliary tree including technical considerations. 2) To be able to identify a broad range of pathological conditions involving the gallbladder and biliary tree. 3) To be able to help referring clinicians

with management and follow up of findings seen incidentally such as gallbladder polyps.

ABSTRACT

Ultrasound is arguably the best way to assess clinical concerns about the gallbladder and biliary tree, common problems in the United States and around the world. Often, the Ultrasound Department is the first to assess a patient who presents with right upper quadrant pain, jaundice, or abnormalities in liver function tests, among others. In addition, abnormalities of the gallbladder and biliary tree can be identified incidentally on imaging studies performed for other indications. This presentation will review common pathology of the gallbladder and biliary tree as well as complications and challenges related to diagnosis. In addition, less common pathology will be discussed as well as suggestions for the management and follow-up of commonly seen incidental findings such as gallbladder polyps.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC611

Advances in Cardiac Nuclear Imaging: SPECT/CT and PET/CT

Thursday, Nov. 29 8:30AM - 10:00AM Room: S504CD

CA CT NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

LEARNING OBJECTIVES

1) Understand the technical advancements associated with new scintillation cameras and SPECT-CT and PET-CT cameras. 2) Appreciate the benefits of CT attenuation correction. 3) Appreciate the adjunctive benefits of anatomic definition provided with CT and physiologic/function information provided by SPECT and PET. 4) Improve interpretive skills related to SPECT and PET-CT.

ABSTRACT

Camera and software technology recently has rapidly advanced, providing improved SPECT image resolution and increased counting statistics. These advancements in turn have provided the possibility of reduced-time and reduced radiopharmaceutical dose image acquisitions. Moreover, increased flexibility in imaging protocols has been realized. Future development of these methods hold promise in increasing diagnostic accuracy and expanding diagnostic applications. The addition of CT to SPECT and PET has afforded the ability to perform attenuation correction, thereby minizing attenuation artifacts and increasing diagnostic specificity. With CT acquisitions of sufficient resolution, complementary anatomic diagnostic information is provided. In addition, more precise anatomic localization of SPECT and PET abnormalities significantly increases clinical applicability.

Sub-Events

RC611A Advances in Cardiac SPECT

Participants
E. Gordon Depuey, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Implement protocols that facilitate patient-centered imaging and that reduce patient radiation exposure. 2) Understand software methods to cope with lower SPECT counting statistics in order to reduce scan acquisition time and/or radiopharmaceutical injected activity and their clinical impact. 3) Understand instrumentation advances that allow new cameras to perform SPECT with markedly reduced acquisition times and/or less radiopharmaceutical activity and their clinical impact. 4) Review myocardial perfusion SPECT scans systematically to avoid artifacts and maximize diagnostic accuracy.

ABSTRACT

There has been an intersocietal effort to promote patient-centered imaging with a focus on appropriateness guidelines, cost-containment, radiation dose reduction, and the selection of the most appropriate imaging test and protocol to suit particular patient needs. The following technical advancements described facilitate implementation of patient-centered imaging. New software methods and new innovative hardware now allow for significantly shortened SPECT acquisition times without a decrease in image quality. Advancements include iterative reconstruction, resolution recovery, and noise reduction software, and focused collimation and solid state detectors incorporated into new camera designs. Attenuation correction increases diagnostic specificity and facilitates stress-only protocols. Software advancements such such as high resolution imaging, scatter correction, and respiratory gating increase diagnostic sensitivity. Even with such technical advancements, however, attention to technical detail is essential to assure optimal image quality. Camera and radiopharmaceutical quality control deserve the highest priority. A systematic review of myocardial perfusion SPECT images is essential to recognize artifacts and optimize diagnostic accuracy. Case examples will be presented to reinforce this approach.

RC611B Advances in Cardiac PET

Participants
Sharmila Dorbala, MD,MPH, Boston, MA (*Presenter*) Research Grant, Astellas Group

LEARNING OBJECTIVES

1) Review the advantages and disadvantages of myocardial perfusion PET compared to SPECT for evaluation of coronary artery disease. 2) Learn the added value of absolute quantitative parameters derived from PET for assessment of coronary artery disease. 3) Discuss novel clinical applications of cardiovascular PET imaging in systemic diseases 4) Review Case Examples of Cardiac PETs

ABSTRACT

Advances in PET detectors, radiotracer availability, clinical software, as well as hybrid PET/CT and PET/MR scanners have revolutionized the clinical and investigative applications of cardiac PET. Cardiac PET myocardial perfusion imaging, in the 1970's, was a predominantly investigative tool, with home-grown software, available at select major academic centers with access to a cyclotron. Over the last decade, with easy access to PET scanners, and to positron emitting perfusion tracers, the use of cardiac PET has exploded -well beyond major academic centers to several hospitals and to large office-based practices. Robust clinical evidence coupled with commercially available software has made quantitative myocardial blood flow assessment, a main-stream clinical application. Hybrid PET/CT scanner applications- calcium score and CT based coronary angiography-have further advanced

the applications of cardiac PET. A growing body of recent literature supports the role of targeted molecular PET to image inflammatory, infectious and infiltrative heart diseases. PET/MR is an emerging technology with promising cardiovascular applications. Each of these exciting developments has transformed cardiac PET from a predominantly investigative tool of the 1970's to the current advanced clinical tool. The primary goal of this session is to discuss the present-day clinical and emerging applications of cardiac PET/CT and PET/MR using a practical case-based approach.

RC611C Cases, Clinical Examples-Panel: How to Build Practice (Both PET and SPECT)

Participants
E. Gordon Depuey, MD, New York, NY (*Presenter*) Nothing to Disclose
Sharmila Dorbala, MD,MPH, Boston, MA (*Presenter*) Research Grant, Astellas Group

LEARNING OBJECTIVES

1) Interpret cardiac SPECT and PET scans with optimal sensitivity and specificity. 2) Recognize technical and patient-related artifacts. 3) Characterize myocardial perfusion defects whereby patients can be risk stratified with regard to risk of future cardiac events. 4) Formulate reports in a clinically relevant manner.

RC612

Diseases of the Thoraco-abdominal Aorta

Thursday, Nov. 29 8:30AM - 10:00AM Room: S503AB

CH VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Phillip M. Young, MD, Rochester, MN (*Moderator*) Consultant, Arterys Inc
Kate Hanneman, MD, FRCPC, Toronto, ON (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

kate.hanneman@uhn.ca

LEARNING OBJECTIVES

1) Discuss the epidemiology of aortic dissections. 2) Review multi-modality imaging findings in patients with acute and chronic dissections. 3) Describe protocols for imaging and techniques for accurately measuring aortic aneurysms. 4) Indicate key measurements and observations relevant to the clinician when interpreting aortic aneurysms. 5) Discuss important secondary findings that may indicate increased risk of aneurysm rupture or influence management decisions. 6. Understand the typical imaging features of large vessel vasculitis and its complications. 7. Discuss challenging cases with insights from pathologic correlation. 8. Understand the role of imaging in diagnosis and management of these disorders. 9) Identify the significance of early versus delayed endograft complications. 10) Describe types of endoleaks including fenestrated aortic grafts. 11) Present treatment of endoleaks and follow-up imaging.

Sub-Events

RC612A Imaging of Aortic Dissection

Participants
Kate Hanneman, MD, FRCPC, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kate.hanneman@uhn.ca

LEARNING OBJECTIVES

1) Discuss the epidemiology of aortic dissections. 2) Review multi-modality imaging findings in patients with acute and chronic dissections.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Kate Hanneman, MD, FRCPC - 2017 Honored EducatorKate Hanneman, MD, FRCPC - 2018 Honored Educator

RC612B Imaging of Aortic Aneurysm

Participants
Iain D. Kirkpatrick, MD, Winnipeg, MB (*Presenter*) Speaker, Siemens AG

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kirkpatrick_iain@hotmail.com

LEARNING OBJECTIVES

1) Describe protocols for imaging and techniques for accurately measuring aortic aneurysms. 2) Indicate key measurements and observations relevant to the clinician when interpreting aortic aneurysms. 3) Discuss important secondary findings that may indicate increased risk of aneurysm rupture or influence management decisions.

ABSTRACT

Aortic aneurysms are a frequent finding on thoracoabdominal CT, and in an era of minimally invasive treatment it is increasingly important to be able to accurately image, measure and characterize them. This session will discuss how to optimize your scanning protocols for assessing aortic aneurysms as well as how to most accurately measure them. Key measurements and observations useful for clinicians will be reviewed. Signs of impending rupture or which suggest an infectious/inflammatory aneurysm will be discussed, as well as risk assessment for rupture.

RC612C Imaging of Vasculitis

Participants
Phillip M. Young, MD, Rochester, MN (*Presenter*) Consultant, Arterys Inc

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young.phillip@mayo.edu

LEARNING OBJECTIVES

1. Understand the typical imaging features of large vessel vasculitis and its complications 2. Discuss challenging cases with insights from pathologic correlation 3. Understand the role of imaging in diagnosis and management of these disorders.

RC612D Aortic Repair Complications: CT Imaging Findings You Need to Know

Participants
Terri J. Vrtiska, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

vrtiska.terri@mayo.edu

LEARNING OBJECTIVES

1) Identify the significance of early versus delayed endograft complications. 2) Describe types of endoleaks including fenestrated aortic grafts. 3) Present treatment of endoleaks and follow-up imaging.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Terri J. Vrtiska, MD - 2016 Honored Educator

RC613

Pediatric Series: Pediatric Safety and Quality

Thursday, Nov. 29 8:30AM - 12:00PM Room: S502AB

PD SQ

AMA PRA Category 1 Credits ™: 3.00
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants
Neville Irani, MD, Kansas City, KS (*Moderator*) Nothing to Disclose
Alex Towbin, MD, Cincinnati, OH (*Moderator*) Author, Reed Elsevier; Grant, Guerbet SA; Grant, Siemens AG; Grant, Cystic Fibrosis Foundation; Consultant, Anderson Publishing, Ltd; Advisory Board, IBM Corporation; Advisory Board, KLAS Enterprises LLC;
Nadja Kadom, MD, Atlanta, GA (*Moderator*) Nothing to Disclose
Nghia Vo, MD, Seattle, WA (*Moderator*) Nothing to Disclose

Sub-Events

RC613-01 Optimizing Run Times for MRI Protocols: Successes and Lessons Learned

Thursday, Nov. 29 8:30AM - 8:50AM Room: S502AB

Participants
Neville Irani, MD, Kansas City, KS (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand how to determine a viable focus area for improvement. 2) Know the common errors made during quality improvement projects. 3) Become familiar with a method to quantify return on investment upon conclusion of your project.

RC613-02 Beyond the DRL: Applying Automated Quality Metrics to Assess Pediatric CT Program Liver Lesion Detection Performance

Thursday, Nov. 29 8:50AM - 9:00AM Room: S502AB

Participants
Tyler Lacy, Durham, NC (*Presenter*) Nothing to Disclose
Aiping Ding, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Ehsan Abadi, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Yakun Zhang, MS, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Francesco Ria, DMP, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc
Donald P. Frush, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To apply an automated program for evaluating pediatric body CT study quality which utilizes metrics of dose and image quality for optimization of liver lesion detection.

METHOD AND MATERIALS

With IRB approval, 880 clinical contrast-enhanced abdominopelvic (AP) CT scans of patients 0-18 years were evaluated. Studies were from Siemens Flash (n=621), GE 750 HD (n=151), and GE VCT (n=108). A quantitative metric of the detection of a potential 5 mm liver lesion was used as a marker for image quality (IQ). To generate this, metrics of spatial resolution, background noise, and lesion contrast were composited. Resolution was assessed by a validated method based on anatomical edges. For noise, phantom noise power spectra were matched to patient-specific scan parameters. For contrast, a 50 Hounsfield unit difference between the IV enhanced liver and a potential 5 mm lesion was the clinical task. The three quality metrics were used to calculate a single established detectability index (d') which represents the relative likelihood of detecting the lesion and was previously correlated with observer performance. Dose reports were extracted for each dataset using an institutional dose monitoring program. Relationships between d' and radiation dose were explored.

RESULTS

There was little CTDIvol variability across ages. For example, AP studies at 100 kVp on one scanner model had a median CTDIvol of 3.0 mGy (2.8-3.4 mGy interquartile range). However, when applying d', the age groups separated such that the younger patients had higher IQ than the older patients (Figure). For the youngest age group, d' and CTDIvol (medians) were 80 and 2.7 mGy; middle groups, 59 and 2.9 mGy; and oldest group, 42 and 3.4 mGy.

CONCLUSION

An automated method to assess clinical IQ using a task-based and patient-specific metric was ascertained. The d' allows establishment of quality reference levels (QRLs) which account for IQ and dose. This provides for robust quality quantification that can serve for single or collective patient CT performance assessment and optimization. Automation also facilitates potential integration with CT registries and investigations using machine learning approaches not feasible with observer ratings alone.

CLINICAL RELEVANCE/APPLICATION

Optimization in CT utilizes DRLs based on dose estimates without metrics of image quality. The addition of quality measures taken from clinical examinations affords improved CT performance assessment.

RC613-03 Contrast-Induced Nephropathy in Pediatric Patients: A Propensity Score-Adjusted Study

Thursday, Nov. 29 9:00AM - 9:10AM Room: S502AB

Participants
Jennifer S. Mcdonald, PhD, Rochester, MN (*Presenter*) Research Grant, General Electric Company; Scientific Advisor, General Electric Company
Robert J. McDonald, MD,PhD, Rochester, MN (*Abstract Co-Author*) Consultant, General Electric Company; Research Grant, General Electric Company; Consultant, Bracco Group
Cheryl L. Tran, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Amy B. Kolbe, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Eric E. Williamson, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
David F. Kallmes, MD, Rochester, MN (*Abstract Co-Author*) Research support, Terumo Corporation; Research support, Medtronic plc; Research support, Sequent Medical, Inc; Research support, Benvenue Medical, Inc; Research support, General Electric Company; Consultant, General Electric Company; Consultant, Medtronic plc; Consultant, Johnson & Johnson

For information about this presentation, contact:

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PURPOSE

The risks of iodinated contrast material administration in pediatric patients are not well defined. The purpose of this study was to examine the rates of acute kidney injury (AKI), dialysis, and death following intravenous contrast material administration in a cohort of pediatric patients.

METHOD AND MATERIALS

Pediatric (<18 yo) patients were identified who underwent either a contrast-enhanced (contrast group) or unenhanced (noncontrast group) CT scan at our institution from 12/2001-1/2016. Patients with insufficient pre- and post-CT creatinine results, who received other iodinated contrast material at the time of CT scan, or who were on dialysis at the time of CT scan were excluded. Contrast and noncontrast group patients underwent propensity score analysis using numerous acute and chronic clinical covariates based on contrast exposure before comparing rates of AKI, dialysis, and death.

RESULTS

A total of 2201 pediatric patients (1773 contrast, 428 noncontrast) were identified. The rate of AKI and dialysis in the contrast group was 3.3% (59/1773) and 0.1% (2/1773), respectively. Following propensity score adjustment, similar rates of AKI (stage 1 AKI OR (95% CI) 0.75 (0.32-1.78), p=.51; stage 2 AKI OR 2.00 (0.18-21.9), p=.57; stage 3 AKI OR 0.50 (0.05-5.48), p=.57), dialysis (OR 1.00 (0.06-15.9, p=.99), and death (OR 1.50 (0.53-4.22), p=.44) were observed between the contrast and noncontrast groups. All patients diagnosed with post-CT stage 3 AKI were found to have other, contrast-independent potential causes of AKI.

CONCLUSION

Rates of AKI, dialysis, and death following contrast-enhanced CT scan were very low in this pediatric cohort. Administration of intravenous contrast material was not associated with an increased risk of these outcomes following propensity-score adjustment.

CLINICAL RELEVANCE/APPLICATION

These findings demonstrate that AKI and other sequelae are rare following intravenous iodinated contrast material administration in pediatric patients.

RC613-04 Safety of Repeated Pediatric Hyperpolarized 3He MR Imaging in Asthma

Thursday, Nov. 29 9:10AM - 9:20AM Room: S502AB

Participants
Nanae Tsuchiya, Madison, WI (*Presenter*) Nothing to Disclose
Mark L. Schiebler, MD, Madison, WI (*Abstract Co-Author*) Stockholder, Stemina Biomarker Discovery, Inc; Stockholder, HealthMyne, Inc;
Michael Evans, MS, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Robert V. Cadman, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Ronald L. Sorkness, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Sean B. Fain, PhD, Madison, WI (*Abstract Co-Author*) Research Grant, General Electric Company Research Consultant, Marvel Medtech, LLC

PURPOSE

The purpose of this study was to evaluate the safety of pediatric hyperpolarized helium 3 magnetic resonance imaging (HP3He MRI) in children with asthma or potential risk of asthma.

METHOD AND MATERIALS

This was an IRB approved prospective study with parental informed consent, and assent from each child. HP3He MRI was performed in 66 children (age range 8 -18 years 38 boys, 28 girls). Fifty-five subjects received a repeated follow-up examination and 5

subjects received two repeated follow-up examinations. A total of 127 HP3He MRI exams were assessed. Heart rate (HR), respiratory rate (RR) and oxygen saturation (SpO2) were recorded before, during (2min and 5 min after gas inhalation) and 1 hour after MRI. Blood pressure (BP) was obtained before and 1 hour after MRI. Any subjective symptoms were also noted. Changes in vital signs were tested for significance across time and subject age group (8-12 years, 13-15 years, 16-18 years) by using linear mixed effect models. A p value less than 0.05 determined statistical significance.

RESULTS

There were no serious adverse events. Only two minor adverse events (1.57%, headache and dizziness) were recorded. HR (p=0.007) and SpO2 (p=0.0004) were higher at 1 hour after MRI than at baseline. There were no significant changes of RR and BP in whole population. The 8-12 year-old age group had an increase in HR at 1 hour after MRI (p=0.005), a decrease in RR at 2 minutes (p=0.009) and 5 minutes (p=0.002), and an increase in SpO2 at 1 hour after gas inhalation (P<0.0001). In the 16-18 year-old group a decrease in SpO2 at 2 minutes after gas inhalation (p=0.002) was observed. No subject required treatment after HP3He MRI.

CONCLUSION

HP3He MRI was safely performed in children with asthma or potential risk of asthma, including repeated examinations in a subset of the study population. Although vital signs were slightly changed during and after MRI, there were no physiological vital signs requiring advanced monitoring or treatment. The younger age group tended to have vital signs that were more variable than their older peers.

CLINICAL RELEVANCE/APPLICATION

The use of HP3He MRI is safe in pediatric subjects with asthma. The pulse oximetry oxygen saturation levels (SpO2) were not adversely affected by this test.

RC613-06 A Novel Methodology for Automated Image Quality Assessment of Pediatric CT

Thursday, Nov. 29 9:30AM - 9:40AM Room: S502AB

Awards
Student Travel Stipend Award

Participants
Tyler Lacy, Durham, NC (*Presenter*) Nothing to Disclose
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Ehsan Abadi, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
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Ehsan Samei, PhD, Durham, NC (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc
Donald P. Frush, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To develop an effective and automated methodology for patient-specific image quality assessment of clinical pediatric body CT examinations.

METHOD AND MATERIALS

This IRB approved study evaluated 816 clinically performed (6/14-11/17), contrast-enhanced abdominopelvic (AP) CT scans of pts ages 0-18. Studies were from 3 scanners: Siemens Flash (n=637), GE 750 HD (n=72), and GE VCT (n=107). Quality metrics included noise magnitude, spatial resolution, and image contrast enhancement. Previously validated methods to measure these in adults were modified and validated for use in pediatric clinical CT images. For noise, the algorithm uses uniform areas of the images to characterize the standard deviation (SD) of Hounsfield units (HU). For contrast, the algorithm identifies ROIs in the liver, lung, aorta, and spine and measures HU values and SD. For resolution, the algorithm samples the skin-air interface which allows for quantification of spatial resolution. The frequency at 50% of the MTF curve is used in our resolution reporting which was found concordant with observer performance.

RESULTS

This system allows for determination of quality variability between any divisions of patient- or scanner-specific metrics (e.g., age, size, gender, model, protocol). In one scanner, between the youngest and oldest age groups, noise increased by 89%, absolute contrast in the liver increased by 14%, the standard deviation of liver contrast increased by 129%, and the f50 value for resolution decreased by 6% (Figure).

CONCLUSION

A novel automated system to obtain advanced quantitative image quality metrics in clinically performed AP examinations in children was established. We are able to quantitatively assess differences between metrics of study quality from patient studies rather than using simplistic phantom studies, observer studies, or manual determination of quality. One benefit of this model is that these patient-specific metrics can be integrated to generate a task-specific quantification to predict observer performance on lesion detection. This quantitative tool serves as a foundation for true CT performance optimizations beyond what can be achieved with the current quality assessment methods and dose monitoring alone.

CLINICAL RELEVANCE/APPLICATION

Current CT practice quality optimization utilizes phantom studies or cumbersome methods that require observers or manual analysis. Automated quality metrics would improve assessment of CT performance.

RC613-07 Variation in Pediatric CT Dose Indices Across the USA: Does the Type of Hospital Matter?

Thursday, Nov. 29 9:40AM - 9:50AM Room: S502AB

Participants
Keith J. Strauss, MS, Cincinnati, OH (*Presenter*) Consultant, Medical Physics Consultants, Inc Consultant, Koninklijke Philips NV Speakers Bureau, Koninklijke Philips NV
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PURPOSE

To compare three CT dose indices during pediatric imaging in academic pediatric (APED) hospitals to academic adult (AADLT), non-academic adult (NAADLT) and non-academic pediatric (NAPED) hospitals for three CT examinations.

METHOD AND MATERIALS

A list published by Children's Hospital Association identified 250 pediatric hospitals in the USA. All other institutions were classified as adult facilities. An institution with a medical school affiliation was labeled an academic center. All other institutions were labeled non-academic. The National Radiology Data Registry (NRDR) for calendar years 2016 and 2017 (N=240301) provided dose data for 3 CT examinations: Brain no IV contrast, Chest no IV contrast, and Abdomen-Pelvis with IV contrast. Pediatric patients were grouped into six and five size ranges respectively for trunk and head examinations. CT dose Index volume (CTDIvol), size specific dose estimate (SSDE), and the Dose Length Product (DLP) were compared for trunk exams; SSDE could not be compared for head examinations as it is not defined. The unequal variance T-test and F-test were used to test the hypotheses that the dose index levels and variances respectively in the APED hospitals are lower than the three other hospital groups. Statistical tests were performed for each size category and the Bonferroni-Holm correction factor was employed to establish the level of statistical significance for the statistical tests to perform multiple comparisons.

RESULTS

Analysis indicates for the majority of size groups (>=83%) the APED hospitals had statistically lower CTDIvol, DLP, and SSDE dose levels and less variability compared to AADLT, NAADLT, and NAPED hospitals. The mean percentage difference in CTDIvol for APED hospitals compared to non-academic pediatric, academic adult, and non-academic adult hospitals were lower by 45±3%, 67±3% and 71±3% across all the size groups and exam types.

CONCLUSION

The results support the hypothesis that pediatric hospitals with academic affiliations use lower, more consistent (lower variance) dose levels during pediatric CT imaging than non-academic pediatric or adult hospitals.

CLINICAL RELEVANCE/APPLICATION

These results identify the need, with the help of medical physicists, to improve imaging techniques for pediatric patients undergoing CT examinations in non-academic pediatric and adult hospitals

RC613-08 Pediatric Quality Initiatives in a Large, Multi-centric Practice

Thursday, Nov. 29 9:50AM - 10:10AM Room: S502AB

Participants
Richard E. Heller III, MD, Chicago, IL (*Presenter*) Nothing to Disclose

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LEARNING OBJECTIVES

1) Understand the value of quality improvement projects in a large group practice. 2) Describe the challenges and opportunities associated with QI projects in a multi-centric practice. 3) Outline the role of technology in operationalizing projects.

RC613-09 Leading Change: Examples from the Frontline

Thursday, Nov. 29 10:30AM - 10:50AM Room: S502AB

Participants
Alex Towbin, MD, Cincinnati, OH (*Presenter*) Author, Reed Elsevier; Grant, Guerbet SA; Grant, Siemens AG; Grant, Cystic Fibrosis Foundation; Consultant, Anderson Publishing, Ltd; Advisory Board, IBM Corporation; Advisory Board, KLAS Enterprises LLC;

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LEARNING OBJECTIVES

1) Describe at least 3 methods of leading change. 2) Describe at least three common causes of resistance to change.

ABSTRACT

Change is hard. Radiology departments strive to constantly improve. While the motiviation to improve can come from within the department or external to the department, the changes related to improcvement are often met with resistance. The purpose of this lecture is to describe multiple improvement projects and discuss the methods that the project leaders used to address resistance and incentivize change.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Alex Towbin, MD - 2014 Honored Educator

RC613-10 Improving Efficiency and Patient Access for Pediatric Sedation MRI

Thursday, Nov. 29 10:50AM - 11:00AM Room: S502AB

Participants
Shlomit Goldberg-Stein, MD, Bronx, NY (*Presenter*) Nothing to Disclose
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Kenay Johnson, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Aralis Ferreira, MS, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Glenn Mann, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Chhavi Katyal, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Kimberly DeFatta, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Marcel Stevenson, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Todd S. Miller, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Seymour Sprayregen, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Vera Donnelly, RN, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Steven Choi, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Wait time for pediatric sedation MRI appointment was >7 weeks at the start of this project. The service was inefficient with median first-case start time of 9:23am for 8am exams, with a high (23%, n=89) rate of same-day cancellations, 20% of which were due to ineffectual pre-screening for sedation suitability. Our SMART aim was to decrease MRI median start time by 50% by 11/30/17, with secondary aims to lower the same-day cancellation rate and improve access to appointments.

METHOD AND MATERIALS

We adopted a structured performance improvement project using a Donabedian model, process maps, waste walks, Ishikawa and key driver diagrams, and Pareto charts. Outcome measure was First-Case MRI start time. Four process measures were: Patient Arrival, RN Assessment Time, Sedation NP Arrival, Sedation MD Arrival. Late patient arrival was targeted over 3 PDSA cycles: PDSA 1- Management of Variation: Standardized pre-call messaging; PDSA 2- Use of Cognitive Aids: Implemented checklist and standard-language for appointment confirmations and required 3 call-attempts at 48 hrs (vs. 24 hrs) prior to appointment; PDSA 3- Enhancing relationships: Obtained free valet parking for pediatric sedation MRI. PDSA 4- Standardizing Work: Created work process for sedation pre-screening.

RESULTS

Baseline data (12/2016- 2/2017) were: 1) Patient Arrival: Median 8:06am (7:46-10:40am); 2) RN Assessment: Median 29min (10-45min); 3) Sedation NP Arrival: Median 8:30am (7:35-10am); 4) Sedation MD Arrival: Median 8:30am (7:35-10am). Baseline MRI First Case Start-Time was median 83min after 8am (range 27-195min). Run charts demonstrate improvements in late patient arrival for PDSA1 (8:06 to 7:25am), PDSA2 (7:25 to 7:20am), and PDSA3 (7:20 to 7:11am). Run chart of First-Case MRI Start demonstrates special cause variation with median decrease from 9:23 to 8:55am. PDSA 4 dropped screening failure cancellations 27% to 10%. Access improved from 51 to 12-day appointment wait.

CONCLUSION

We demonstrate significant improvement (by 35%) in first case start-time for Pediatric Sedation MRI exams. Patient arrival time was significantly improved (71 to 11min delay). Same-day cancellations from screening failure decreased 27% to 10%. Patient access to pediatric sedation MRI appointments improved from 51 to 12 days.

CLINICAL RELEVANCE/APPLICATION

A Quality Improvement Team reduced first-case delays and eliminated a backlog of patients waiting for pediatric sedation MRI appointments.

RC613-11 Image to Image Translation of Pediatric Computed Tomography through the Generative Adversarial Network (GAN)-Based Deep Learning Approach

Thursday, Nov. 29 11:00AM - 11:10AM Room: S502AB

Participants
Sun Kyoung You, MD, Daejeon, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jeong Eun Lee, Daejeon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyoung Suk Park, Daejeon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kiwan Jeon, Daejeon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the clinical feasibility of the virtual 120 kilovoltage (kVp) image made by a generative adversarial network (GAN)-based deep learning approach using the original 80 kVp image of pediatric abdominal and pelvic computed tomography (APCT).

METHOD AND MATERIALS

Total 82 low dose APCT (LDCT; fixed 80 kVp and 100 mAs reference tube current) and 65 conventional APCT (CCT; fixed 120 kVp and 200 mAs reference tube current) thorough 64-channel multidetector CT scanner in the emergency room were included in our study. We prepared a data set by selecting 20 dcm files that contain the portal vein and liver for each patients. The dataset of 42 patients from LDCT and 42 patients from CCT were used for training of GAN. We train a GAN based model that enables the 80 kVp image-to-120 kVp image transformation with unpaired 80 kVp and 120 kVp images. To preserve the morphological structure of 80 kVp image, the proposed model includes an additional penalty that enforces similarities between 80 kVp and corresponding virtual

120 image. Other datasets of 41 patients from LDCT were used to create the virtual 120 kVp images (VI) as the original 80 kVp images (OI). Quantitative and qualitative image analyses were performed by two radiologists to compare the OI and VI.

RESULTS

The mean CT number of the portal vein, liver, psoas muscles and the mean image noise in OI were higher than in VI ($p<0.001$, respectively). The mean CNR of the main portal vein, the mean SNR of the portal vein and the liver of VI were higher than in OI ($p<0.001$, $p<0.001$, $P=0.001$, respectively). Qualitative analysis showed no significant difference between the two groups with substantial agreement between two reviewers.

CONCLUSION

GAN-created virtual image can be applied to conventional CT scanner, which can not be applied recent developed dose reducing programs, and our results are expected to be extended to other areas of low dose CT. Our study suggest new direction of low dose CT research using deep learing algorithm.

CLINICAL RELEVANCE/APPLICATION

Image to image translation based on generative adversarial network (GAN)-based deep learning can be applied to conventional CT scanner. If the result of our studies extended to overweight children or adolescents, this could be applicable to adult patients with low body mass.

RC613-12 Effect of Pediatric Emergency Care Applied Research Network (PECARN) Algorithm Embedded in EMR on Head CT Utilization in Minor Pediatric Head Trauma

Thursday, Nov. 29 11:10AM - 11:20AM Room: S502AB

Participants
Joel Y. Sun, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Ryan K. Lee, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Bryan J. Kang, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Neena David, MD, Hershey, PA (*Abstract Co-Author*) Nothing to Disclose
Terence A. Matalon, MD, Philadelphia, PA (*Abstract Co-Author*) Speaker, Koninklijke Philips NV

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PURPOSE

To determine the effect embedding PECARN algorithm has on the utilization of head CT in pediatric patients with minor head trauma. We previously presented (SIIM 2018) that implementation of PECARN into the EMR increased the compliance of adherence to PECARN algorithm from 30% (before) to 80%(after).

METHOD AND MATERIALS

A clinical decision algorithm for minor pediatric head trauma was developed based on the PECARN validated algorithms for the identification of children under age 18 in the setting of minor head trauma. The CDS was implemented into the EHR at a level 1 trauma center and two suburban hospitals. Head CT use and the total number of ED visits made by patients under 18 presenting with a traumatic indication was obtained prior to implementation of PECARN in the EMR (September 2016- August 2017) and after the implementation of PECARN in the EMR (September 2017- March 2018). Head CT outcomes for both time periods were also reviewed, with a positive result defined as the presence of intracranial hemorrhage or calvarial fracture.

RESULTS

Out of 670 pediatric trauma ED visits before implementation of CDS, 58 head CTs were obtained (8.7%). After implementation of CDS, 61 head CTs were obtained out of 649 ED visits (9.4%), which was not significantly different ($p=0.67$). One head CT (1.7%) was positive during the pre-intervention period and 6 exams (9.8%) were positive during the post-intervention period, which was not significantly increased ($p=0.07$).

CONCLUSION

Despite the improved compliance for PECARN as a result of implementation of PERCARN into the EMR, it does not affect utilization of head CT for pediatric head trauma in the ED. Furthermore, implementation of this algorithm into the EMR does not have an effect on the identification of intracranial hemorrhages. Despite this, implementation of PECARN in EMR improves standardization of care through the improved compliance of the algorithm.

CLINICAL RELEVANCE/APPLICATION

The implementation of a PECARN derived CDS can improve adherence to evidence based guidelines without affecting utilization.

RC613-13 Image Gently and Rapidly - Elimination of Sedation and Repeat Scans: How Fast is Fast Enough?

Thursday, Nov. 29 11:20AM - 11:30AM Room: S502AB

Participants
Marta Hernanz-Schulman, MD, Nashville, TN (*Presenter*) Nothing to Disclose
Diana E. Carver, PhD, Nashville, TN (*Abstract Co-Author*) Nothing to Disclose
Kenneth Lewis, PHD, Nashville, TN (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Motion can affect many pediatric scans, and scans of older patients who are tachypneic or in distress. Obtaining diagnostic CT scans on young or uncooperative children may require sedation, result in repeated scans, or delay the performance of urgent examinations, particularly those intolerant of any patient motion, such as angiography. Newer CT units have lower tube rotation times (TRT), higher table speeds and pitches (P) than earlier versions of multislice spiral equipment. Our purpose was to investigate the acquisition speed at which motion could be consistently frozen in a simulated moving patient

METHOD AND MATERIALS

An oval fluid-filled object measuring 6.3 cm long, 6.7 cm wide, 5.0 cm across, was scanned stationary and then rotating at 20 RPM at 120 kVp and 20 mA. TRT and P were varied resulting in scan times (ST) between 0.1 and 2.5 seconds. Image motion was quantified by: 1) dividing standard deviation (SD) around object edges by background SD (O/B), 2) counting number of side lobes (NSL) generated 3) subjective grading image quality by a pediatric radiologist and a pediatric neuroradiologist as near motionless (G1) diagnostic (G2) limited(G3) or unusable (G4)

RESULTS

The stationary O/B was 1.6; SL = 0. Moving object O/B ranged from 1.2 (TRT=0.28s, P=3.0, ST=0.10s [G1]) to 114 (TRT=1s, P=0.6, ST=2.46s [G4]). NSL ranged from 0 (TRT=0.25s, P=3.0, ST=0.09[G1]) to too numerous to count (TRT=1s, P=0.6, ST=2.46s[G4]). Images with TRT=0.25s and 0.28s, when coupled with a P >1.5 and ST <0.18sec had O/B=1.2 to 2.8 and were graded G1 or G2. Images obtained with TRT=0.4s, P=0.8 to1.3 and ST=0.49s to 0.79s were limited (G3). Images with a TRT >= 0.75s , P=0.64 to 1.0 and ST = 1.2s-2.5s had O/B 64-114 and were unusable (G4), while more than doubling the dose to 50mAs

CONCLUSION

Fractions of a second matter. Scans with TR 0.4 had poor motion suppression, and were nondiagnostic at pitches of <1 with ST >0.5 seconds while more than doubling radiation dose. Scans with TR 0.28 or lower had diagnostic images at pitches greater than 1.5, with the fastest settings, highest pitches and ST <0.2 seconds nearly freezing object motion

CLINICAL RELEVANCE/APPLICATION

Knowledge of speed where patient motion freezes will help determine investment in equipment, which patients will not need sedation, optimize protocol parameters, and decrease or eliminate repeat scans

RC613-14 Brain Iron Deposition after Ferumoxytol-enhanced MRI: A Study of Pediatric and Porcine Brains

Thursday, Nov. 29 11:30AM - 11:40AM Room: S502AB

Participants
Ashok Joseph Theruvath, MD, Mainz, CA (*Presenter*) Nothing to Disclose
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Laura J. Pisani, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Olga Lenkov, BSC, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Kristen W. Yeom, MD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Iron oxide nanoparticles are re-emerging as promising contrast agents for MRI. While gadolinium deposition in the brain has raised safety concerns, it is unknown if iron oxide nanoparticles are deposited in brain as well. The purpose of this study was to evaluate, if intravenously administered ferumoxytol nanoparticles are deposited in brain tissue.

METHOD AND MATERIALS

In an IRB-approved retrospective case-control study, 12 pediatric patients (age 4-24, mean 12.3) received at least two ferumoxytol injections intravenously (3mg/kg) for brain MRIs at 3T with quantitative susceptibility mapping and R2* maps. 12 additional patients served as unexposed controls. In addition, brains of 10 pigs, who received 1-2 intravenous ferumoxytol injections (5mg/kg; n=4) or remained untreated (n=6) underwent *ex vivo* MRI at 7T with R2* maps. MRI scans were evaluated by measuring R2* values of the caudate, globus pallidus, putamen, dentate nucleus, thalamus, and substantia nigra. Pig brains were sectioned and stained with Prussian blue. Data of ferumoxytol-exposed and unexposed groups were compared with unpaired and paired t-tests and Pearson correlation.

RESULTS

In pediatric patients, visual susceptibility effects and quantitative R2* data of all brain regions did not significantly differ from baseline ($p>0.05$). On follow up studies at 14.67 ± 7.70 months after the last ferumoxytol infusion slightly increased R2* in the dentate and globus pallidus ($p=0.013$ and $p=0.019$, respectively) were detected. No significant correlation was found between ferumoxytol dose and R2* and susceptibility values. In pigs, there were no significant differences in R2* of brain regions in the ferumoxytol group vs control ($p>0.05$) and no significant correlation between ferumoxytol dose and R2* values. Histologically, no difference in iron deposition was found.

CONCLUSION

No significant differences were found in R2* values in pediatric and pig brains after ferumoxytol-enhanced MRIs. However, slightly increased R2* in the dentate nucleus and globus pallidus in pediatric brains at follow-up were detected, which suggests that ferumoxytol might be transiently retained in specific brain regions.

CLINICAL RELEVANCE/APPLICATION

Iron oxide nanoparticles are a promising alternative for gadolinium-enhanced MRI. Further studies have to evaluate potential minimal

and transient retention of iron oxides in the brain.

RC613-15 Pediatric Headache Imaging: Cost Effectiveness Analysis Benefits and Pitfalls

Thursday, Nov. 29 11:40AM - 12:00PM Room: S502AB

Participants
Nadja Kadom, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the value of cost-effectiveness research. 2) Discuss imaging issues in pediatric headache. 3) Identify shortcomings in cost-effectiveness studies.

RC614

Interventional Series: Non-Vascular Interventions

Thursday, Nov. 29 8:30AM - 12:00PM Room: N227B

IR

AMA PRA Category 1 Credits ™: 3.00
ARRT Category A+ Credits: 3.50

FDA Discussions may include off-label uses.

Participants
Ramona Gupta, MD, Chicago, IL (*Moderator*) Nothing to Disclose
Bill S. Majdalany, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

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Sub-Events

RC614-01 Treating Ascites: Paracentesis, TIPs, PleuRx, Denver Shunt: Which One and Why?

Thursday, Nov. 29 8:30AM - 8:45AM Room: N227B

Participants
David C. Madoff, MD, New York, NY (*Presenter*) Advisory Board, RenovoRx; Consultant, General Electric Company; Consultant, Terumo Corporation; Consultant, Argon Medical Devices, Inc; Consultant, Abbott Laboratories; Consultant, Embolx, Inc

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LEARNING OBJECTIVES

1) To briefly review the pathophysiology related to the development of ascites. 2) To describe the minimally invasive treatment options currently available in the management of ascites. 3) To assess data to optimize which treatment strategy is most appropriate for a specific indication.

RC614-02 Transthoracic Biopsy Considerations

Thursday, Nov. 29 8:45AM - 9:00AM Room: N227B

Participants
Ramona Gupta, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review current indications and techniques for lung biopsies. 2) Review data on acceptable complication rates and techniques for mitigating complications. 3) Review techniques for complex biopsies.

RC614-03 Percutaneous Gastrostomy Tube Placement is Safe in Patients on High Dose Aspirin

Thursday, Nov. 29 9:00AM - 9:10AM Room: N227B

Participants
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Zachary Bercu, MD, Atlanta, GA (*Abstract Co-Author*) Speaker, Terumo Medical Corporation; Grant, Coulter Translational Program, Steerable Robotic Guidewire
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PURPOSE

Percutaneous gastrostomy tube placement is a common procedure performed by interventional radiologists and has a moderate risk of bleeding per the Society of Interventional Radiology. Anticoagulants are typically held until reaching acceptable lab coagulation parameters, and clopidogrel is held for 5 days prior to procedure. High dose (325mg) aspirin (ASA) is commonly held for 5 days, but in certain populations (e.g. patients with new free flaps), holding ASA may put the patient at increased risk of complications (small vessel thrombosis and flap necrosis). The purpose of this study is to evaluate the safety of performing percutaneous gastrostomy tube placement in patients on aspirin 325mg.

METHOD AND MATERIALS

A retrospective review of patients who underwent gastrostomy tube placement by IR at a tertiary care center between 1/2017 - 3/2018 was performed. The primary outcome was bleeding noted at the gastrostomy site within 48 hours by the IR or clinical team. A chi-squared test was used to test for differences in bleeding rates between patients on ASA 325mg and patients not taking antiplatelet/anticoagulation therapy.

RESULTS

Of the 213 patients (age 64.8±11.7, 42% female) who underwent gastrostomy tube placement, 163 were being treated for head and neck cancer (95 patients had prior resection surgery, 92 with a flap, 54 within 1 month of surgery; 52 undergoing radiation therapy at time of procedure). Fifty-three patients were on ASA 325mg (48 with head and neck cancer, 39 within 1 month post-surgery), which was not held in any patients. Four patients were on clopidogrel (held for 5 days) and 21 were on anticoagulation (held until labs within acceptable range). None of the 53 patients on ASA 325mg experienced bleeding, but three other patients had significant bleeding at their gastrostomy site, one of whom was on warfarin (held with pre-procedure INR 1.64). There was no significant difference in bleeding rate between patients on ASA 325mg and patients not taking antiplatelet/anticoagulation therapy (P=0.37).

CONCLUSION

Gastrostomy tube placement may be safe in patients in whom holding ASA 325mg is risky clinically (e.g. patients with new flaps). Further study with a larger sample size is warranted.

CLINICAL RELEVANCE/APPLICATION

Holding high dose aspirin in patients undergoing percutaneous gastrostomy tube placement may not be necessary, especially in patients with new free flaps.

RC614-04 Sealing the Needle Track with Saline Solution After-lung Biopsy Decreases the Risk of Pneumothorax

Thursday, Nov. 29 9:10AM - 9:20AM Room: N227B

Participants
Irene Vicente Zapata, MD, Murcia, Spain (*Presenter*) Nothing to Disclose
Ana Sanchez, Murcia, Spain (*Abstract Co-Author*) Nothing to Disclose
Juana M. Plasencia-Martinez, MD,PhD, Murcia, Spain (*Abstract Co-Author*) Nothing to Disclose
Begona Marquez-Argente-del-Castillo, MS, Murcia, Spain (*Abstract Co-Author*) Nothing to Disclose

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PURPOSE

To assess whether saline solution instillation through the coaxial needle track after computed tomography-guided lung biopsy (SSLB) reduces the risk of pneumothorax.

METHOD AND MATERIALS

In this retrospective matched case-control study, we compared the size and early evolution of pneumothorax in patients undergoing SSLB (cases) vs. patients studied with a conventional technique (CoLB). Other variables possibly related with pneumothorax were also evaluated. Sample size was calculated and univariate and multivariate statistical analysis were performed. Differences were significant when $P < 0.05$.

RESULTS

Fifty-six cases and 56 controls were recruited. Pneumothorax was diagnosed in 35/112 (31.3%) patients after lung biopsy, but it was less frequent ($P = 0.025$) with SSLB (12/56; 21.4%) than CoLB (23/56; 41.1%). Size (SSLB 6.58 ± 5.99 mm vs. CoLB 9.17 ± 4.60; P=0.16) and progressive pneumothorax increase (SSLB 5.67 ± 4.72 mm; 0% equal or greater than 2 cm vs. CoLB 15.90 ± 11.83 mm; 40% equal or greater than 2 cm; $P = 0.18$) did not reach a significant difference. According to the multivariate analysis, SSLB was the unique variable independently related with pneumothorax (OR 2.48, 95% confidence interval = 1.03-5.96; $P = 0.042$). Biopsy needle gauge, added fine-needle aspiration, patient position, lesion depth and lobe, and lesion semiology were not related with pneumothorax risk after lung-biopsy.

CONCLUSION

Saline solution instillation while removing the coaxial needle in CT-guide lung biopsy is an easy and cost-effective strategy to decrease the incidence and severity of pneumothorax.

CLINICAL RELEVANCE/APPLICATION

We can reduce the number and severity of pneumothorax as a complication of CT-guided lung biopsy with an easy strategy: sealing the coaxial needle track with normal saline solution.

RC614-05 Refractory Abscess Management

Thursday, Nov. 29 9:20AM - 9:35AM Room: N227B

Participants
Claire Kaufman, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Claire.Kaufman@hsc.utah.edu

LEARNING OBJECTIVES

1) Identify the various etiologies and risk factors associated with refractory abscesses. 2) Review treatment options. 3) Understand the role of the interventionalist in the management of refractory abscesses. 4) Review complications that can occur with refractory

abscesses.

RC614-06 Outcomes and Factors Influencing Complications and Pain Scores in Image-Guided Percutaneous Nephrostomy Tube Insertion: A Prospective Study

Thursday, Nov. 29 9:35AM - 9:45AM Room: N227B

Awards
Student Travel Stipend Award

Participants
Prateek Malik, DMRD,MBBS, Vellore, India (*Presenter*) Nothing to Disclose
Vinu Moses, MD, Vellore, India (*Abstract Co-Author*) Nothing to Disclose
Shyamkumar N. Keshava, FRCR,FRANZCR, Vellore, India (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

prateekmalikcmc@gmail.com

PURPOSE

There exists a paucity of data, especially prospective studies, regarding complication rates and factors influencing them in patients undergoing image-guided percutaneous nephrostomy (PCN) tube insertion. Pain and quality of life post percutaneous nephrostomy is an important factor which again has not been extensively studied. Our study aims to assess patient and procedure related outcomes, post procedural pain and possible factors influencing the same in patients undergoing an image-guided PCN tube insertion

METHOD AND MATERIALS

All consecutive patients undergoing a PCN insertion over a period of 1 year (2016-2017) were included in the study. Procedure information including interviews with the patient and radiologists were collected at the time of the procedure. Post-procedure 8, 24 and 48hour pain & anxiety scores were collected via interviews conducted in post-procedure rounds using a Visual Analog Scale (VAS) scoring system. A follow-up of the patient from discharge upto tube removal was maintained during OPD visits. Outcomes group consisting of Complications (present Vs absent) and high pain and anxiety scores (>5 vs <5) were then analysed for multiple factors using univariate and multivariate regression on SPSSv25

RESULTS

A successful PCN insertion was done for 98% of the procedures (112/114). 111 procedures were included and 1 was lost to follow up. Minor complication rate of the study was 20.5% (23/111) and there were no major complications. Tube duration was found to be significantly associated with higher complication rates (p-value -0.032). Difficulty of the procedure (p-value -0.016), radiologists experience (p-value -0.035), duration between preprocedural analgesic and procedure (p-value -0.001), preprocedure pain scores (p-value -0.04) and anxiety scores (p-value -0.016) were found to be significantly associated with significant post procedure pain.

CONCLUSION

PCN is a safe procedure with low complication rates. Tubes with a longer insitu duration have a higher risk of complication. Difficult procedures, higher preprocedural patient pain and anxiety, delay between the procedure and preprocedural analgesic and inexperience of the radiologist performing the procedure are associated with a more painful post procedural period.

CLINICAL RELEVANCE/APPLICATION

To our knowledge, factors determining complications &pain scores post PCN tube insertion haven't been studied previously.

RC614-07 Percutaneous Enterocutaneous Fistula Repair

Thursday, Nov. 29 9:45AM - 10:00AM Room: N227B

Participants
Jeffry S. Kriegshauser, MD, Phoenix, AZ (*Presenter*) Research support, General Electric Company

LEARNING OBJECTIVES

1) To identify relevant anatomy and various causes of enterocutaneous fistulas (ECF). 2) To describe the various interventional techniques available for the treatment of ECF. 3) To understand the importance of short and long term follow up.

RC614-08 Celiac Plexus Blocks

Thursday, Nov. 29 10:30AM - 10:45AM Room: N227B

Participants
Andrew J. Lipnik, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify important anatomy for celiac plexus blockade. 2) Describe the appropriate technique and approach for celiac plexus blocks. 3) Recognize the major and minor complications from neurolysis of the celiac plexus.

RC614-09 Contemporaneous Placement of Port Catheter and Percutaneous Feeding Gastrostomy Tubes In Head and Neck Cancer Patient: Is a Single Session Combined Procedure Safe?

Thursday, Nov. 29 10:45AM - 10:55AM Room: N227B

Participants
Tyler Braaten, MD, Houston, TX (*Presenter*) Nothing to Disclose
Jason M. Low, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Rodrick C. Zvavanjanja, MD, FRCR, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Placement of ports for chemotherapy and percutaneous feeding gastrostomy (PFG) in the same setting is controversial. Traditionally, these procedures have been performed on separate days due to the theoretical risk for port site infection from transient bacteremia induced by PFG placement and possible skin contamination from gastrointestinal flora. The primary purpose of this study was to evaluate the safety of same setting combined port catheter and PFG placement. The secondary purpose was to evaluate any potential cost reduction to the patient.

METHOD AND MATERIALS

A retrospective review of 21 adult head and neck cancer patients who underwent combination port catheter and PFG placement between February 2013 and February 2017 at a single academic institution was performed. All procedures were performed in a standard interventional radiology suite. Antibiotic prophylaxis was administered. A proprietary method of separate sterile preparation was performed and will be further delineated. In all but one case, the port was performed first and in all cases the operator changed their sterile attire for each procedure. Clinical and procedural details were evaluated in the electronic medical record. To assess for post procedure complications, clinic follow up notes were reviewed. Procedure related port infection was deemed as any site infection within the first two weeks of placement. The costs of combined procedures vs. separate procedures was determined based on CPT codes and average national payments adjusted based on the Centers for Medicare and Medicaid Services (CMS) Multiple Procedure Payment Reduction (MPPR) calculations.

RESULTS

Of the 21 patients with same day port and PFG placement, there were no cases of early port site infection. 2/21 (9.5%) patients had gastrostomy tube site infections, all of which resolved with oral antibiotic therapy. The cost of the combined procedure is cheaper for the patient based on CMS MPPR by reducing the cost by $724.25.

CONCLUSION

Placement of a port and PFG in a single session did not result in increased port complications. The combined procedure is more cost-effective and could be more convenient to the patient. Further large-scale multi-center experiences are required to validate our results.

CLINICAL RELEVANCE/APPLICATION

The study suggests it is safe to perform combined chest port catheter and PFG placement in the same setting and there is a significant associated cost savings to the patient.

RC614-10 Primary Biliary Stenting

Thursday, Nov. 29 10:55AM - 11:10AM Room: N227B

Participants
Joseph P. Erinjeri, MD, PhD, New York, NY (*Presenter*) Nothing to Disclose

RC614-11 Percutaneous Occlusion of Biliary Leaks with the Artventive EOS Device: A Feasibility Study in a Porcine and Bovine Model

Thursday, Nov. 29 11:10AM - 11:20AM Room: N227B

Participants
Daniel Kuetting, MD, Bonn, Germany (*Presenter*) Nothing to Disclose
Hans H. Schild, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Julian A. Luetkens, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Claus C. Pieper, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

daniel.kuetting@ukbonn.de

PURPOSE

Percutaneous treatment of postoperative biliary leaks is an increasingly required, yet technically challenging intervention, typically limited to minor leaks. The aim of this study was to investigate the occlusive properties of the ArtVentive Endoluminal Occlusion System (EOS) for the occlusion of bile duct and cystic duct leaks.

METHOD AND MATERIALS

The employed occlusion device - EOS - consists of a detachable ePTFE-coated nitinol spiral. In 5 explanted porcine and 3 explanted bovine livers artificially created biliary leaks were occluded using the EOS device. After establishing percutaneous biliary access in conventional PTCD technique, artificially created biliary leaks were occluded via a 6F guide catheter using 5 and 8 mm EOS devices. Using the 5 mm device peripheral (n = 3), central (n = 1) and cystic duct leaks (n = 1) were occluded, whereas with the 8 mm device peripheral (n = 1), central (n = 1), main duct (n = 1) and cystic duct leaks (n = 2) were occluded.

RESULTS

All central biliary leaks (3/3) and all cystic duct leaks (3/3) could be selectively and immediately occluded with the EOS device. Peripheral biliary leaks could not be selectively catheterized in 3 out of 4 cases, devices had to be placed several millimeters proximal of the leaks.

CONCLUSION

In this feasibility study, the EOS device enabled selective and immediate occlusion of cystic duct-, central - and larger peripheral bile duct leaks.

CLINICAL RELEVANCE/APPLICATION

The ArtVentive EOS occlusive device offers an "off the shelf" solution for percutaneous occlusion of larger biliary leaks, while smaller

peripheral biliary leaks cannot be treated selectively.

RC614-12 Thoracic Duct Embolization

Thursday, Nov. 29 11:20AM - 11:35AM Room: N227B

Participants
Bill S. Majdalany, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bmajdala@med.umich.edu

LEARNING OBJECTIVES

1) Recognize standard lymphatic anatomy and describe the physiology of the lymphatic system. 2) Discuss the clinical presentation and etiologies of chylothorax. 3) Understand the basic principles of Thoracic Duct Embolization and appraise current results. 4) Identify future trends in thoracic lymphatic interventions.

RC614-13 Lymphatic Interventions for Chylothorax: A Systematic Review and Meta-Analysis

Thursday, Nov. 29 11:35AM - 11:45AM Room: N227B

Participants
Pyeong Hwa Kim, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jiaywei Tsauo, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Ji Hoon Shin, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

peace4701@hotmail.com

PURPOSE

To perform a systematic review and meta-analysis of published studies to evaluate the efficacy of lymphatic interventions for chylothorax.

METHOD AND MATERIALS

The MEDLINE, EMBASE, and Cochrane databases were searched for English-language studies until March 2017, and that included patients with chylothorax treated with lymphangiography (LAG), thoracic duct embolization (TDE) or thoracic duct disruption (TDD). The exclusion criteria were a sample size of < 10, no extractable data or data included in subsequent articles or duplicate reports.

RESULTS

The cases of 407 patients from nine studies were evaluated. The pooled technical success rates of LAG and TDE were 94.2% (95% confidence interval [CI], 88.4%-97.2%; I2 = 46.7%) and 63.1% (95% CI, 55.4%-70.2%; I2 = 37.3%), respectively. The pooled clinical success rates of LAG, TDE, and TDD, on a per-protocol basis, were 56.6% (95% CI, 45.4%-67.2%; I2 = 5.4%), 79.4% (95% CI, 64.8%-89.0%; I2 = 68.1%), and 60.8% (95% CI, 49.4%-71.2%; I2 = 0%), respectively. The pooled major complication rate of LAG and TDE was 1.9% (95% CI, 0.8%-4.3%; I2 = 0%) and 2.4% (95% CI, 0.9%-6.6%; I2 = 26.4%), respectively. The pooled overall clinical success rate of lymphatic interventions, on an intention-to-treat basis, was 60.1% (95% CI, 52.1%-67.7%; I2 = 54.3%). Etiology of chylothorax was identified as a significant source of heterogeneity for the pooled clinical success rate of TDE and overall clinical success rate.

CONCLUSION

Lymphatic interventions have a respectable efficacy for the treatment of chylothorax.

CLINICAL RELEVANCE/APPLICATION

LAG is associated with high technical success and low clinical success, whereas TDE is associated with high clinical success and low technical success. The efficacy of TDD is questionable. Traumatic chylothorax is associated with a higher clinical success of TDE and overall clinical success of lymphatic interventions than non-traumatic chylothorax.

RC614-14 Advanced Feeding Tube Placement

Thursday, Nov. 29 11:45AM - 12:00PM Room: N227B

Participants
Adam N. Plotnik, MBBS,FRANZCR, Los Angeles, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

aplotnik@mednet.ucla.edu

LEARNING OBJECTIVES

1) Understanding of the multiple techniques of placement of percutaneous feeding tubes, including Gastrostomy, Gastrojejunostomy and jejunostomy tubes. 2) Essential pre and post procedural management for percutaneous feeding tube placements. 3) Review of the complications of percutaneous feeding tube placements and their management. 4) Tips and tricks for placing percutaneous feeding tubes in more complex anatomy, e.g., post partial gastrectomy, interposition of colon.

RC615

Advanced Breast Imaging Technologies

Thursday, Nov. 29 8:30AM - 10:00AM Room: E451A

BR MR NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Maxine S. Jochelson, MD, New York, NY (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

jochelsm@mskcc.org

LEARNING OBJECTIVES

I will put my learning objectives in under my course itself and presume the other 2 presenters will do the same. Don't think there needs to be a separate learning objective for the moderator?

Sub-Events

RC615A PET and PET/MRI

Participants
Amy M. Fowler, MD, PhD, Madison, WI (*Presenter*) Research support, General Electric Company

For information about this presentation, contact:

afowler@uwhealth.org

LEARNING OBJECTIVES

1) Describe current approaches for performing breast PET imaging. 2) Assess diagnostic performance of breast PET imaging for extent of disease and therapy response evaluation. 3) Examine potential uses of PET/MRI for breast imaging.

RC615B Molecular Breast Imaging

Participants
Carrie B. Hruska, PhD, Rochester, MN (*Presenter*) Institutional license agreement, CMR Naviscan Corporation

For information about this presentation, contact:

hruska.carrie@mayo.edu

LEARNING OBJECTIVES

1) Describe MBI instrumentation and clinical protocol for low-dose imaging. 2) Assess performance of MBI in screening of women with dense breasts. 3) Examine the potential role of MBI as an imaging biomarker of breast cancer risk.

RC615C Contrast Enhanced Mammography & Tomosynthesis

Participants
Maxine S. Jochelson, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The utility of tomosynthesis in the screening setting. 2) The technique and risks of Contrast Enhanced Mammography. 3) Potential uses for Contrast Enhanced Mammography in the screening and diagnostic setting.

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RC616

The Impact of Artificial Intelligence on Radiology Training and Practice Around the World (Sponsored by RSNA Committee of International Radiology Education)

Thursday, Nov. 29 8:30AM - 10:00AM Room: E350

AI ED IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

LEARNING OBJECTIVES

1) Discuss how Artificial Intelligence (AI) will impact Radiology's role in global health. 2) Explain how AI is changing radiology training and practice in different parts of the world. 3) Identify radiology AI products that are ready and appropriate for implementation in low-resource environments. 4) Discuss how the CIRE might play a part in AI education.

ABSTRACT

Artificial intelligence (AI) will affect global health (global radiology) in myriad ways. In addition to AI for initial imaging evaluation in resource-limited environments, many AI products may be applicable to near-term implementation in these environments and may leap-frog traditional systems. AI will change not only the way in which radiology is practiced in global health but also how radiologists are trained and their roles within the healthcare system after residency.

Sub-Events

RC616A Introduction: The Potential for AI in Global Radiology and Training

Participants
Eliot L. Siegel, MD, Baltimore, MD (*Presenter*) Medical Advisory Board, Brightfield Technologies Medical Advisory Board, McCoy Board of Directors, Carestream Health, Inc Founder, MedPerception, LLC Board of Directors Clear Health Quality Institute Founder, Topoderm Founder, YYESIT, LLC Medical Advisory Board, Bayer AG Medical Advisory Board, Bracco Group Medical Advisory Board, Carestream Health, Inc Medical Advisory Board, Fovia, Inc Medical Advisory Board, McKesson Corporation Medical Advisory Board, Merge Healthcare Incorporated Medical Advisory Board, Microsoft Corporation Medical Advisory Board, Koninklijke Philips NV Medical Advisory Board, Toshiba Medical Systems Corporation Research Grant, Anatomical Travelogue, Inc Research Grant, Anthro Corp Research Grant, Barco nv Research Grant, Dell Inc Research Grant, Evolved Technologies Corporation Research Grant, General Electric Company Research Grant, Herman Miller, Inc Research Grant, Intel Corporation Research Grant, MModal IP LLC Research Grant, McKesson Corporation Research Grant, RedRick Technologies Inc Research Grant, Steelcase, Inc Research Grant, Virtual Radiology Research Grant, XYBIX Systems, Inc Research, TeraRecon, Inc Researcher, Bracco Group Researcher, Microsoft Corporation Speakers Bureau, Bayer AG Speakers Bureau, Siemens AG

For information about this presentation, contact:

esiegel@umaryland.edu

LEARNING OBJECTIVES

View learning objectives under main course title.

RC616B How Resident Training May Be Affected by AI

Participants
David C. Gimarc, MD, Madison, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC616C Panel Discussion

Participants
Nitin P. Ghonge, MD, New Delhi, India (*Presenter*) Nothing to Disclose
Omolola M. Atalabi, MBBS, Ibadan, Nigeria (*Presenter*) Nothing to Disclose
Claudio Silva, MD , Santiago, Chile (*Presenter*) Nothing to Disclose
Jeong Min Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Grant, Bayer AG Grant, General Electric Company Grant, Koninklijke Philips NV Grant, STARmed Co, Ltd Grant, RF Medical Co, Ltd Grant, Samsung Electronics Co, Ltd Grant, Guerbet SA

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LEARNING OBJECTIVES

View learning objectives under main course title.

RC616D Near-term adoption of AI in Global Radiology: Barriers and Opportunities

Participants
Jeffrey B. Mendel, MD, West Newton, MA (*Presenter*) Advisor, McKesson Corporation

For information about this presentation, contact:

jmendel@pih.org

LEARNING OBJECTIVES

View learning objectives under main course title.

RC616E How CIRE Can Serve as a Locus for the Extension of AI Into Global Radiology Training

Participants
Kristen K. DeStigter, MD, Burlington, VT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC616F Q&A

LEARNING OBJECTIVES

View learning objectives under main course title.

RC617

Emerging Technologies: Prostate Cancer Imaging & Management - Update 2018

Thursday, Nov. 29 8:30AM - 10:00AM Room: S505AB

GU MI MR NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Peter L. Choyke, MD, Rockville, MD (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

pchoyke@nih.gov

LEARNING OBJECTIVES

1) Understand current issues in prostate cancer relevant to imaging. 2) Understand the role of emerging technologies in the imaging and management of prostate cancer.

ABSTRACT

Prostate cancer is a major health issue. Imaging has made great strides in the last decade including the use of multiparametric MRI, MR-ultrasound fusion biopsies and most recently PET scanning. This refresher course explores emerging technolgies in prostate cancer imaging and management.

Sub-Events

RC617A Introduction to Imaging in Prostate Cancer

Participants
Peter L. Choyke, MD, Rockville, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the impact of new screening guidelines on imaging of prostate cancer. 2) Understand the issues facing clinicians treating prostate cancer.

ABSTRACT

This talk will review the current status of screening for prostate cancer and how stage migration is beginning to be seen. The problems of early detection, early recurrence and early metastases will be discussed. This talk will serve as a starting off point for the subsequent talks on new technologies.

RC617B Next Generation Prostate MRI

Participants
Baris Turkbey, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand current status and uses of multi-parametric MRI. 2) Understand role of MRI in assessment of prostate cancer aggressiveness and tumor heterogeneity. 3) Understand role of computer aided diagnosis systems in evaluation of prostate cancer aggressiveness and tumor heterogeneity.

RC617C Molecular Prostate Imaging: Chemistry to Clinic

Participants
Martin G. Pomper, MD, PhD, Baltimore, MD (*Presenter*) Researcher, Progenics Pharmaceuticals, Inc; License agreement, Progenics Pharmaceuticals, Inc; Researcher, Advanced Accelerator Applications SA; License agreement, Advanced Accelerator Applications SA; Co-founder, Cancer Targeting Systems, Inc; Board Member, Cancer Targeting Systems, Inc; Researcher, Celgene Corporation, Inc; License agreement, Celgene Corporation, Inc; Co-founder, Neurly; Board Member, Neurly; Co-founder, Theraly Pharmaceuticals, Inc; Board Member, Theraly Pharmaceuticals, Inc

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC617D Hyperpolarized C-13 MR Molecular Imaging of Prostate Cancer

Participants
Daniel B. Vigneron, PhD, San Francisco, CA (*Presenter*) Research Grant, General Electric Company;

LEARNING OBJECTIVES

1) To describe the basic principles and techniques used in hyperpolarized carbon-13 MRI. 2) Understand the cellular metabolic reprogramming that occurs in prostate cancer. 3) Demonstrate the changes in pyruvate to lactate conversion that are observed in prostate cancer and differences with cancer aggressiveness and response to therapy.

RC617E Radionuclide Therapy for Prostate Cancer

Participants
Peter L. Choyke, MD, Rockville, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC618

Interactive Game: When Do Imaging Findings Make a Difference? (Interactive Session)

Thursday, Nov. 29 8:30AM - 10:00AM Room: E353B

GU MK NR OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
David M. Panicek, MD, New York, NY (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

panicekd@mskcc.org

LEARNING OBJECTIVES

1) To recognize and review a range of potential interpretive pitfalls in oncologic imaging of the nervous, gynecologic, and musculoskeletal systems, using an interactive audience response system.

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC618A Neuro

Participants
Birgit B. Ertl-Wagner, MD, Toronto, ON (*Presenter*) Spouse, Stockholder, Siemens AG; ;

For information about this presentation, contact:

BirgitBetina.Ertl-Wagner@sickkids.ca

LEARNING OBJECTIVES

1) To comprehend the importance of signs in neuroimaging for diagnostic decision making. 2) To understand in which instances imaging findings have a direct consequence for therapeutic decision making. 3) To appreciate the therapeutic consequences of select neuroimaging findings.

RC618B Musculoskeletal

Participants
David M. Panicek, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

panicekd@mskcc.org

LEARNING OBJECTIVES

1) Assess imaging features that facilitate specific diagnoses of musculoskeletal lesions. 2) Describe scenarios in which various imaging features of musculoskeletal lesions lead to more accurate tumor staging and treatment response assessment. 3) Detect musculoskeletal complications of tumors and their treatment.

RC618C Pelvis

Participants
Rosemarie Forstner, MD, Salzburg, Austria (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the role of imaging in the management of gynaecological malignancies.2) Assess imaging features that allow accurate staging of gynaecological malignancies.3) Be familiar with pitfalls that can result in staging errors using imaging.4) Understand the changes in imaging appearance post treatment.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Caroline Reinhold, MD, MSc - 2013 Honored EducatorCaroline Reinhold, MD, MSc - 2014 Honored EducatorCaroline Reinhold, MD, MSc - 2017 Honored Educator

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RC621

Advances in CT: Technologies, Applications, Operations - CT Systems

Thursday, Nov. 29 8:30AM - 10:00AM Room: S403A

CT PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants

Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc
Lifeng Yu, PhD, Chicago, IL (*Coordinator*) Nothing to Disclose

For information about this presentation, contact:

yu.lifeng@mayo.edu

ABSTRACT

CT has become a leading medical imaging modality, thanks to its superb spatial and temporal resolution to depict anatomical details. New advances have enabled extending the technology to depict physiological information. This has enabled a wide and expanding range of clinical applications. These advances are highlighted in this multi-session course. The course offers a comprehensive and topical depiction of these advances with material covering CT system innovations, CT operation, CT performance characterization, functional and quantitative applications, and CT systems devised for specific anatomical applications. The sessions include advances in CT system hardware and software, CT performance optimization, CT practice management and monitoring, spectral CT techniques, quantitative CT techniques, functional CT methods, and special CT use in breast, musculoskeletal, and interventional applications.

Sub-Events

RC621A MDCT Systems and Acquisitions

Participants
Lifeng Yu, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

yu.lifeng@mayo.edu

LEARNING OBJECTIVES

1) Introduce recent development of multi-detector CT (MDCT) system. 2) Describe some of the latest CT acquisition techniques, including high pitch, gating, dynamic, and automatic kV selection. 3) Explain clinical applications of these novel acquisition techniques.

RC621B Cone-Beam CT Systems and Applications

Participants
Jeffrey H. Siewerdsen, PhD, Baltimore, MD (*Presenter*) Research Grant, Siemens AG; Research Grant, Carestream Health, Inc; Advisory Board, Siemens AG; Advisory Board, Carestream Health, Inc; License agreement, Carestream Health, Inc; License agreement, Precision X-Ray, Inc; License agreement, Elekta AB; ; ;

LEARNING OBJECTIVES

1) Understand the principles of cone-beam CT imaging. 2) Understand the challenges to cone-beam CT image quality and emerging techniques for image quality improvement. 3) Understand the scope of clinical applications in diagnostic and image-guided procedures utilizing cone-beam CT.

ABSTRACT

1) Understand the principles of cone-beam CT imaging. 2) Understand the challenges to cone-beam CT image quality and emerging techniques for image quality improvement. 3) Understand the scope of clinical applications in diagnostic and image-guided procedures utilizing cone-beam CT.

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RC622

Advances in Cone Beam CT Acquisition and Reconstruction in Radiotherapy

Thursday, Nov. 29 8:30AM - 10:00AM Room: S504AB

CT PH RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Douglas Moseley, PhD, Toronto, ON (*Moderator*) License agreement, Modus Medical Devices Inc; Consultant, Elekta AB

Sub-Events

RC622A State of the Art in Advanced CBCT Acquisition and Reconstruction

Participants
Wojciech Zbijewski, PhD, Baltimore, MD (*Presenter*) Research Grant, Carestream Health, Inc; Research Grant, Siemens AG

For information about this presentation, contact:

wzbijewski@jhu.edu

LEARNING OBJECTIVES

1) Identify key challenges to image quality in CBCT. 2) Discuss latest developments in CBCT instrumentation. 3) Describe recent advances in reconstruction algorithms and artifact correction methods for CBCT. 4) Compare CBCT image quality achievable on their systems to state-of-the-art.

RC622B Clinical Need for Advanced CBCT Imaging in Radiotherapy

Participants
Tianyu Zhao, PhD, St. Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Gain greater understanding on the clinical need of CBCT in radiotherapy in the following applications: Image-Guided Radiotherapy (IGRT) with more precise tumor localization and better patient setup, 4D CBCT in managing respiratory motion, and adaptive radiotherapy (ART).

Active Handout:Tianyu Zhao

http://abstract.rsna.org/uploads/2018/18001992/RSNA 2018 handout RC622B.pdf

RC622C Technical Challenges in the Integration of CBCT Imaging into Radiotherapy

Participants
Douglas Moseley, PhD, Toronto, ON (*Presenter*) License agreement, Modus Medical Devices Inc; Consultant, Elekta AB

For information about this presentation, contact:

douglas.moseley@rmp.uhn.ca

LEARNING OBJECTIVES

1) Identify the technical challenges when using CBCT imaging for image-guided radiation therapy. 2) Discuss strategies for commissioning and QA of the IGRT workflow in the clinic. 3) Describe the future direction of in-room image guidance.

ABSTRACT

The Scan-Plan-Treat paradigm is becoming too simplistic to do describe the workflow in the modern radiation therapy clinic. Multiple CBCT scans are performed during the treatment delivery that may trigger, re-Scans and re-Plans. This presents several challenges.

RC623

Advanced Ultrasound Technology and Applications

Thursday, Nov. 29 8:30AM - 10:00AM Room: S404CD

PH US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
William F. Sensakovic, PhD, Scottsdale, AZ (*Coordinator*) Speaker, Bayer AG; Research Grant, Mazor Robotics Ltd; Founder, Telerad Physics Teaching, LLC
Thaddeus A. Wilson, PhD, Madison, WI (*Coordinator*) Nothing to Disclose

For information about this presentation, contact:

wfsensak@gmail.com

LEARNING OBJECTIVES

1) Understand the role of contrast agents in ultrasound. 2) Explain the science and technology behind strain imaging. 3) Implement strain imaging and ultrasound contrast in clinical practice.

Sub-Events

RC623A Contrast Agents

Participants
Peter N. Burns, PhD, Toronto, ON (*Presenter*) Research collaboration, Koninklijke Philips NV

LEARNING OBJECTIVES

1) Understand the physical composition of microbubble contrast agents and how they interact with an ultrasound field. 2) Describe the principles of contrast specific imaging modes found on modern ultrasound scanners. 3) Review the characteristics of contrast images and flow measurements as the basis for their interpretation in a clinic setting.

RC623B Elasticity Imaging

Participants
Stephen McAleavey, PhD, Rochester, NY (*Presenter*) Research collaboration, Siemens AG; Research Grant, Carestream Health, Inc;

For information about this presentation, contact:

stephen.mcaleavey@rochester.edu

LEARNING OBJECTIVES

1) Explain the physical principles of several elasticity imaging methods in clinical use. 2) Understand capabilities and limitations of elasticity methods. 3) Describe current and emerging clinical applications of elasticity imaging.

RC623C Practical Clinical Advice on the Use of Contrast and Strain Imaging

Participants
Richard G. Barr, MD, PhD, Campbell, OH (*Presenter*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Canon Medical Systems Corporation; Research Grant, Esaote SpA; Research Grant, BK Ultrasound; Research Grant, Hitachi, Ltd

LEARNING OBJECTIVES

1) To review appropriate use of ultrasound contrast in the clinical setting. 2) Discuss which patients would benefit from a contrast enhanced ultrasound. 3) Review the requirements for performing a contrast enhanced ultrasound. 4) Review which applications are appropriate for elastography. 5) Discuss how elastography can help in diagnosis.

Honored Educators

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RC624

Fakes, Forgeries, and Hidden Repairs in Art and Archaeology: The Role of Forensic Imaging

Thursday, Nov. 29 8:30AM - 10:00AM Room: N229

OT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Barry D. Daly, MD, Baltimore, MD (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

bdaly@umm.edu

LEARNING OBJECTIVES

1) To describe the adaptation of modern imaging techniques to confirm or refute the authenticity of ancient treasures and artworks. 2) To learn about 'fingerprinting' of valuable artifacts with 3D imaging as a technique for identifying stolen art treasures. 3) To differentiate bona fide from fake restorations in ancient artifacts.

ABSTRACT

A major challenge in the world of art is the prevalence of faux or stolen treasures or works with concealed repairs. One of the major applications of modern imaging technology in this setting is the ability to non-invasively investigate the 3D structure and hidden internal contents of ancient and fragile treasures. Using a case-based approach, this course addresses the use of advanced imaging techniques to confirm or refute the authenticity of ancient artworks, with case examples from 3,000 year old Mezo-American statues to late Renaissance musical instruments and paintings. The implications of forgery, erroneous provenance, and concealed alterations or repairs to artworks are discussed.

Sub-Events

RC624A A Historical Perspective on the Use of Imaging Techniques to Confirm or Refute the Authenticity of Ancient Treasures and Artworks

Participants
Barry D. Daly, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC624B Hidden Restorations: Bona Fide or Fake?

Participants
Jonathan P. Brown, MS, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jpbrown@fieldmuseum.org

LEARNING OBJECTIVES

1) Discuss x-radiographic investigations for separating restoration from the original object so that the original may be examined without the overlying restorations.

RC624C 'Fingerprinting' of Valuable Artifacts: Imaging Techniques for Identifying Stolen Art Treasures

Participants
Vahid Yaghmai, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

Honored Educators

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RC625

Mini-course: Radiation Safety for Patients and Staff - Emerging Advances in Patient Radiation Protection

Thursday, Nov. 29 8:30AM - 10:00AM Room: S105AB

AI PH SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Madan M. Rehani, PhD, Boston, MA (*Coordinator*) Nothing to Disclose

For information about this presentation, contact:

madan.rehani@gmail.com

Active Handout:Madan M. Rehani

http://abstract.rsna.org/uploads/2018/18001512/Rehani_RSNA_Quality _dose RC625.pdf

Sub-Events

RC625A Emerging Concepts of Integration of Image Quality, Radiation Dose, and Artificial Intelligence

Participants
Ehsan Samei, PhD, Durham, NC (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

LEARNING OBJECTIVES

1) To understand how dose monitoring is but a component of the broad objective of quality and excellence in imaging. 2) To understand how dose and image quality need to be recognized together to enable optimized care. 3) To appreciate how artificial intelligence methods can be used to inform quality and safety monitoring and optimization.

RC625B Practical Aspects of Integration of Clinical Image Quality and Patient Dose Optimization

Participants
Madan M. Rehani, PhD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

madan.rehani@gmail.com

LEARNING OBJECTIVES

1) Define strength and limitations of diagnostic reference levels (DRLs). 2) Describe criteria for image quality assessment. 3) Apply the concept of integration of image quality scoring with dose indices in CT imaging for the purpose of optimization.

Active Handout:Madan M. Rehani

http://abstract.rsna.org/uploads/2018/18001514/Rehani_RSNA_Quality _dose RC625B.pdf

RC627

Basic Principles of Cost-Effectiveness Analysis in Imaging

Thursday, Nov. 29 8:30AM - 10:00AM Room: E353A

HP RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Pari Pandharipande, MD, MPH, Boston, MA (*Moderator*) Research Grant, Medical Imaging & Technology Alliance
Stella Kang, MD,MSc, New York, NY (*Moderator*) Royalties, Wolters Kluwer nv

LEARNING OBJECTIVES

1) Describe the value of cost-effectiveness analyses in affecting reimbursement policies and practice guidelines. 2) Identify potential databases that can be used for input parameters for both effectiveness data and cost data. 3) Describe the incremental cost effectiveness ratio in laymen's terms to patients, physicians, and policymakers.

ABSTRACT

Cost-effectiveness analysis (CEA) is commonly used by policymakers to gain insight into the value of healthcare interventions. Standard CEA methods, grounded in principles of economics and resource allocation, are unfamiliar to most radiologists. In the current era of value-based care, radiologists' understanding of how health services researchers and economists project CEA outcomes will be increasingly important for identifying efficient and affordable imaging strategies. In this course, basic research concepts and applications relevant to CEA in imaging will be reviewed, including decision-analysis and simulation modeling, life expectancy and lifetime cost metrics, health-related quality-of-life measurement, and incremental cost-effectiveness ratios (ICERs). Our goal will be to expose early investigators and the general radiology community to CEA in imaging.

Sub-Events

RC627A An Introduction to Cost-Effectiveness Analysis in Diagnostic Testing

Participants
Pari Pandharipande, MD, MPH, Boston, MA (*Presenter*) Research Grant, Medical Imaging & Technology Alliance

LEARNING OBJECTIVES

1) Describe the basic structure of a decision-analytic model that is designed to evaluate the long-term health and economic consequences of a diagnostic test. 2) Describe how an incremental cost-effectiveness ratio (ICER) is calculated and used for policy-level decision-making. 3) Explain the strengths and limitations of cost-effectiveness analysis as method to determine the value of an imaging test.

RC627B An Example of Cost-Effectiveness Analysis in Imaging: MRI for Choledocholithiasis

Participants
Stella Kang, MD,MSc, New York, NY (*Presenter*) Royalties, Wolters Kluwer nv

For information about this presentation, contact:

stella.kang@nyumc.org

LEARNING OBJECTIVES

1) Understand how to approach the question of whether risk-stratified or non-risk-stratified use of imaging is more cost-effective. 2) Apply methods of evidence synthesis and probabilistic modeling to a cost-effectiveness analysis of MRI versus risk-stratified diagnostic evaluation for suspected acute biliary obstruction. 3) Evaluate the clinical and research implications of results from a cost-effectiveness analysis of diagnostic strategies for suspected acute biliary obstruction.

RC627C Cost-effectiveness of Imaging in Stroke

Participants
Ajay Gupta, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain the need for high quality cost-effectiveness studies to optimize imaging utilization in the prevention, diagnosis, and treatment of cerebrovascular diseases. 2) Describe the existing literature supporting the role of specific cost-effective imaging strategies in patients with stroke. 3) Identify gaps in our understanding of cost-effective imaging strategies in cerebrovascular diseases.

RC629

Quantitative MR Imaging and Clinical Applications (Interactive Session)

Thursday, Nov. 29 8:30AM - 10:00AM Room: S103AB

BQ MR OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Hero K. Hussain, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

Sub-Events

RC629A MR Fingerprinting: Principles and Applications

Participants
Vikas Gulani, MD, PhD, Cleveland, OH (*Presenter*) Research support, Siemens AG; Licensed Technology, Siemens Healthineers - both myself and my spouse. MR Fingerprinting, on which we are both inventors, has been licensed by Siemens.

LEARNING OBJECTIVES

1) Understand the motivation behind the development of Magnetic Resonance Fingerprinting (MRF). 2) Understand basic principles and rationale in the design of an MRF acquisition, and comprehend the meaning of the output maps. 3) Identify applications to which MRF has been applied clinically thus far, and the unique insights that this work has thus far provided. 4) Understand the implications of MRF for tissue characterization, prediction of response to treatment, quantitative image analysis, radiomics, and computerized decision support. 5) Use the knowledge gained about MRF to analyze how this technology could be used in other clinical settings.

ABSTRACT

Magnetic Resonance Fingerprinting (MRF) is a new technology that enables efficient simultaneous mapping of multiple interesting MR properties, making it clinically feasible to measure T1 and T2, and thus provide a quantitative underlay to MRI. This enables a move towards a fully quantitative MR exam. We will start by laying out the rationale behind the need for quantitative MR. The approach adopted in MRF will be discussed, and the basics of such an acquisition will be explained. The initial clinical applications that have thus far been published will be shared, followed by a discussion of the implications of the technology in the future.

RC629B Radiomics for the Detection of Prostate Cancer

Participants
Masoom A. Haider, MD, Toronto, ON (*Presenter*) Advisory Board, Siemens AG; ;

LEARNING OBJECTIVES

1) Recognize the unmet needs in prostate cancer detection and surveillance. 2) Recognize the potential applications of quantitative imaging and radiomics to prostate cancer detection and surveillance. 3) Recognize what is required to have a valid imaging biomarker that can be applied to risk stratification in prostate cancer.

RC629C Free Breathing 3D Quantitative Perfusion MR Imaging of the Abdomen

Participants
Nicole Seiberlich, PhD, Cleveland, OH (*Presenter*) Research Grant, Siemens AG

LEARNING OBJECTIVES

1) Describe various challenges to the collecting high-resolution, time-resolved MR images needed to quantify perfusion in the abdomen. 2) Understand different data collection and reconstruction strategies that have been recently proposed to enable this application. 3) Compare and contrast the merits of various novel acceleration methods for abdominal perfusion imaging. 4) Implement rapid perfusion quantification methods at their institution, or have the ability to contact those that can offer support in this area.

RC629D Elastography Beyond the Liver

Participants
Richard L. Ehman, MD, Rochester, MN (*Presenter*) CEO, Resoundant, Inc Stockholder, Resoundant, Inc

LEARNING OBJECTIVES

1) Explain the basic physical principles of MR Elastography (MRE). 2) Understand the emerging applications of MRE for intracranial imaging. 3) Describe other potential applications of MRE that are being investigated, including assessing cardiac, lung, breast, renal, and pancreatic disease.

Honored Educators

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educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Richard L. Ehman, MD - 2016 Honored Educator

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November 25–30 | McCormick Place, Chicago

RC631

Common Spinal Injection Procedures for Diagnosis and Treatment of Back Pain (Hands-on)

Thursday, Nov. 29 8:30AM - 10:00AM Room: E263

MK NR IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
A. Orlando Ortiz, MD, MBA, Mineola, NY (*Presenter*) Nothing to Disclose
Bassem A. Georgy, MD, MSc, San Diego, CA (*Presenter*) Consultant, Johnson & Johnson; Consultant, Merit Medical Systems, Inc; Consultant, Medtronic plc; Stockholder, Spine Solutions, Inc; ;
Todd S. Miller, MD, Bronx, NY (*Presenter*) Nothing to Disclose
Stanley Golovac, MD, Coral Gables , FL (*Presenter*) Nothing to Disclose
Allan L. Brook, MD, Bronx, NY (*Presenter*) Nothing to Disclose
Michele H. Johnson, MD, New Haven, CT (*Presenter*) Nothing to Disclose
Afshin Gangi, MD, PhD, Strasbourg, France (*Presenter*) Proctor, BTG International Ltd; Proctor, Galil Medical Ltd

For information about this presentation, contact:

Sgolovac@mac.com

gangi@unistra.fr

tmiller@montefiore.org

LEARNING OBJECTIVES

1) To introduce common spinal injection procedures that are used for the diagnosis and treatment of neck and back pain disorders. 2) To learn the indications and contraindications for these procedures. 3) To understand how imaging guidance is used to perform these procedures. 4) To introduce some of the equipment and techniques that are helpful in performing spine injection procedures in a hands on format with an opportunity for attendees to address their specific questions and concerns with the course faculty.

ABSTRACT

Image guided spine interventions can be used for the diagnosis and/or treatment of painful conditions of the spinal access. Diagnostic procedures often include specific nerve blocks that can be performed with anesthetic agents. Facet joint and sacroiliac joint pain syndromes can likewise be managed with spine interventional techniques. Epidural steroid injections can be performed using interlaminar, caudal or transforaminal techniques in the management of focal back or neck pain with an associated radicular pain component. More advanced longer lasting treatments inclued radiofrequency neuolysis which can also be used to manage facet or sacroiliac joint related pain that temporarily responds to diagnostic median branch blocks or specific joint injections. Spinal cord stimulator placement is another advanced technique that can be used to manage chronic pain syndromes. The workshop emphasizes patient selection, imaging evaluation, procedure indication and contraindications in order to optimize treatment outcome.

RC632

Essentials of Radiology Operation

Thursday, Nov. 29 8:30AM - 10:00AM Room: S404AB

LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Satoshi Minoshima, MD, PhD, Salt Lake City, UT (*Moderator*) Consultant, Hamamatsu Photonics KK; Research Grant, Hitachi, Ltd; Research Grant, Nihon Medi-Physics Co, Ltd;

Sub-Events

RC632A MACRA, MIPS, and the QPP: What is Ahead for Radiologists?

Participants
Lauren P. Golding, MD, Winston Salem, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lgolding@triadradiology.com

LEARNING OBJECTIVES

1) Discuss the major changes in MIPS for 2018, with emphasis on strategies to optimize eadiologists' performance. 2) Review the APM pathway within the QPP, highlighting opportunities for radiologists to participate in alternative payment models. 3) Discuss the future of value based healthcare, recent policy updates, and what may be on the horizon radiologists.

RC632B Measuring Radiologists' Productivity

Participants
Sanjay Saini, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ssaini@mgh.harvard.edu

LEARNING OBJECTIVES

1) Understand why productivity is a critical economic metric. 2) Describe the pros and cons of various methods for measuring productivity. 3) Outline approach for impremenring productivity measures in professional practices.

ABSTRACT

References: 1. Ding A, Saini S, Bernt ER. Radiologist Productivity: what, when and how. JACR 2009; 12:824-827.

RC632C Integration of Radiology Practice to Health System: Why and How?

Participants
Satoshi Minoshima, MD, PhD, Salt Lake City, UT (*Presenter*) Consultant, Hamamatsu Photonics KK; Research Grant, Hitachi, Ltd; Research Grant, Nihon Medi-Physics Co, Ltd;

For information about this presentation, contact:

sminoshima@hsc.utah.edu

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RC650

Fallopian Tube Catheterization (Hands-on)

Thursday, Nov. 29 8:30AM - 10:00AM Room: E260

GU OB IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Amy S. Thurmond, MD, Portland, OR (*Presenter*) Nothing to Disclose
Ronald J. Zagoria, MD, San Francisco, CA (*Presenter*) Consultant, ReCor Medical, Inc
A. Van Moore JR, MD, Charlotte, NC (*Presenter*) Chairman and CEO, Strategic Radiology
Anne C. Roberts, MD, La Jolla, CA (*Presenter*) Nothing to Disclose
David M. Hovsepian, MD, Stanford, CA (*Presenter*) Nothing to Disclose
James E. Silberzweig, MD, New York, NY (*Presenter*) Nothing to Disclose
Lindsay S. Machan, MD, Vancouver, BC (*Presenter*) Stockholder, Analytics for Life, Inc; Stockholder, Calgary Scientific, Inc; Stockholder, Harmonic Medical; Stockholder, IKOMED Technologies Inc; Stockholder, Innovere Medical Inc; Stockholder, Confluent Medical Inc
Maureen P. Kohi, MD, San Francisco, CA (*Presenter*) Research Grant, Boston Scientific Corporation; Consultant, LaForce; Advisory Board, Boston Scientific Corporation; Advisory Board, AbbVie Inc

For information about this presentation, contact:

ron.zagoria@ucsf.edu

lindsay.machan@vch.ca

acroberts@ucsd.edu

jsilberzweig@cvsnyc.com

LEARNING OBJECTIVES

1) Obtain hands-on experience with fallopian tube catheterization using uterine models and commercially available catheters and guidewires. 2) Review the evolution of interventions in the fallopian tubes. 3) Learn safe techniques for fallopian tube recanalization for promoting fertility, and fallopian tube occlusion for preventing pregnancy. 4) Discuss the outcomes regarding pregnancy rate and complications. 5) Appreciate ways to improve referrals from the fertility specialists and expand your practice.

ABSTRACT

Fallopian tube catheterization using fluoroscopic guidance is a relatively easy, inexpensive technique within the capabilities of residency trained radiologists. Fallopian tube cathterization can be used to dislodge debris from the tube in women with infertility,or to place FDA-approved tubal occlusion devices in women who do not desire fertility. The fallopian tube is the 1 mm gateway between the egg and the sperm. Noninvasive access to this structure for promoting, and preventing, pregnancy has been sought for over 160 years. This hands-on course allows participants use commercially available catheters and devices in plastic models for fallopian tube catheterization, and to speak directly to world experts about this exciting procedure.

Active Handout:Amy Suzanne Thurmond

http://abstract.rsna.org/uploads/2018/3990740/Hands-on 2018 handout RC650.pdf

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RC652

Live Ultrasound Interventional Procedures: Joint Injections, Cyst Aspiration, Abscess Drainage, Vascular Access, Core Biopsy, and Foreign Body Removal (Hands-on)

Thursday, Nov. 29 8:30AM - 10:00AM Room: E264

MK IR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

Veronica J. Rooks, MD, Honolulu, HI (*Moderator*) Nothing to Disclose
Veronica J. Rooks, MD, Honolulu, HI (*Presenter*) Nothing to Disclose
Stephen C. O'Connor, MD, Boston, MA (*Presenter*) Nothing to Disclose
James W. Murakami, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Kal Dulaimy, MD, Springfield, MA (*Presenter*) Nothing to Disclose
Hisham A. Tchelepi, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Christian L. Carlson, MD, MS, Jbsa Ft Sam Houston, TX (*Presenter*) Nothing to Disclose
Paolo Minafra, MD, Pavia, Italy (*Presenter*) Nothing to Disclose
Leah E. Braswell, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Horacio M. Padua JR, MD, Boston, MA (*Presenter*) Nothing to Disclose
Adam S. Young, MD, MBA, Los Angeles, CA (*Presenter*) Nothing to Disclose
Brian H. Ching, DO, Tripler Army Medical Center, HI (*Presenter*) Nothing to Disclose
Paula B. Gordon, MD, Vancouver, BC (*Presenter*) Stockholder, OncoGenex Pharmaceuticals, Inc ; Stockholder, Volpara Health Technologies Limited; Scientific Advisory Board, Real Imaging Ltd; Scientific Advisory Board, DenseBreast-info, Inc;
Ebonee Carter, MD, Savanna, GA (*Presenter*) Nothing to Disclose
Eric Royston, DO, MPH, Tripler Army Med Ctr, HI (*Presenter*) Nothing to Disclose
Peter L. Cooperberg, MD, Vancouver, BC (*Presenter*) Nothing to Disclose
Shankar Rajeswaran, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Eva M. Smietana, MD, Kailua, HI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ronirooks@gmail.comronirooks@gmail.com

brian.h.ching.civ@mail.mil

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James.Murakami@nationwidechildrens.org

LEARNING OBJECTIVES

1) Identify basic skills, techniques, and pitfalls of freehand invasive sonography. 2) Define and discuss technical aspects, rationale, and pitfalls involved in musculoskeletal interventional sonographic care procedures. 3) Successfully perform basic portions of hands-on US-guided MSK procedures in a tissue simulation learning module, including core biopsy, small abscess drainage, cyst aspiration, soft tissue foreign body removal, vascular access, and intraarticular steriod injection. 4) Incorporate these component skill sets into further life-long learning for expansion of competency and prepartaion for more advanced interventional sonographic learning opportunities.

RC653

Machine Learning and Artificial Intelligence: The Non-Interpretive Considerations

Thursday, Nov. 29 8:30AM - 10:00AM Room: E450A

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Saurabh Jha, MD, Philadelphia, PA (*Moderator*) Speakers Bureau, Canon Medical Systems Corporation

For information about this presentation, contact:

saurabh.jha@uphs.upenn.edu

LEARNING OBJECTIVES

1) To appreciate the history of automation. 2) To understand the opposing economic factors in the adoption of artificial intelligence. 3) To understand what motivates entrepreneurs and venture capitalists to fund AI ventures. 4) To get an overview of how we can assess the quality of AI. 5) To appreciate the ethical and legal issues about AI.

ABSTRACT

This session will discuss the more non technical issues in artificial intelligence such as the economics, history, legal and ethical considerations, entrepreneurship and how we assess the product. The session intends to complement the more technical elements of artificial intelligence to give a rounded perspective about this emerging area.

Sub-Events

RC653A The Economics of Artificial Intelligence

Participants
Saurabh Jha, MD, Philadelphia, PA (*Presenter*) Speakers Bureau, Canon Medical Systems Corporation

For information about this presentation, contact:

saurabh.jha@uphs.upenn.edu

LEARNING OBJECTIVES

1) Understand the history of automation. 2) Is automation inevitable in radiology? 3) Review economic theory relevant to automation. 4) Critique the economic theory and empirical evidence which informs us about artificial intelligence.

ABSTRACT

Though artificial intelligence is a recent phenomenon, at least in terms of scale, automation and the replacement of labor by machines, is not new. There are broad economic and cultural principles. What are these principles? Can they be applied to radiology in general and healthcare in particular?

RC653B Entrepreneurship and Artificial Intelligence

Participants
Ajay Kohli, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ajay@ajaykohlimd.com

LEARNING OBJECTIVES

1) Start-ups, funding, exit strategies and more: to learn about what it means to be an entrepreneur in healthcare. 2) To understand what motivates venture capitalists and healthcare CEOs to invest in Artificial Intelligence start-up companies. 3) To understand some of the barriers faced by entrepreneurs, speficially those working on bringing in Artificial Intelligence in medical imaging. 4) To learn how to evaluate Artifical Intelligence applications from start-up companies.

RC653C How to Tell if My AI is Telling the Truth

Participants
Hugh Harvey, MBBS, London, United Kingdom (*Presenter*) Employee, Kheiron Medical

For information about this presentation, contact:

hugh@kheironmed.com

LEARNING OBJECTIVES

1) Learn an overview on how to assess an AI application. 2) Understand how training data selection, biases, disease prevalence, and statistics can alter medical device claims. 3) Learn about 'intended use' as per medical device regulations.

RC653D Ethical and Legal Aspects of Machine Learning

Participants
Falgun H. Chokshi, MD, Marietta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss ethical ramifications of AI mediated imaging diagnosis versus detection. 2) Understand legal perspectives of AI's impact on Radiology as a speciality as they pertain to medical liability and risk. 3) Empathize with the patient's role and perspective in their care as AI augments radiologists' practices and workflow.

RC654

The Use of Business Analytics for Improving Radiology Operations, Quality, and Clinical Performance (In Association with the Society for Imaging Informatics in Medicine)

Thursday, Nov. 29 8:30AM - 10:00AM Room: S104A

IN LM SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Katherine P. Andriole, PhD, Dedham, MA (*Moderator*) Research Grant, NVIDIA Corporation; Research Grant, General Electric Company; Research Grant, Nuance Communications, Inc; Advisory Board, McKinsey & Company, Inc

For information about this presentation, contact:

kandriole@bwh.harvard.edu

LEARNING OBJECTIVES

1) Understand what is meant by business analytics in the context of a radiology practice. 2) Be able to describe the basic steps involved in implementing a business analytics tool. 3) Learn how business analytics tools can be used for quality assurance in radiology, for maintenance of certification (MOC), and for practice quality improvement. 4) Be introduced to the capabilities of current and potential future business analytics technologies.

ABSTRACT

This course will provide an overview of the use of business analytics (BA) in radiology. How a practice manages information is becoming a differentiator in the competitive radiology market. Leveraging informatics tools such as business analytics can help a practice transform its service delivery to improve performance, productivity and quality. An introduction to the basic steps involved in implementing business analytics will be given, followed by example uses of BA tools for quality assurance, maintenance of certification (MOC) and pracitce quality improvement . The power of current business analytics technologies will be described, along with a look at potential future capabilities of business analytics tools.

Sub-Events

RC654A Introduction to Business Analytics Demonstrating Application to Radiology

Participants
Katherine P. Andriole, PhD, Dedham, MA (*Presenter*) Research Grant, NVIDIA Corporation; Research Grant, General Electric Company; Research Grant, Nuance Communications, Inc; Advisory Board, McKinsey & Company, Inc

For information about this presentation, contact:

kandriole@bwh.harvard.edu

LEARNING OBJECTIVES

1) Gain an overview of business analytics tools and understand how they might be used in radiology. 2) Be able to describe the general steps involved in business analytics, including data extraction, transformation, analysis, and presentation or visualization of key performance indicators (KPI). 3) Review several example radiology use cases.

ABSTRACT

This session will provide a general overview of business analytics concepts and how they can be used in radiology. A walk through of the basic steps involved in implementation including identifying, collecting, transforming, and analyzing data, followed by dynamically presenting key performance indicators (KPI) will be demonstrated. Example use cases involving multiple database sources taken from a radiology practice will be shown.

RC654B Operational and Predictive Analytics in Radiology

Participants
Luciano M. Prevedello, MD, MPH, Dublin, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain the big data science and radiology. 2) Identify the role of informatics in capturing, extracting, analyzing, and communication quality projects. 3) Illustrate graphical dashboarding examples to support quality efforts.

RC654C Capabilities of Current and Future Business Analytics Technologies

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (*Presenter*) Royalties, Osler Institute

For information about this presentation, contact:

tessa.cook@uphs.upenn.edu

LEARNING OBJECTIVES

1) To gain familiarity with currently available business technologies and their relevance to radiology practice. 2) To consider how existing business technologies can support quality assurance in radiology. 3) To learn about business analytics features that may be available/desirable in the future to augment and support both the practice of radiology.

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104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RCB51

Intro to Statistics with R (Hands-on)

Thursday, Nov. 29 8:30AM - 10:00AM Room: S401CD

IN RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
James E. Schmitt, MD, PhD, Philadelphia, PA (*Moderator*) Nothing to Disclose
James E. Schmitt, MD, PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Nathan M. Cross, MD, MS, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

nmcross@uw.edu

LEARNING OBJECTIVES

1) Install and launch the R software package. Understand how to search for and download external packages to extend R's functionality. 2) Load data from external files such as txt, csv, and xlsx. 3) Perform basic mathematical operations and utilize data structures to manipulate data. 4) Use loops to perform more complex operations over the data, including true/false logic. 5) Understand the basics of creating plots and histograms. 6) Perform common statistical tests including correlation, Chi-square, and ANOVA.

RCC51

Virtual Reality and 3D Printing

Thursday, Nov. 29 8:30AM - 10:00AM Room: S501ABC

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Beth A. Ripley, MD, PhD, Seattle, WA (*Moderator*) Nothing to Disclose
Nicole Wake, PhD, New York, NY (*Moderator*) In-kind support, Stratasys, Ltd

LEARNING OBJECTIVES

1) Describe the modes of visualizing medical images and models in VR/AR using a comprehensive conceptual framework. 2) Explain the considerations for the implementation of medical image visualization modes in VR/AR. 3) Describe key considerations for placing VR/AR visualization tools into a radiology-based workflow.

Honored Educators

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Sub-Events

RCC51A Visualizing Medical Images and Models in VR

Participants
Justin Sutherland, PhD, Ottawa, ON (*Presenter*) Nothing to Disclose

RCC51B 3D Printed and Augmented Reality Urological Models

Participants
Nicole Wake, PhD, New York, NY (*Presenter*) In-kind support, Stratasys, Ltd

RCC51C AR/VR Multidimensional Medicine

Participants
Dmitry Levin, Seattle, WA (*Presenter*) Nothing to Disclose

RCC51D Augmented and Virtual Reality in Diagnostic Imaging: A Primer and Current State of the Art

Participants
Eliot L. Siegel, MD, Baltimore, MD (*Presenter*) Medical Advisory Board, Brightfield Technologies Medical Advisory Board, McCoy Board of Directors, Carestream Health, Inc Founder, MedPerception, LLC Board of Directors Clear Health Quality Institute Founder, Topoderm Founder, YYESIT, LLC Medical Advisory Board, Bayer AG Medical Advisory Board, Bracco Group Medical Advisory Board, Carestream Health, Inc Medical Advisory Board, Fovia, Inc Medical Advisory Board, McKesson Corporation Medical Advisory Board, Merge Healthcare Incorporated Medical Advisory Board, Microsoft Corporation Medical Advisory Board, Koninklijke Philips NV Medical Advisory Board, Toshiba Medical Systems Corporation Research Grant, Anatomical Travelogue, Inc Research Grant, Anthro Corp Research Grant, Barco nv Research Grant, Dell Inc Research Grant, Evolved Technologies Corporation Research Grant, General Electric Company Research Grant, Herman Miller, Inc Research Grant, Intel Corporation Research Grant, MModal IP LLC Research Grant, McKesson Corporation Research Grant, RedRick Technologies Inc Research Grant, Steelcase, Inc Research Grant, Virtual Radiology Research Grant, XYBIX Systems, Inc Research, TeraRecon, Inc Researcher, Bracco Group Researcher, Microsoft Corporation Speakers Bureau, Bayer AG Speakers Bureau, Siemens AG

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MSRT52

ASRT@RSNA 2018: The Missed Breast Cancer - Causes and Cures

Thursday, Nov. 29 9:15AM - 10:15AM Room: N230B

BR OI

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Michael N. Linver, MD, Albuquerque, NM (*Presenter*) Medical Advisory Board, Solis; Scientific Advisory Board, Real Imaging Ltd; Scientific Advisory Board, Seno Medical Instruments, Inc

For information about this presentation, contact:

mammomike@aol.com

LEARNING OBJECTIVES

1) Identify the major biological features of breast cancers which cause some cancers to be missed on mammography. 2) Identify the technical issues which cause some breast cancers to be missed on mammography. 3) Apply various strategies to prevent breast cancers from being missed on mammography.

ABSTRACT

This session will cover the major reasons that breast cancers are sometimes missed on mammography. Emphasis will be placed on the biological factors of breast cancers that the radiologist cannot control, and the technical factors related to the process of obtaining the images that the radiologist can and should control. For all of these issues, strategies will be offered to prevent missing cancers on mammography.

MSCN52

Case-based Review of Neuroradiology (Interactive Session)

Thursday, Nov. 29 10:30AM - 12:00PM Room: S406A

HN NR PD

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Pina C. Sanelli, MD, Manhasset, NY (*Director*) Research funded, Siemens AG;

Sub-Events

MSCN52A Head & Neck: What Space is That Lesion In?

Participants
Hillary R. Kelly, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hillary.kelly@mgh.harvard.edu

LEARNING OBJECTIVES

1) Define the fascia-lined spaces of the head and neck as relevant to imaging interpretation. 2) Specify the anatomic landmarks that aid in recognition of the spaces of the neck on cross-sectional imaging. 3) Develop a region specific differential diagnosis for the major spaces in the head and neck.

MSCN52B Head & Neck: Vascular Lesions Important to Know!

Participants
Deborah R. Shatzkes, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

shatzkes@hotmail.com

LEARNING OBJECTIVES

1) Understand modern classification and nomenclature of vascular lesions. 2) Recognize characteristic imaging findings of the most common vascular lesions encountered in the head and neck.

Active Handout:Deborah Rachelle Shatzkes

http://abstract.rsna.org/uploads/2018/18001605/ISSVA-Classification MSCN52B.pdf

MSCN52C Brain Interventions: Can We Really Treat That?

Participants
Philip M. Meyers, MD, New York, NY (*Presenter*) Consultant, Stryker Corporation; Clinical site, Medtronic plc; Consultant, Penumbra, Inc; Consultant, Siemens AG

LEARNING OBJECTIVES

The participant will understand the application and ongoing relevance of catheter cerebral arteriography and specific imaging considerations to the safe and effective endovascular treatment of specific pediatric neurovascular diseases.

ABSTRACT

Advancements in computer-aided imaging and catheter-based technologies now permit safe and effective treatment of an increasing range of neurovascular diseases. At the conclusion of this lecture, the participant will understand the application of these technologies and specific imaging considerations to the safe and effective treatment of important categories of pediatric neurovascular disease.

MSCN52D Pediatric: The Stuff We Don't See in Adults

Participants
Ahmet M. Agildere, MD, Bahcelievler, Turkey (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

muhtesem@baskent.edu.tr

LEARNING OBJECTIVES

1) Learn the essential differential diagnostic features of pediatric patients in neuroradiology. 2) Learn on the basis of interesting cases that the tumor, vascular, metabolic, infectious etc. diseases' unique properties belong to children that are important on the

differential diagnosis of pediatric patients.

ABSTRACT

The neurologic symptoms and signs are usually unable to make the certain diagnosis of pediatric patients even on the basis of laboratory and/or imaging findings. So evaluation of neuroradiologic findings and clues are more important in pediatric patients , particulary on MR. Some patients may have unique findings own to pediatric patients or require additional or advanced techniques for certain diagnosis. In this presentation main pediatric titles will be discussed on the basis of imaging findings.

MSCS52

Case-based Review of Musculoskeletal Radiology (Interactive Session)

Thursday, Nov. 29 10:30AM - 12:00PM Room: S100AB

MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Stacy E. Smith, MD, Boston, MA (*Director*) Nothing to Disclose

Sub-Events

MSCS52A Foot and Ankle

Participants
Hilary R. Umans, MD, Ardsley, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hilary.umans@radnet.com

LEARNING OBJECTIVES

1) Learn to identify common pathology encountered in imaging the ankle / hind-foot, mid- and forefoot; cases will be selected to encompass common osteochondral, ligamentous, myotendinous capsular and soft tissue pathology.

MSCS52B Metabolic MSK Disorders

Participants
Giuseppe Guglielmi, MD, Foggia, Italy (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

giuseppe.guglielmi@unifg.it

LEARNING OBJECTIVES

1) To learn about osteoporosis, osteopoenia and osteomalacia in course of gastrointestinal, ematological, tumoral and metabolic diseases. 2) To understand the physiopathogenesis of these conditions and its differences from primary osteoporosis. 3) To present the role conventional and advanced techniques to evaluate bone mineral density and bone quality.

ABSTRACT

Metabolic bone diseases are widespread conditions which can be either primary or secondary to several disorders, such as gastrointestinal, ematological and tumoral ones. Conventional and advanced Imaging techniques may help the Radiologist to detect changes in bone mineral density (bone quantity) as well as in bone mineral architecture (bone quality) in order to make the proper diagnosis. In particular, in this session the role of Radiographs, bone densitometry, CT, MRI and their histology speciments will be discussed.

MSCS52C Hip

Participants
Donna G. Blankenbaker, MD, Fitchburg, WI (*Presenter*) Consultant, Reed Elsevier; Royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Recognize the imaging appearance for different hip conditions. 2) Improve diagnostic skill and apply principles for developing a differential diagnosis.

MSCS52D Knee

Participants
Christine B. Chung, MD, La Jolla, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify current challenges in clinical diagnosis of commonly encountered knee pathology. 2) Apply strategies to address diagnostic challenges using a case-based format.

MSES52

Essentials of Trauma Imaging

Thursday, Nov. 29 10:30AM - 12:00PM Room: S406B

CT ER GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Matthew T. Heller, MD, Gibsonia, PA (*Moderator*) Author, Reed Elsevier; Consultant, Reed Elsevier;

Sub-Events

MSES52A Blunt Abdominal Trauma

Participants
Matthew T. Heller, MD, Gibsonia, PA (*Presenter*) Author, Reed Elsevier; Consultant, Reed Elsevier;

For information about this presentation, contact:

hellermt@gmail.com

LEARNING OBJECTIVES

1) Describe common CT findings of blunt abdominal trauma. 2) Review key components for classification of traumatic injuries of abdominal organs. 3) Discuss the role of imaging findings in patient triage and management.

ABSTRACT

Blunt abdominal trauma is a significant cause of morbidity and mortality worldwide. Contrast-enhanced computed tomography (CT) is the most efficient and commonly used imaging modality to evaluate patients presenting after sustaining blunt abdominal trauma. Familiarity with common imaging findings and mechnism of injury are critical to the proper diagnosis and triage of patients. In this session, the key imaging findings and classifications of blunt abdominal trauma will be reviewed.

MSES52B Penetrating Abdominal Trauma

Participants
Felipe Munera, MD, Key Biscayne, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

fmunera@med.miami.edu

LEARNING OBJECTIVES

1) To discuss the role of MDCT in patients with Penetrating abdominal Trauma. 2) Describe MDCT protocols for PAT. 3) Review the MDCT findings of selected penetrating abdominal injuries.

ABSTRACT

Patients with PAT who are in a hemodinamically stable condition may forgo laparotomy if the do not have surgically pertinent MDCT findings. This lecture focuses on key MDCT findings in patients with penetrating abdominal trauma.

MSES52C Blunt + Penetrating Thoracic Trauma

Participants
Sanjeev Bhalla, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) An approach to CTA of the thorax in trauma. 2) Highlight the differences between blunt and penetrating trauma. 3) Emphasize the importance of direct and indirect signs.

ABSTRACT

CTA is frequently used in the assessment of thoracic trauma. Potential pitfalls can result in unnecessary work up if they are not appreciated and subtle injuries can easily be overlooked. This lecture will use cases to highlight an approach to CTA of the thorax in trauma and teh importance of direct vs. indirect signs.

Honored Educators

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MSES52D Motorcycle Injuries: Head to Toe

Participants
Stacy E. Smith, MD, Boston, MA (*Presenter*) Nothing to Disclose

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MSRT53

ASRT@RSNA 2018: Techniques That Can Make or Break Musculoskeletal Imaging - A Case-Based Approach

Thursday, Nov. 29 10:30AM - 11:30AM Room: N230B

MK

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Laura W. Bancroft, MD, Orlando, FL (*Presenter*) Author with royalties, Wolters Kluwer nv; Speaker, World Class CME; Editor, Thieme Medical Publishers, Inc; Travel support, Thieme Medical Publishers, Inc ; ;

For information about this presentation, contact:

laura.bancroft.md@flhosp.org

LEARNING OBJECTIVES

1) Discuss importance of proper radiographic positioning for upper and lower extremity musculoskeletal imaging. 2) Review radiographic pitfalls and potentially missed musculoskeletal cases in a case-based format.

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RCA52

Case Review: Introduction to LI-RADS - Bring Your Own Device (Hands-on)

Thursday, Nov. 29 10:30AM - 12:00PM Room: E450B

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Ania Z. Kielar, MD, Shanty Bay, ON (*Moderator*) Research Grant, General Electric Company
Kathryn J. Fowler, MD, San Diego, CA (*Presenter*) Nothing to Disclose
Robert M. Marks, MD, San Diego, CA (*Presenter*) Nothing to Disclose
James T. Lee, MD, Lexington, KY (*Presenter*) Nothing to Disclose
Venkateswar R. Surabhi, MD, Houston, TX (*Presenter*) Nothing to Disclose
Cynthia S. Santillan, MD, San Diego, CA (*Presenter*) Consultant, Robarts Clinical Trials, Inc
Aya Kamaya, MD, Stanford, CA (*Presenter*) Nothing to Disclose
Yuko Kono, MD, PhD, San Diego, CA (*Presenter*) Equipment support, Canon Medical Systems Corporation; Equipment support, General Electric Company; Contrast agent support, Lantheus Medical Imaging, Inc; Contrast agent support, Bracco Group
Alice W. Fung, MD, Portland, OR (*Presenter*) Nothing to Disclose
Eleanor L. Ormsby, MD, Davis, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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venkateswar.r.surabhi@uth.tmc.edu

jtlee3@uky.edu

csantillan@ucsd.edu

eormsby@gmail.com

LEARNING OBJECTIVES

1) Implement newest LI-RADS categories when assessing liver observations in patients at risk for HCC. 2) Review LI-RADS major and ancillary features and learn how to apply them in LI-RADS categorization. 3) Demonstrate proficiency with the newly developed LI-RADS algorithm for assessing response of liver lesions to locoregional treatment. 4) Compare LI-RADS updates to AASLD updates.

ABSTRACT

Participants will review cases on their own devices and answer questions. The cases will then be reviewed by the presenters. Note: this activity is best done on a laptop or tablet. Although phones will work, their small size limits optimal image view. In this 1.5-hour Hands-On Workshop, the participants will be seated at stand-alone computers and have the opportunity to review up to 15 MRI, CT and ultrasound cases of livers in patients at risk for HCC and characterize the observations based on the most up to date version of LI-RADS. The workshop will be led by world-renown experts in the field, all of them members of the LI-RADS steering committee and/or members of a LI-RADS working group. A 20 minute didactic review of the most up to date LI-RADS will be offered at the start of the course to familiarize attendees. Following this introduction, workshop participants will have time to work through each case on their own, with support faculty available throughout the room to answer individual questions. Subsequently, each case will be reviewed by a faculty member in a didactic fashion, highlighting pearls for accurate use of LI-RADS in each case, with opportunity for questions. Focus will be on the overall integration of LI-RADS into daily practice. This workshop will initially focus on the major imaging features post-contrast enhancement and work through the algorithm of how to assign a LI-RADS score. This workshop will also encompass ancillary imaging features and how to apply them to ensure standardized LI-RADS reporting of various types of liver observations.

Active Handout:James T. Lee

http://abstract.rsna.org/uploads/2018/17002588/2018 RSNA LI-RADS Hands-On Workshop RCA52.pdf

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RCB52

Hands-on Introduction to Social Media: Core (Hands-on)

Thursday, Nov. 29 10:30AM - 12:00PM Room: S401CD

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (*Presenter*) Royalties, Osler Institute
Saad Ranginwala, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Tirath Y. Patel, MD, Houston, TX (*Presenter*) Nothing to Disclose
Amy K. Patel, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

tessa.cook@uphs.upenn.edu

amykpatel64112@gmail.com

LEARNING OBJECTIVES

1) Appreciate the professional relevance of social media for radiologists. 2) Understand the differences between social media in personal and professional roles. 3) Understand the differences between and advantages/disadvantages of multiple social media networks. 4) Set up and use a Twitter account.

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RCC52

Novel Discoveries Using the NCI's Cancer Imaging Archive (TCIA) Public Data Sets

Thursday, Nov. 29 10:30AM - 12:00PM Room: S501ABC

AI IN OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Janet F. Eary, MD, Bethesda, MD (*Moderator*) Nothing to Disclose
Evis Sala, MD, PhD, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose
Andriy Fedorov, PhD, Boston, MA (*Presenter*) Research funded, Siemens AG
Jayashree Kalpathy-Cramer, MS, PhD, Charlestown, MA (*Presenter*) Consultant, Infotech Software Solution
Daniel L. Rubin, MD, MS, Stanford, CA (*Presenter*) Nothing to Disclose
Aaron J. Grossberg, MD, PhD, Portland, OR (*Presenter*) Nothing to Disclose
Jeffrey F. Williamson, PhD, St. Louis , MO (*Presenter*) Nothing to Disclose
John B. Freymann, BS, Rockville, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

daniel.l.rubin@stanford.edu

john.freymann@nih.gov

grossber@ohsu.edu

andrey.fedorov@gmail.com

kalpathy@nmr.mgh.harvard.edu

janet.eary@nih.gov

LEARNING OBJECTIVES

1) Critically appraise The Cancer Imaging Archive (TCIA)/MD Anderson Cancer Center Head and Neck Squamous Cell Carcinoma (HNSCC) data set. 2) Identify solutions to challenges in sharing and curating RT DICOM data collections. 3) Describe novel discoveries made using the HNSCC data set. 4) Apply TCIA data sets to derive imaging-based predictors of oncologic outcome. 5) Recommend innovative research approaches using extant and future TCIA collections. 6) Discuss updates in enriching TCIA collections of images with results of their annotation and analysis. 7) Discuss the importance of standardization as applied to image-derived data representation for its reuse and harmonization across TCIA collections.

ABSTRACT

This didactic session will highlight popular data sets and major projects utilizing TCIA with presentations from leading researchers and data contributors. Attendees will hear presentations about the following projects and data sets: • The Applied Proteogenomics OrganizationaL Learning and Outcomes (APOLLO) network • Cancer Proteomics Tumor Analysis Consortium (CPTAC) • Crowds Cure Cancer • Quantitative Imaging Network (QIN) Prostate MRI • Quantitative Image Informatics for Cancer Research (QIICR) • Digital Database for Screening Mammography • Head and Neck Squamous Cell Carcinoma (HNSCC) • 4D-Lung

URL

https://na01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdicom4qi.readthedocs.io%2Fen%2Flatest%2Fresources%2Fdatasets%2F&data=02%7C01%7Ccricchio%40rsna.org%7Cb8fff403a6a34d30d3f408d651874712%7Cfb5fefcd7ca642
https://na01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdicom4qi.readthedocs.io%2Fen%2Flatest%2Fresources%2Fsoftware%2F&data=02%7C01%7Ccricchio%40rsna.org%7Cb8fff403a6a34d30d3f408d651874712%7Cfb5fefcd7ca642

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MSRT54

ASRT@RSNA 2018: The Importance of Good Technique in Achieving Diagnostic Images

Thursday, Nov. 29 11:45AM - 12:45PM Room: N230B

SQ

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Amanda Martin, Farnworth, United Kingdom (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

amanda.martin@boltonft.nhs.uk

LEARNING OBJECTIVES

1) To be able to recognize inadequately positioned images of the shoulder, knee and foot; know how to correct the positioning of the patient in order to produce good images. 2) Understand the common pathologies associated with the shoulder, knee and foot; be able to evaluate images of the shoulder, knee and foot in order to identify an abnormality.

ABSTRACT

Radiographers are commonly taught to produce two images when xraying a patient who presents with a musculoskeletal condition. In most cases, these two images are standardised across the profession, for example, a postero-anterior and a lateral projection for wrist injuries. However, there are a number of body areas where the standard projections are performed incorrectly and this can impact on the resultant diagnosis. Shoulders, knees and feet are three areas which can be performed inadequately. This presentation will outline the challenges in interpreting images which are poorly performed and suggest changes in the standard technique used for image acquisition in given scenarios. A systematic way to evaluate these images will be presented, with a range of common conditions and their appearances on these images.

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RCA53

Leveraging Machine Learning Techniques and Predictive Analytics for Knowledge Discovery in Radiology (Hands-on)

Thursday, Nov. 29 12:30PM - 2:00PM Room: S401AB

AI IN RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Kevin Mader, DPhil,MSc, Basel, Switzerland (*Moderator*) Employee, 4Quant Ltd; Shareholder, 4Quant Ltd
Kevin Mader, DPhil,MSc, Basel, Switzerland (*Presenter*) Employee, 4Quant Ltd; Shareholder, 4Quant Ltd
Barbaros S. Erdal, PhD, Columbus, OH (*Presenter*) Nothing to Disclose
Joshy Cyriac, Basel, Switzerland (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the basic principles of predictive analytics. 2) Be exposed to some of the existing validation methodologies to test predictive models. 3) Understand how to incorporate radiology data sources (PACS, RIS, etc) into predictive modeling. 4) Learn how to interpret results and make visualizations.

ABSTRACT

During this course, an introduction to machine learning and predictive analytics will be provided through hands on examples on imaging metadata (scan settings, configuration, timestamps, etc). Participants will use open source as well as freely available commercial platforms in order to achieve tasks such as image metadata and feature extraction, statistical analysis, building models, and validating them. Imaging samples will include datasets from a variety of modalities (CT, PET, MR) and scanners. The course will begin with a brief overview of important concepts and links to more detailed references. The concepts will then be directly applied in visual, easily understood workflows where the participants will see how the data are processed, features are selected, and models are built.

RCC53

Growing Your Business with Social Media: Tips and Tricks for Department and Practice Managers

Thursday, Nov. 29 12:30PM - 2:00PM Room: S501ABC

IN LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants

Alex Towbin, MD, Cincinnati, OH (*Moderator*) Author, Reed Elsevier; Grant, Guerbet SA; Grant, Siemens AG; Grant, Cystic Fibrosis Foundation; Consultant, Anderson Publishing, Ltd; Advisory Board, IBM Corporation; Advisory Board, KLAS Enterprises LLC;
Alex Towbin, MD, Cincinnati, OH (*Presenter*) Author, Reed Elsevier; Grant, Guerbet SA; Grant, Siemens AG; Grant, Cystic Fibrosis Foundation; Consultant, Anderson Publishing, Ltd; Advisory Board, IBM Corporation; Advisory Board, KLAS Enterprises LLC;
Saad Ranginwala, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Lindsey A. Shea, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe how social media can be used to promotoe a radiology practice. 2) Name three social media platforms, their benefits, and their contraints.

Honored Educators

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MSCB51

Case-based Review of Breast (Interactive Session)

Thursday, Nov. 29 1:30PM - 3:00PM Room: N228

BR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Jiyon Lee, MD, New York, NY (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify appropriate application of multi-modality breast imaging for routine screening, supplemental screening, and diagnostic indications. 2) Select appropriate methods for image-guided percutaneous biopsy and perform post-biopsy radiologic-pathologic correlation for next management recommendation. 3) Review appropriateness criteria and performance benchmarks, and guidelines for ongoing breast imaging audits as they apply. 4) Appreciate the range of reassuringly common and sometimes not-so common among the international faculty's portrayal of their piece of the globe.

ABSTRACT

Title: *Managing expectations in breast imaging around the world. "Best" versus sufficient?* Abstract: Our case-based review course will use the interactive audience response system (ARS) to walk and skip through the fundamentals of breast imaging. We will present how we use mammography, ultrasound, and MRI in daily screening and diagnostic scenarios, along with reminders of the overarching principles of BI-RADS lexicon for effective communication, and ACR appropriateness criteria and performance metrics as applicable or adapted around the world. Our international faculty (sessions 1 and 2) will also add depth, and the fun added dimensions of how breast imaging works around the world. Varying breast cancer statistics, possible innate ethnic variations, differing cultural expectations and socioeconomic context can and do impact how we carry out our discretionary work. Such interesting details will inform the narrative of the speakers' case scenarios, while the core diagnostic radiology skills aim to be constant, and teachable. The focus is using lots of cases to demonstrate breast imaging now and evolving. Please join us for smart fun!

Active Handout:Jiyon Lee

http://abstract.rsna.org/uploads/2018/18001608/MSCB51 52.pdf

Sub-Events

MSCB51A Tomosynthesis: Evolving Appreciation of the Better Mammogram

Participants
Jiyon Lee, MD, New York, NY (*Presenter*) Nothing to Disclose

MSCB51B From Andes to Patagonia: Breast Imaging in Argentina

Participants
Daniel E. Lehrer, MD, CABA, Argentina (*Presenter*) Speaker, Hologic, Inc; Institutional research agreement, Siemens AG

For information about this presentation, contact:

lehrerdan@cerim.com.ar

LEARNING OBJECTIVES

1) Identify appropriate application of multi-modality breast imaging for routine screening, supplemental screening, and diagnostic indications. 2) Improve basic knowledge and skills relevant to clinical practice. 3) Recommend the appropriate technique and avoid mistakes, incorporating others' clinical experiences.

ABSTRACT

We show cases from different parts of the country, with different realities and possibilities. This cases include a wide range of sophistication, from the optimization of the basic knowledge to the ones that require the latest technologies. You can realize that Tolstoy´s: Paint your village and you will paint the whole world is true for breast imaging.

Active Handout:Daniel E. Lehrer

http://abstract.rsna.org/uploads/2018/18001610/RSNA_Argentina MSCB51B.pdf

MSCB51C The Many 'Faces' of DCIS

Participants
Ana P. Lourenco, MD, Providence, RI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

alourenco@lifespan.org

LEARNING OBJECTIVES

1) Detect the varied appearances of DCIS on mammography, ultrasound, and MRI. 2) Compare how imaging findings may predict pathology.

ABSTRACT

This case-based session will showcase the various appearances of DCIS on mammography, ultrasound and MRI, highlighting how certain imaging findings may predict pathology. The interactive questions will cover management as well as follow-up recommendations, and illustrate key findings that should be included in imaging reports.

Active Handout:Ana P. Lourenco

http://abstract.rsna.org/uploads/2018/18001611/Handout.Lourenco.DCIS MSCB51C.pdf

MSCB51D Spain Explains the Mundane and the Less So

Participants
Lucia Grana Lopez, MD, Lugo, Spain (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lucia.grana.lopez@sergas.es

LEARNING OBJECTIVES

1) Identify appropriate application of multi-modality breast imaging mainly for supplemental screening, diagnosis and define its interventional indications. 2) Learn about the advantages of ultrasound-guided percutaneous removal of benign breast lesions and when and how to perform this procedure, as we've experienced in our practice. 3) Preview emerging molecular breast dedicated imaging tool, define its possible indications and potential use in clinical routine.

ABSTRACT

My case-based review course will use the interactive audience response system (ARS) to walk and skip through the fundamentals of breast imaging. I will present how we use mammography, ultrasound, and MRI in daily supplemental screening and diagnostic scenarios, along with reminders of the overarching principles of BI-RADS lexicon for effective communication, and ACR appropriateness criteria and performance metrics as applicable.I will try to show how breast imaging works in Spain.

Active Handout:Lucia Grana Lopez

http://abstract.rsna.org/uploads/2018/18001612/Spain explains the mundane MSCB51D.pdf

MSCU51

Case-based Review of Ultrasound (Interactive Session)

Thursday, Nov. 29 1:30PM - 3:00PM Room: E450B

GI GU OB US VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Deborah J. Rubens, MD, Rochester, NY (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn current techniques and advances in ultrasound imaging. 2) Become familiar with state of the art guidelines for diagnosis and management of imaging findings. 3) Review critical physiology and pathology as it is depicted by ultrasound. 4) Understand the vital role of ultrasound imaging in modern-day patient care.

ABSTRACT

This course is designed to highlight the vital role ultrasound plays in imaging and diagnosis in all parts of radiology. Special emphasis will be placed on technical advances including ultrasound contrast and elastography and interventional guidance. The wide range of ultrasound applications will be covered including vascular, general abdominal, pediatric, gynecology, small parts and obstetrics. Our goal is to provide a broad update in the field while addressing new opportunities and challenges for everyday practice.

Sub-Events

MSCU51A Ultrasound Advances: Elastography and Contrast

Participants
Richard G. Barr, MD, PhD, Campbell, OH (*Presenter*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Canon Medical Systems Corporation; Research Grant, Esaote SpA; Research Grant, BK Ultrasound; Research Grant, Hitachi, Ltd

LEARNING OBJECTIVES

1) Review the clinical uses of elastography in routine practice. 2) Discuss the advantages and disadvantages of elastography. 3) Review the uses of ultrasound contrast - on label and off label. 4) Discuss how CEUS can be incorporated into a routine practice. 5) Review the materials need to develop a CEUS program.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Richard G. Barr, MD, PhD - 2017 Honored Educator

MSCU51B Vascular Ultrasound

Participants
Leslie M. Scoutt, MD, New Haven, CT (*Presenter*) Speaker, Koninklijke Philips NV

For information about this presentation, contact:

leslie.scoutt@yale.edu

LEARNING OBJECTIVES

1) Describe pitfalls in Doppler ultrasound examination of the abdomen and peripheral arteries. 2) Discuss unusual vascular pathology. 3) Discuss how waveform analysis can aid in vascular ultrasound interpretation.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Leslie M. Scoutt, MD - 2014 Honored Educator

MSCU51C Obstetric Ultrasound: Things to Know 2018

Participants
Phyllis Glanc, MD, Toronto, ON (*Presenter*) Advisory Board, General Electric Company

For information about this presentation, contact:

phyllis.glanc@sunnybrook.ca

LEARNING OBJECTIVES

1) Familiarize yourself with emerging trends and research developments. 2) Learn about urgent/emergent obstetrical clinical and imaging scenarios.3) Consider the impact of social media and the internet on our practice.

ABSTRACT

This course is designed to highlight urgent and emergent obstetrical imaging issues in daily practice. It will also examine new research findings which may impact daily practice and examine the role of social media and the internet as it affects obstetrical imaging practice. The course is based on case presentation scenarios.

MSCU51D Abdominal Ultrasound

Participants
Jason M. Wagner, MD, Oklahoma City, OK (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jason-wagner@ouhsc.edu

LEARNING OBJECTIVES

1) Use contrast enhanced ultrasound to evaluate hepatic and renal lesions. 2) Recognize common sonographic pitfalls in the diagnosis of hepatobiliary conditions. 3) Diagnose abdominal wall abnormalities with ultrasound.

SPFF51

Fast 5

Thursday, Nov. 29 1:30PM - 2:00PM Room: Arie Crown Theater

ARRT Category A+ Credit: 0
CME credit is not available for this session.

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (*Moderator*) Royalties, Osler Institute

Sub-Events

SPFF51A Patient Feedback for Radiology Reports: Are We Prepared to Be Yelp'd?

Participants
Arun Krishnaraj, MD, MPH, Charlottesville, VA (*Presenter*) Nothing to Disclose
Arthur J. Pesch III, MD, Charlottesville, VA (*Abstract Co-Author*) Nothing to Disclose

ABSTRACT

Customer feedback pervades nearly all aspects of consumer life, from Amazon to Zappos, though is largely absent from the radiology world. Yet, in the era of value based care, responding to consumer demands and needs will be important to ensure radiologists value proposition. We have developed a novel website for collecting feedback from our "customers" (the patients and ordering providers) via a link included at the end of each of our imaging reports. The feedback we have received has allowed us to improve our reporting practices, increasing both ordering provider and patient satisfaction by responding to the needs and desires of various stakeholders. Taking a cue from the consumer world, and applying it to radiology reporting, is a new way of implementing the principles of value based reporting to our everyday practice.

SPFF51B Human-centered Design in Radiology

Participants
Achala S. Vagal, MD, Mason, OH (*Presenter*) Research Consultant, Nervive; Research Grant, Imaging Core Lab; Research Grant, ENDOLOW ; Grant, Johnson & Johnson

ABSTRACT

Design thinking is a human-centered approach to innovation that was originally developed in the business world to create new products. Although there has been an explosion of design thinking in the industry with companies like IDEO adopting innovative, design led solution to business strategies, healthcare is yet to actively embrace design thinking and holistic, human centered approaches in redesigning operations. We need to invite all our "external and internal customers" to the design table - referring physicians, patients, families, hospital administrators, schedulers, technologists, staff members, radiologists - keeping the needs, desires and behaviors of people at center of the design process. We will discuss how at University of Cincinnati Medical center we are collaborating with one of the world's top design school (UC College of Design, Architecture, Art, and Planning [DAAP]) to incorporate human centered design in our Radiology Department.

SPFF51C Patient-friendly Imaging Appropriateness Criteria Summaries

Participants
Andrea K. Borondy Kitts, MS,MPH, South Glastonbury, CT (*Presenter*) Stockholder, Abbott Laboratories; Stockholder, AbbVie Inc; Stockholder, F. Hoffmann-La Roche Ltd; Stockholder, Johnson & Johnson; Officer, Prosumer Health; Investor, Prosumer Health

ABSTRACT

Helping people understand what imaging or radiologist intervention is appropriate for commonly encounterd medical conditions such as low back pain can help avoid unnecessary interventions. Patients sometimes insist on specific tests such as an MRI for low back pain without concerning symptoms or etiology. Referring physicians comment that it is easier to order the test than to explain why the test is unnecessary to the patient. The Journal of the American College of Radiology started a project to write and publish patient friendly 250 word summary of American College of Radiology Appropriateness Criteria. The summaries are written by lay person authors and co-authored by AC patient subcommittee members to oversee technical accuracy.

SPFF51D Mirage of AI Substituting Radiologists: Lessons from When AI Got it Wrong

Participants
Vasanthakumar Venugopal, MD, New Delhi, India (*Presenter*) Nothing to Disclose

ABSTRACT

There are many AI systems that claim human or super-human performance. We present from our experience of validating various algorithms, instances where, even though the average algorithmic performance was at par with or even better than experienced radiologists, relying on AI results could have translated into clinical disasters. Such cases range from pneumothorax on x-ray to intra-cranial bleeds on CT. Eventually, when implemented unsupervised, not only is it imperative that AI systems have higher accuracy than radiologists, but it is also critical that the AI err only in situations where a human would have erred.

SPFF51E Mentorship/Sponsorship of a New Generation of #RADxx & #RADxy through Social Media

Participants
Amy K. Patel, MD, Boston, MA (*Presenter*) Nothing to Disclose

ABSTRACT

Social media (#SoMe) has transformed medicine by significantly reducing barriers and the traditional hierarchy that the profession inherently possesses. #SoMe has created an innovative avenue which is connecting medical students, residents, and fellows to practicing physicians, especially in the Radiology Twitterverse. As a result, I am now mentoring/sponsoring many female (#RADxx) and male (#RADxy) trainees across the country who have actively sought me out. Our professional relationships have resulted in recruitment into radiology, landing electives, residency/fellowship programs, and even jobs of their choice. My Fast 5 would share the recipe of success on #SoMe to forge these relationships regardless of any level of training and demonstrate the value in making a concerted effort to this do via this avenue to diversify radiology and recruit the best and brightest our field has to offer.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

SPRG51

RadioGraphics' Publication Information for Potential Authors

Thursday, Nov. 29 1:30PM - 2:45PM Room: E353A

ED OT

AMA PRA Category 1 Credits ™: 1.25
ARRT Category A+ Credits: 1.50

Participants
Jeffrey S. Klein, MD, Burlington, VT (*Presenter*) Nothing to Disclose
James Clinton, Oak Brook, IL (*Presenter*) Nothing to Disclose
Melissa L. Reen, Milton, VT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jklein@rsna.org

LEARNING OBJECTIVES

1) Explain the process that RadioGraphics uses to invite manuscripts for consideration of publication. 2) Detail the differences in submitting standard manuscripts and interactive online presentations for the Training and Fundamentals section of the journal. 3) Understand the process of submitting manuscripts for consideration. 4) List criteria used by the journal to render decisions on peer-reviewed papers and online journal presentations.

ABSTRACT

This session will review the journal's methods of invitation for select RSNA annual meeting education exhibits, and the process of submitting both standard manuscripts and selected education exhibit presentations for peer review by RadioGraphics.

VSIO51

Interventional Oncology Series: IO Practice and Clinical Trials

Thursday, Nov. 29 1:30PM - 6:00PM Room: S405AB

IR RS

AMA PRA Category 1 Credits ™: 4.25
ARRT Category A+ Credits: 4.25

Participants
Riad Salem, MD, MBA, Chicago, IL (*Moderator*) Research Consultant, BTG International Ltd; Research Grant, BTG International Ltd; Consultant, Eisai Co, Ltd; Consultant, Exelixis, Inc; Consultant, Bristol-Myers Squibb Company; Consultant, Dove; ;
Luigi Solbiati, MD, Pieve Emanuele (Milano), Italy (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

lusolbia@tin.it

LEARNING OBJECTIVES

1) Understand challenges of clinical trials with locoregional therapies.

Sub-Events

VSIO51-01 Limitations of Clinical Trials in IO

Thursday, Nov. 29 1:30PM - 1:50PM Room: S405AB

Participants
Riad Salem, MD, MBA, Chicago, IL (*Presenter*) Research Consultant, BTG International Ltd; Research Grant, BTG International Ltd; Consultant, Eisai Co, Ltd; Consultant, Exelixis, Inc; Consultant, Bristol-Myers Squibb Company; Consultant, Dove; ;

LEARNING OBJECTIVES

1) To learn about challenges of clinical trials involving locoregional therapies.

VSIO51-02 Are Randomized Clinical Trials Mandatory in IO?

Thursday, Nov. 29 1:50PM - 2:10PM Room: S405AB

Participants
Stacey M. Stein, MD, New Haven, CT (*Presenter*) Nothing to Disclose

VSIO51-03 Cancer-Induced Bone Pain Palliation: A Multicenter, Phase III, Randomized, Case-Control Trial of MR-Guided Focused Ultrasound (MRgFUS) versus External Beam Radiation Therapy (EBRT) for the Evaluation of Patients with Painful Metastatic Bone Disease

Thursday, Nov. 29 2:10PM - 2:20PM Room: S405AB

Participants
Alessandro Napoli, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Roberto Scipione, MD , Rome, Italy (*Presenter*) Nothing to Disclose
Andrea Leonardi, MD , Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Fabrizio Andrani, MD , Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Alberto Bazzocchi, MD, Bologna, Italy (*Abstract Co-Author*) Nothing to Disclose
Hans Peter Erasmus, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Michele Anzidei, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

alessandro.napoli@uniroma1.it

PURPOSE

To assess and compare the clinical impact of MR-guided Focused Ultrasound (MRgFUS) and External Beam Radiation Therapy (EBRT) for pain palliation in patients with symptomatic non-spinal bone metastasis.

METHOD AND MATERIALS

Patients with solid malignant tumors and one or more bone metastasis were enrolled in the study. Included patients were >=18 years of age, presented with symptomatic bone metastasis (defined by a pain score >=4 at Visual Analogue Scale, VAS), confirmed at imaging, and could safely undergo both MRgFUS and radiotherapy. Vertebral locations were excluded as considered non-accessible by ultrasound. Participants were randomly assigned (1:1 ratio) to receive MrgFUS or EBRT. Outcomes were compared at 1, 3, 6 and 12 months. Treatment response was defined as a reduction of >= 2 points in worst pain by 1 month, accompanied by a stable or reduced opioid dose, compared with baseline and was considered as primary outcome. Secondary outcomes included

average pain, interference of pain with activity, mood, quality of life, and procedure-related adverse events.

RESULTS

281 patients (M: 151; F: 130) were enrolled and randomly assigned: 140 to MRgFUS and 141 to EBRT. The most common cancers were prostate (n=92; 33%), breast (n=86; 31%), and lung (n=67; 24%). In the MRgFUS arm 109 patients (77.9%) achieved the primary end point, compared with 112 (79.4%) in the EBRT arm (adjusted odds ratio, 1.04; p = 0.728). There were no statistically significant differences in all secondary outcomes between arms, too. Results were stable along the whole follow-up period.

CONCLUSION

MRgFUS results appear comparable to EBRT in pain palliation of patients with symptomatic bone metastasis; this technique does not require radiation exposure, has not any toxic effect, and is performed in a single session. MRgFUS is limited to non-spinal locations.

CLINICAL RELEVANCE/APPLICATION

MRgFUS represents a valid treatment option for pain palliation in patients with bone metastasis and could be routinely introduced in those cases that are technically accessible and do not respond to conventional treatment.

VSIO51-04 Imaging Issues in Interventional Oncology Trials

Thursday, Nov. 29 2:20PM - 2:40PM Room: S405AB

Participants
Mishal Mendiratta-Lala, MD, West Bloomfield, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Become familiar with the existing tumor response criteria, including RECIST, WHO, mRECIST and EASL. 2) Understand the limitations of using size alone (RECIST/WHO criteria) to assess tumor response after various locoregional therapy, by using hepatocellular carcinoma as a prototype. 3) Identify imaging features, other than size, which help predict response to locoregional therapy.

VSIO51-05 Introduction to Statistics and the P-Value

Thursday, Nov. 29 2:40PM - 3:00PM Room: S405AB

Participants
Jeffrey D. Blume, PhD, Nashville, TN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

(1) To examine the origins of the p-value and its proper usage. (2) To understand why confidence intervals are critical for interpreting results (3) To appreciate why p-value based inference can go awry when confidence intervals are not presented.

ABSTRACT

Verifying that a statistically significant result is scientifically meaningful is not only good scientific practice, it is a natural way to control the Type I error rate. Here I will review the origins of p-value based inference by contrasting significance testing with hypothesis testing. I will explain the role of the tail area probability in both inferential paradigms and I will show examples to illustrate why p-value based inference, without reference to a confidence interval, can be highly misleading.

VSIO51-06 Introduction to Cost Effectiveness Trials

Thursday, Nov. 29 3:00PM - 3:20PM Room: S405AB

Participants
Nishita Kothary, MD, Stanford, CA (*Presenter*) Scientific Advisor, Siemens AG; Research Grant, Siemens AG; Scientific Advisor, Echopixel; Research Grant, Echopixel

For information about this presentation, contact:

kothary@stanford.edu

LEARNING OBJECTIVES

1) Identify factors that have led to the rising healthcare expenditure and describe the need for cost-effectiveness analysis. 2) Describe the differences between cost-effectiveness and comparative-effectiveness and explain the need for value (whether the benefits of an intervention justify its cost). 3) Describe the general principles of doing a cost-effectiveness comparison with particular attention to assessing the value of healthcare technologies.

VSIO51-07 Outcomes in Interventional Oncology Trials: Survival as an Endpoint for Staged and Repeatable Therapies

Thursday, Nov. 29 3:20PM - 3:40PM Room: S405AB

Participants
Michael C. Soulen, MD, Philadelphia, PA (*Presenter*) Royalties, Cambridge University Press; Consultant, Guerbet SA; Research support, Guerbet SA; Research support, BTG International Ltd; Consultant, Merit Medical Systems, Inc; Proctor, Sirtex Medical Ltd; Consultant, Terumo Corporation; Consultant, Bayer AG

For information about this presentation, contact:

Michael.soulen@uphs.upenn.edu

LEARNING OBJECTIVES

1) Review the many definitons of 'survival' in clinical trials. 2) Describe staisitcal methods for analysis of survival. 3) Apply novel

clinical trial designs that account for staged and repeatable therapies.

ABSTRACT

Traditional oncologic outcomes for cancer clinical trials revlove around survival, be it overall,cancer-specific,or a surrogate measure such as PFS. Survival is estimated using Kaplan-Meier plots, and compared using hazard ratios calculated by the log rank test. This approach applied to systemic therapies assumes that all cancer is treated from a fixed starting timepoint, and progression or death marks the endpoint. Image-guided cancer therapies such as embolization are often staged, with portions of the tumor treated at monthly intervals, so there is no fixed timepoint for start of treatmetn that applies to entire tumor burden. Another conundrum is repeatability; progression on a drug therapy signifies failure, but embolization and ablation can be repeated, restoring a disease-free or diseae-controlled state. Clinical trial designs incorporating staged and repeatabie therpies are a unique challenge for IO.

VSIO51-08 Interventional Oncology Series: 'Other' Organs

Participants
Luigi Solbiati, MD, Pieve Emanuele (Milano), Italy (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

lusolbia@tin.it

LEARNING OBJECTIVES

1) To learn in what organs thermal ablation can be applied, in addition to the 'traditional' organs (liver, kidney, lung, bone). 2) To understand what technical difficulties can be encountered for the treatment of tumors of thyroid, parathyroid, breast, adrenal glands and pancreas and how to get over them. 3) To learn if and how ablation can replace more traditional therapies for tumors of those organs.

VSIO51-09 Irreversible Electroporation of Pancreatic Tumors

Thursday, Nov. 29 3:40PM - 4:00PM Room: S405AB

Participants
Govindarajan Narayanan, MD, Miami, FL (*Presenter*) Consultant, BTG International Ltd; Consultant, AngioDynamics, Inc; Consultant, Medtronic plc;

VSIO51-10 Percutaneous Radiofrequency Ablation of Pancreatic Adenocarcinoma

Thursday, Nov. 29 4:00PM - 4:10PM Room: S405AB

Participants
Alessandro Sarno, Verona, Italy (*Abstract Co-Author*) Nothing to Disclose
Giorgia Tedesco, Verona, Italy (*Abstract Co-Author*) Nothing to Disclose
Riccardo De Robertis, MD, Peschiera del Garda, Italy (*Abstract Co-Author*) Nothing to Disclose
Paolo Tinazzi Martini, MD, Peschiera del Garda, Italy (*Abstract Co-Author*) Nothing to Disclose
Emilio Barbi, Peschiera, Italy (*Abstract Co-Author*) Nothing to Disclose
Mirko D'Onofrio, MD, Verona, Italy (*Presenter*) Speaker, Bracco Group; Speaker, Siemens AG; Consultant, Siemens AG; Speaker, Hitachi, Ltd

PURPOSE

The objective of this study was to evaluate the feasibility and safety of percutaneous radiofrequency ablation (RFA) of locally advanced pancreatic cancer located in the pancreatic body.

METHOD AND MATERIALS

Patients with biopsy-proven locally advanced pancreatic adenocarcinoma were considered for percutaneous radiofrequency ablation. Postprocedural computed tomography studies and CA 19.9 tumor marker evaluation were performed at 24 hours and 1 month. At computed tomography, treatment effect was evaluated by excluding the presence of complications. The technical success of the procedure is defined at computed tomography as the achievement of tumoral ablated area.

RESULTS

Thirty-five patients have been included in the study. Five of the 35 patients were excluded. At computed tomography, the mean size of the intralesional postablation necrotic area was 32 mm (range: 15-65 mm). None of the patients developed postprocedural complications. Mean CA 19.9 serum levels 1 day before, 1 day after, and 1 month after the procedure were 285.8 U/mL (range: 16.6-942.0 U/mL), 635.2 U/mL (range: 17.9-3368.0 U/mL), and 336.0 U/mL (range: 7.0-1400.0 U/mL), respectively. The mean survival after RFA procedure of the Patients, calculated on the data collected for 26 subjects, is 312 days (range: 65 - 718 days)

CONCLUSION

Percutaneous radiofrequency ablation of locally advanced adenocarcinoma has a high technical success rate and is effective in cytoreduction.

CLINICAL RELEVANCE/APPLICATION

Percutaneous RFA of locally advanced pancreatic adenocarcinoma could be proposed as a complementary treatment for this pathology.

VSIO51-11 Breast Cancer: Is There a Role for Ablation?

Thursday, Nov. 29 4:10PM - 4:30PM Room: S405AB

Participants
Jean Palussiere, MD, Bordeaux, France (*Presenter*) Speaker, Boston Scientific Corporation

For information about this presentation, contact:

j.palussiere@bordeaux.unicancer.fr

Active Handout:Jean Palussiere

http://abstract.rsna.org/uploads/2018/18001248/RSNA breast ablation VSIO51-11.pdf

LEARNING OBJECTIVES

1) To know if image guided percutaneous thermal ablation techniques are feasible on breast cancers. 2) To know indications, contraindications and limits of thermal ablation on breast cancers. 3) How to follow up patients and how to manage complications.

ABSTRACT

Thermal ablation techniques are showing promise for the treatment of breast cancer and deserve further investigation in large trials. These techniques may be available in some breast centres, with interventional radiologists taken part in selected cases as part of the core team. • Image-guided percutaneous thermal ablation techniques cinclude hyperthermia induced by application of radiofrequency currents (RFA), laser, microwave (MWA), insonation with high-intensity focused ultrasound (HIFU), or hypothermia by cryotherapy • Breast conservation with lumpectomy remains the standard of care but percutaneous thermal ablation has been proposed as a substitute to surgery, especially for older patients who are not candidates for surgery or who refuse it. Feasibility and efficacy has been demonstrated above all with RFA and cryotherapy. • After thermal ablation, the tumour remains in place, so regular follow-up with imaging is warranted to ensure that the tumour volume has been completely treated.

VSIO51-12 Percutaneous Ablation for Locoregional Treatment of Breast Cancer Patients with Oligometastatic Disease

Thursday, Nov. 29 4:30PM - 4:40PM Room: S405AB

Awards
Student Travel Stipend Award

Participants
Ryan W. England, MD, New York, NY (*Presenter*) Nothing to Disclose
Majid Maybody, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Stephen B. Solomon, MD, New York, NY (*Abstract Co-Author*) Research Grant, General Electric Company; Consultant, Johnson & Johnson; Consultant, BTG International Ltd;
Constantinos T. Sofocleous, MD, PhD, New York, NY (*Abstract Co-Author*) Consultant, General Electric Company; Consultant, Johnson & Johnson; Consultant Terumo; ; Research Support: BTG, Ethicon J&J; ; ;
Lynn A. Brody, MD, New York, NY (*Abstract Co-Author*) Stockholder, Sirtex Medical Ltd
Anne M. Covey, MD, New York, NY (*Abstract Co-Author*) Stockholder, Amgen Inc; Advisory Board, Accurate Medical
Etay Ziv, MD,PhD, New York, NY (*Abstract Co-Author*) Research Grant, Johnson & Johnson; Research Grant, Cycle for Survival ; Research Grant, Functional Genomics Initiative
Serena Wong, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Jacqueline Bromberg, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Tiffany A. Traina, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Amy R. Deipolyi, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Percutaneous thermal ablation may be attempted for the eradication of disease in patients with oligometastatic breast cancer (BC). This study aims to describe a single-institution's experience in treating liver, lung, and bone/soft tissue BC metastases.

METHOD AND MATERIALS

From 1999 to 2017, forty-six (35 liver, 7 lung, 4 bone/soft tissue) ablations were performed utilizing microwave, radiofrequency and cryoablation, with CT, MRI or PET/CT guidance, in 33 women with BC (mean age 52±12 years). Thirteen patients also underwent next generation genetic sequencing with MSK-IMPACT or Sequenom. Retrospective chart review established outcomes after first and subsequent ablations. Indication was for either eradication of disease (EOD; no other sites of mestastasis present) or control of disease (COD; growing lesion in the setting of other stable or decreasing sites). Progression after ablation was defined as residual/recurrent disease or other newly growing lesions.

RESULTS

Kaplan-Meier survival analyses demonstrated a median time to progression of 9 months, with a median overall survival of 70 months after first ablation. There was no difference in time to progression between ablations performed for EOD vs. COD (p=0.36). Patients treated for EOD had a trend towards improved overall survival over patients who were treated for COD (p=0.06). ER-positivity was a predictor for both longer overall survival (p=0.03) and longer time to progression (p=0.03) following ablation. Of the 13 patients whose tumors underwent genetic sequencing, no mutations were found that predicted outcome after ablation. Among 33 patients, 7 (21%) maintained no evidence of disease after a mean follow up of 33±26 months. Adverse events requiring additional intervention occurred after 2/35 (6%) liver ablations, 1/4 (25%) bone/soft tissue ablations, and 2/7 (29%) lung ablations.

CONCLUSION

Ablation of oligometastatic BC lesions is a relatively safe procedure associated with long-term survival of about 6 years. Over one fifth of patients may achieve no evidence of disease lasting for nearly three years. ER+ patients survive longer with longer time to progression after ablation. Further work is needed to characterize genetic predictors.

CLINICAL RELEVANCE/APPLICATION

Percutaneous ablation of oligometastatic lesions due to breast cancer is associated with excellent survival and long disease free intervals, particularly in ER+ patients.

VSIO51-13 Percutaneous Ablation of Thyroid Goiter

Thursday, Nov. 29 4:40PM - 5:00PM Room: S405AB

Participants

Fulvio Stacul, MD, Trieste, Italy (*Presenter*) Consultant, Bracco Group

For information about this presentation, contact:

fulvio.stacul@asuits.sanita.fvg.it

LEARNING OBJECTIVES

1) Identify appropriate indication for percutaneous ablation of thyroid goiter. 2) Recommend appropriate technique for percutaneous ablation of thyroid goiter. 3) Estimate expected clinical results after percutaneous ablation of thyroid goiter

VSIO51-14 US-guided Ablations for Thyroid Malignancies

Thursday, Nov. 29 5:00PM - 5:20PM Room: S405AB

Participants
Jung Hwan Baek, Seoul, Korea, Republic Of (*Presenter*) Consultant, STARmed; Consultant, RF Medical

For information about this presentation, contact:

radbaek@naver.com

LEARNING OBJECTIVES

1) Indications of US-guided ablations for thyroid malignancies. 2) Techniques: How to maximize efficacy and minimize complications. 3) Clinical results of recurrent thyroid cancers and primary thyroid cancers.

ABSTRACT

Papillary thyroid carcinoma (PTC) is the most common subtype (> 80% of all thyroid cancers) of thyroid malignancy with good prognosis and a low mortality rate. Although patients with PTC show an excellent outcome, the tumor recurrence in the neck ranged from 20% to 59% according to their risk. Although surgery is the standard treatment, complications can be increased because distortion of neck anatomy by scar tissue formation, especially in patients with repeated neck dissections. For these patients, ultrasound US-guided treatments have been used as an alternative such as ethanol ablation (EA), radiofrequency ablation (RFA) and laser ablation (LA). In Korea, the incidence of thyroid cancer increased explosively from 2004. This phenomenon was induced by over-diagnosis. The increased incidence of thyroid cancer is a worldwide phenomenon, and the necessity of active surveillance (AS) was proposed by surgeons from Japan. The 2015 American Thyroid Association (ATA) guidelines suggested AS as an alternative for papillary thyroid microcarcinoma (PTMC). However, the concept of AS of PTMC has been recently introduced, so more evidence is required to prove its long-term clinical efficacy and safety. Moreover recent studies have suggested the application of RFA for low-risk PTMC. The goal of this review is to evaluate the possible indications, devices, techniques, and clinical outcomes of US-guided ablations based on the scientific evidence available and an expert opinion regarding the use of ablations for the recurrent and primary thyroid cancers in clinical practice.

VSIO51-15 Percutaneous Ablation of Parathyroid Adenoma

Thursday, Nov. 29 5:20PM - 5:40PM Room: S405AB

Participants
Luigi Solbiati, MD, Pieve Emanuele (Milano), Italy (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lusolbia@tin.it

LEARNING OBJECTIVES

1) To learn what instrumentations can be used for ablation of parathyroid adenomas and how to use them.2) To understand what complications can be caused by ablation of parathyroid adenomas and what solutions can be adopted to avoid them. 3) To learn indications and contraindications of thermal ablation of parathyroid adenomas.

VSIO51-16 Percutaneous Ablation of Adrenal Tumors

Thursday, Nov. 29 5:40PM - 6:00PM Room: S405AB

Participants
Paul B. Shyn, MD, Boston, MA (*Presenter*) Research Grant, Siemens AG

For information about this presentation, contact:

pshyn@bwh.harvard.edu

LEARNING OBJECTIVES

1) Assess the appropriateness of clinical indications for adrenal tumor ablation. 2) Compare the advantages and disadvantages of various adrenal tumor ablation technologies. 3) Appraise and manage the risks of adrenal tumor ablation.

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RCA54

Case Review: Rectal MRI - Bring Your Own Device (Hands-on)

Thursday, Nov. 29 2:30PM - 4:00PM Room: S404CD

GI MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
David H. Kim, MD, Middleton, WI (*Moderator*) Shareholder, Cellectar Biosciences, Inc; Shareholder, Elucent Medical;
Marc J. Gollub, MD, New York, NY (*Presenter*) Nothing to Disclose
David H. Kim, MD, Middleton, WI (*Presenter*) Shareholder, Cellectar Biosciences, Inc; Shareholder, Elucent Medical;
Gaiane M. Rauch, MD, PhD, Houston, TX (*Presenter*) Nothing to Disclose
Elena K. Korngold, MD, Portland, OR (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Critically evaluate the primary tumor, particularly in the differentiation between T2/early T3 -and- advanced T3 status. 2) Apply criteria to determine regional lymph node status. 3) Recognize relevant anatomic landmarks used in Rectal MR cancer staging.

ABSTRACT

Participants will review cases on their own devices and answer questions. The cases will then be reviewed by the presenters. Note: this activity is best done on a laptop or tablet. Although phones will work, their small size limits optimal image view. This workshop will be led by members of the Society of Abdominal Radiology Rectal Cancer Disease Focused Panel. This group helps set the interpretation standards for rectal cancer MRI in the United States. In this 1.5 hour Hands-on Workshop, the participants will have the opportunity to review a number of rectal staging MRI cases on stand-alone computers or on a personal mobile device. The selected cases are intended to give a broad overview of the common issues encountered in rectal cancer staging, including appropriately categorizing the correct T category of the tumor as well as determining regional lymph node status. The relevant anatomic relationships of the tumor with adjacent structures for surgical and potential neoadjuvant options will be emphasized. An interactive platform will allow participants to see overall class performance for questions posed by the expert reviewer. Each case will be reviewed after a short interval to allow a participant to form an opinion prior to the expert review. This workshop is intended to give a practical, hands-on approach to rectal cancer staging by MRI.

RCB54

Reject Rate Analysis in the Digital Era: Leveraging Informatics to Enhance Quality Control in Radiography

Thursday, Nov. 29 2:30PM - 4:00PM Room: S401CD

IN SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Kevin Little, PhD, Columbus, OH (*Moderator*) Nothing to Disclose

Sub-Events

RCB54A Setting Up a Unified Database for Multi-vendor Reject Analysis

Participants
Kevin Little, PhD, Columbus, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define rejected images and reject rate. 2) Identify sources of rejected image data. 3) Develop a plan for data aggregation. 4) Recognize pitfalls of data collection and analysis.

Active Handout:Kevin Little

http://abstract.rsna.org/uploads/2018/17002568/Kevin Little RSNA Reject RCB54A.pdf

RCB54B Initial Clinical Experience: Reasons for Rejects and Remedial Actions

Participants
Ingrid Reiser, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ireiser@uchicago.edu

LEARNING OBJECTIVES

1) Understand the importance of monitoring reject rates in digital radiography. 2) Develop effective remedial actions. 3) Recognize pitfalls of remedial actions. 4) Understand the trade-off between reject rate and quality standards.

Active Handout:Ingrid Reiser

http://abstract.rsna.org/uploads/2018/17002569/RejectRateRSNA2018_dist RCB54B.pdf

RCB54C Strategies for Repeat Analysis Program: Implementation and Expectations

Participants
Alisa Walz-Flannigan, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the scope of information needed for repeat analysis aimed at quality improvement. 2) Learn how to harness a repeat analysis program for quality improvement: objectives, workflow, and practice engagement. 3) Appreciate the clinical value of a comprehensive repeat analysis program through practical examples of quality improvement. 4) Recognize the role of informatics: the need for standard data and analytics tools.

Active Handout:Alisa Walz-Flannigan

http://abstract.rsna.org/uploads/2018/17002570/Strategies for Reject Analysis_RSNA_2018 RCB54C.pdf

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RCC54

IHE on FHIR

Thursday, Nov. 29 2:30PM - 4:00PM Room: S501ABC

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

David S. Mendelson, MD, Larchmont, NY (*Moderator*) Spouse, Employee, Novartis AG; Advisory Board, Nuance Communications, Inc; Advisory Board, General Electric Company; Advisory Board, Canon Medical Systems Corporation; Advisory Board, Bayer AG; Advisory Board, Nines
Brad Genereaux, Waterloo, ON (*Presenter*) Employee, Agfa-Gevaert Group
Wyatt M. Tellis, PhD, San Francisco, CA (*Presenter*) Officer, EyePACS, LLC
Tone Southerland, Cambridge, MA (*Presenter*) Employee, IQVIA
Stephen M. Moore, MS, Saint Louis, MO (*Presenter*) Employee, Corista; Employee, Gestalt; Employee, Hamamatsu Photonics KK; Employee, Leico; Employee, Pathcore; Employee, Koninklijke Philips NV; Employee, F. Hoffmann-La Roche Ltd; Employee, Sectra AB; Employee, Neagen OY;

For information about this presentation, contact:

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wyatt.tellis@ucsf.edu

LEARNING OBJECTIVES

1) Learn about HL7 FHIR- Fast Healthcare Interoperability Resources- an emerging standard using RESTful web services. 2) Review IHE- profile' guides for using standards to address clinical use cases and workflows. 3) Discuss how FHIR is being incorporated into IHE. 4) Review some specific IHE Profiles which have integrated FHIR. 5) Discuss the DICOMweb RESTful services and how they relate to FHIR and IHE.

ABSTRACT

RESTful services have become a mainstay of current network-based transaction and communications technologies, often employed in consumer services on the internet. HL7 FHIR is a standard currently in development that uses RESTful services to exchange healthcare data. Over time FHIR is likely to replace legacy versions provided earlier versions of HL7 that are currently widely used. Similarly, DICOM has introduced REST-based services for communicating medical images in its DICOMWeb standards. IHE coordinates the use of standards to provide interoperable solutions that improve communication and workflow. IHE uses HL7, DICOM and other standards in its profiles. We will review the current work to incorportate FHIR in IHE profiles replacing legacy standards where appropriate and introducing new capabilities. We will discuss specific use cases and standards, some from the domain of Radiology but also some from other healthcare domains. Interoperability has become a major focus of the worldwide HIT community and the intelligent incorporation of RESTful services in the standards we use daily is of paramount importance in delivering the highest quality of healthcare services in a cost-effective and robust manner.

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SPDL51

Peds, IR, Potpourri (Case-based Competition)

Thursday, Nov. 29 3:00PM - 4:00PM Room: E451B

IR PD

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Researcher, Bayer AG; Advisory Board, Bayer AG; Advisory Board, Aidoc Ltd; Advisory Board, EnvoyAI; Advisory Board, Inference Analytics
Kate A. Feinstein, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Brian S. Funaki, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kfeinstein@radiology.bsd.uchicago.edu

LEARNING OBJECTIVES

1) Be introduced to a series of radiology case studies via an interactive team game approach designed to encourage 'active' consumption of educational content. 2) Use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) Receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

ABSTRACT

The extremely popular audience participation educational experience, Diagnosis Live!, is an expert-moderated session featuring a series of interactive case studies that will challenge radiologists' diagnostic skills and knowledge. The session features a lively, fast-paced game format: participants will be automatically assigned to teams who will then use their personal mobile devices to test their knowledge in a fast-paced session that will be both educational and entertaining. After the session, attendees will receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance.

SPSH51

Hot Topic Session: Cardiometabolic Imaging

Thursday, Nov. 29 3:00PM - 4:00PM Room: E353C

CA

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Jadranka Stojanovska, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

Sub-Events

SPSH51A Background and Epidemiology

Participants
David A. Bluemke, MD,PhD, Bethesda, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dbluemke@rsna.org

LEARNING OBJECTIVES

1) Define currently used concepts applied to metabolic disease. 2) Discuss components of metabolic syndrome and their impact on cardiovascular disease. 3) Analyze the results of large cohort studies assessing the metabolic disease in relationship to cardiovascular disease.

ABSTRACT

Ischemic disease of the heart is the leading cause of death and disability worldwide. A major contributor to cardiovascular disease increasingly results from metabolic disease. An underlying concept in consideration of metabolic disease is defined as metabolic syndrome. Metabolic syndrome is thought to affect 23 percent of men and women in the United States, with increasing numbers of individuals world-wide. The presence of metabolic syndrome is associated with elevated risk of cardiovascular disease related to atherosclerosis and organ dysfunction. Metabolic syndrome is defined by 3 or more of the following characteristics: abdominal obesity, hypertriglyceridemia, low HDL, hypertension and elevated fasting glucose. In this presentation, the epidemiology of metabolic syndrome and its underlying relationship to cardiovascular disease is presented on the basis of large cohort epidemiologic studies, typically using imaging methods to characterize outcomes and detect subclinical disease.

SPSH51B Coronary Artery Disease and Outcomes

Participants
Udo Hoffmann, MD, Boston, MA (*Presenter*) Institutional Research Grant, Kowa Company, Ltd; Institutional Research Grant, Abbott Laboratories; Institutional Research Grant, HeartFlow, Inc; Institutional Research Grant, AstraZeneca PLC

LEARNING OBJECTIVES

1) Identify imaging cardic and non-cardiac findings that reflect metabolic state and ahve prognostic impaortance for advrese cardiovascular outcomes. 2) Understand the methodology of using Artificial Intelligence to quantify the controbution of each of these findings to increased cardiovascuolar event risk.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Udo Hoffmann, MD - 2015 Honored Educator

SPSH51C Cardiac Function and Non-ischemic Disease

Participants
Jadranka Stojanovska, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jstoanov@umich.edu

LEARNING OBJECTIVES

1) Understand the importance of imaging-based characterization of cardiomatabolic phenotypes in non-coronary artery disease. 2) Discuss the association between apicardial adiposity and cardiac function/mass. 3) Discuss the association of epicardial adiposity with inflammatory triggered cardiovascular diseases. 4) Discuss challanges and future direction of cardiometabolic imaging.

ABSTRACT

Interest in epicardial adipose tissue as a visceral adipose tissue of the heart and coronary arteries is rapidly growing as the

scientific evidence indicates that the anatomic specificity is an important contributor to the cardiometabolic disease. A greater epicardial adipose tissue volume is associated with diastolic dysfunction, LV hypertrophy, and non-ischemic cardiovascular disease (CVD). Epicardial adipose tissue has dual role, it can be cardioprotective to protect against CVD and proinflammatory that promotes CVD. It has been hypothesized that an epicardial pro-inflammatory phenotype triggers inflammation that correlates with LV hypertrophy, diastolic dysfunction, and CVD such as atrial fibrillation, and pulmonary hypertension. In this presentation we will demonstrate the role of quantifying epicardial adiposity in patients with atrial fibrillation, systemic sclerosis-pulmonary arterial hypertension, and diastolic dysfunction. The future role of cardiometabolic imaging is to understand epicardial adipose tissue biology by developing a diagnostic tool for analysis of epicardial adipose tissue by imaging, molecular/genetic, metabolite, and clinical profiling.

SPSH51D **Panel Discussion**

SPSH52

Hot Topic Session: Biomarker and Personalized Medicine in Lung Cancer Imaging

Thursday, Nov. 29 3:00PM - 4:00PM Room: E350

AI BQ CH CT NM

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Patricia M. de Groot, MD, Houston, TX (*Moderator*) Nothing to Disclose

Sub-Events

SPSH52A Personalized Medicine and Lung Cancer Biomarkers: The Oncologist's Perspective

Participants
John V. Heymach, MD,PhD, Houston, TX (*Presenter*) Consultant, AstraZeneca PLC; Consultant, Boehringer Ingelheim GmbH; Consultant, Merck KGaA; Consultant, F. Hoffmann-La Roche Ltd; Consultant, Eli Lilly and Company; Consultant, Merck & Co, Inc; Consultant, Spectrum Dynamics Ltd; Consultant, Guardant; Consultant, Johnson & Johnson; Consultant, Novartis AG

LEARNING OBJECTIVES

1) Describe the goals and current state of personalized therapy for patients with non-small cell lung cancer. 2) Identify the lung cancer biomarkers now in clinical use as well as those in experimental trials. 3) Understand the barriers to optimal selection of individual patient therapy from the clinical and basic research perspective.

SPSH52B Imaging Biomarkers in Non-small Cell Lung Cancer

Participants
Brett W. Carter, MD, Houston, TX (*Presenter*) Editor, Reed Elsevier;

For information about this presentation, contact:

bcarter2@mdanderson.org

LEARNING OBJECTIVES

1) Identify the imaging manifestations and patterns of disease associated with specific non-small cell lung cancer genetic mutations such as EGFR and KRAS and rearrangements such as ALK on computed tomography (CT) and FDG positron emission tomography (PET)/CT. 2) Describe the role of established response criteria and emerging and novel imaging techniques on the assessment of treatment response in non-small cell lung cancer. 2) Understand the continuously evolving impact of radiogenomics, defined as the linking of medical images with the genomic properties of neoplasms, in predicting the presence of specific genetic alterations, response to therapy, and survival of patients with non-small cell lung cancer.

Honored Educators

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SPSH52C Using Artificial Intelligence to Develop Non-invasive Biomarkers in Lung Cancer

Participants
Hugo Aerts, PhD, Boston, MA (*Presenter*) Stockholder, Sphera Inc

LEARNING OBJECTIVES

1) Learn about the motivation and methodology of AI technologies in lung cancer imaging. 2) Learn about scientific studies investigating the role of radiologic AI with other -omics data for precision medicine. 3) Learn about open-source informatics developments.

SPSH53

Hot Topic Session: Imaging of Inflammation

Thursday, Nov. 29 3:00PM - 4:00PM Room: S404AB

NR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants

Donna J. Cross, PhD, Salt Lake City, UT (*Moderator*) Nothing to Disclose
Alexander Drzezga, MD, Cologne, Germany (*Moderator*) Consultant, Siemens AG; Consultant, Bayer AG; Consultant, General Electric Company; Consultant, Eli Lilly and Company; Consultant, The Piramal Group; Speakers Bureau, Siemens AG; Speakers Bureau, Bayer AG; Speakers Bureau, General Electric Company; Speakers Bureau, Eli Lilly and Company; Speakers Bureau, The Piramal Group

For information about this presentation, contact:

d.cross@utah.edu

ABSTRACT

This session will highlight molecular imaging techniques to image inflammation including neuroinflammation as well as inflammatory disease. Topics will include new PET tracers, MRI methodologies and quantitative analyses.

Sub-Events

SPSH53A Inflammation: A Generalized Process in Many Diseases: Needs for Specific Imaging

Participants
Richard L. Wahl, MD, Saint Louis, MO (*Presenter*) Research Consultant, Nihon Medi-Physics Co, Ltd; Contract, WhiteRabbit.AI Inc

Honored Educators

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SPSH53B Molecular Imaging of Neuroinflammation

Participants
Satoshi Minoshima, MD, PhD, Salt Lake City, UT (*Presenter*) Consultant, Hamamatsu Photonics KK; Research Grant, Hitachi, Ltd; Research Grant, Nihon Medi-Physics Co, Ltd;

SPSH53C Brain in Flame: Pathology and Imaging of Non-infectious CNS Inflammation

Participants
Anne G. Osborn, MD, Salt Lake Cty, UT (*Presenter*) Author, Reed Elsevier;

For information about this presentation, contact:

anne.osborn@hsc.utah.edu

LEARNING OBJECTIVES

1) Identify microglial activation as the central response to brain inflammation. 2) Identify inflammasome assembly as the event that triggers downstream events in noninfectious brain inflammation. 3) Name at least three disorders that exhibit inflammation as a key component of their underlying pathology.

ABSTRACT

Microglia are the less well-known component of the neuropil, yet they function as the brain's resident macrophages. Once thought to be the 'bad guys' of the CNS, microglia are now recognized as the brain's 'security guards' and 'housekeepers.' In this session we will briefly discuss microglial activation and the role of the 'super molecules' called inflammasomes in a broad spectrum of CNS pathologies ranging from trauma and noninfectious inflammations to neoplasms and brain degenerations. The role of standard imaging (e.g., MRI) will be emphasized in this section as the new radiotracers that can detect microglial activation are discussed in subsequent parts of the course.

SPSH54

Hot Topic Session: Immunotherapy for Cancer-A Demanding New Imaging Frontier

Thursday, Nov. 29 3:00PM - 4:00PM Room: S503AB

CT MR NM

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Janet F. Eary, MD, Bethesda, MD (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

janet.eary@nih.gov

LEARNING OBJECTIVES

1) Understand the unique role that quantitative clinical imaging plays as costly, highly effective immunotherapies are increasingly approved by FDA for advanced cancer treatments and their dependence on imaging. 2) Learn the pitfalls confronting joint oncologist - imager teams can expect to encounter during the time course of cancer treatments and the need to modify existing intellectual models used by clinical cancer imagers. 3) By showing specific case examples that distinguish immune cancer treatments from conventional cytotoxic chemotherapies, attendees will comprehend the need to carefully exercise and reserve judgment when analyzing treatment care patterns.

Sub-Events

SPSH54A The Unmet Imaging Needs in Immunotheraphy Drug Development

Participants
Elad Sharon, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSH54B The Role of PET-CT in Immunotherapy

Participants
Regis Otaviano Bezerra, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

regisfranca@gmail.com

LEARNING OBJECTIVES

1) Brief overview of basic concepts in immunotherapy. 2) To review key points of imaging response patterns according to IRECIST: partial response, complete response, pseudo-progression, and disease progression. 3) To illustrate PET-CT cases with emphasis in response patterns. 4) To recognize immune-related adverse events: pneumonitis, hepatitis, pancreatitis, colitis,, and nephritis. 5) Others uncommon events: abscopal effect and sarcoid-like reaction.

ABSTRACT

Evidence is now accumulating on the use of functional imaging for evaluation of immunotherapy, once this is a treatment option for a wide range of FDG-avid:tumors, including: melanoma, colorectal, breast,and lung cancers. New response patterns have arisen with the use of this treatment, which currently represent a challenge for conventional imaging and standard therapy assessment criteria. A delayed response and even a transient tumor enlargement are often seen, and can be misdiagnosed as disease progression.Moreover, unusual side effects may occur and these can be subtle or very difficult to recognize in regular anatomical images, such as CT or MRI. Especially in this scenario, PET/CT plays a pivotal role, since adverse events might be detected earlier, even preceding clinical symptoms.The most common immune-related adverse events such as pneumonitis, hepatitis, pancreatitis and nephritis will be discussed. Another out-of-target tumor response is demonstrated, known as the abscopal effect, part of immunomodulation effect of check point inhibitors. This presentation will demonstrate initial assessment; response patterns following immunotherapy, and tumor recurrence using PET/CT illustrative cases. Perspectives on new imaging probes will be addressed as well.

URL

https://www.hospitalsiriolibanes.org.br/Paginas/default.aspx

SPSH54C Imaging of Tumor Associated Macrophages with Ferumoxytol-enhanced MRI

Participants
Heike E. Daldrup-Link, MD, Palo Alto, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

heiked@stanford.edu

LEARNING OBJECTIVES

1) To understand basic principles of tumor immune responses. 2) To learn MR imaging approaches for the detection of tumor associated macrophages (TAM) in patients. 3) To learn, how to assess tumor response to TAM-modulating cancer immunotherapies.

ABSTRACT

Many malignant tumors, including breast cancer, lung cancer, colon cancer, pancreatic cancer, lymphomas, sarcomas and neuroblastomas (among many others) are associated with an anti-inflammatory tumor microenvironment, which is characterized by infiltration of leukocytes where increases in some leukocyte subsets parallels disease progression and worse clinical outcomes. Tumor-associated macrophages (TAMs) play a key role in this context. New therapeutic drugs that target TAM are currently being developed and are starting to enter the clinic. Therefore, it becomes increasingly important to identify patients whose tumors are heavily infiltrated by TAM. To serve this goal, an imaging test is advantageous over invasive biopsy because it is non-invasive, can cover the whole tumor and can interrogate treatment effects repeatedly in vivo, in patients. Unfortunately, existing clinical imaging tests do not provide a good method for evaluating response to immunotherapies because most immune modulating therapeutics do not cause changes in tumor size, at least not in the immediate post-treatment time period. This presentation will show how TAM can be detected with an immediately clinically applicable imaging approach, using the FDA-approved iron supplement ferumoxytol off label as an MR contrast agent. Our team showed that ferumoxytol nanoparticles exert an initial perfusion effect of the tumor tissue, followed by retention in the tumor via the 'enhanced permeability and retention (EPR) effect' and subsequent phagocytosis by TAM, which results in a marked negative (dark) signal effect on delayed T2-weighted MR images. This can be used to accurately and noninvasively track the degree of macrophage infiltration in a tumor tissue. This new TAM imaging test could represent a significant breakthrough for clinicians as a new biomarker for risk stratification and for monitoring tumor response to novel TAM-modulating immunotherapies. Ferumoxytol is particularly suited for tracking cancer immune responses due to its intrinsic pro-inflammatory effects on the cancer microenvironment.

URL

http://daldrup-link-lab.stanford.edu/

SPSH54D Assessment of Tumor Dynamics beyond RECIST

Participants
Sean Khozin, MD, Silver Spring, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

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SPSH55

Hot Topic Session: Prostatic Artery Embolization for Primetime

Thursday, Nov. 29 3:00PM - 4:00PM Room: S402AB

GU IR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Janice M. Newsome, MD, Alexandria, VA (*Moderator*) Nothing to Disclose
Justin P. McWilliams, MD, Los Angeles, CA (*Presenter*) Consultant, NeuWave Medical, Inc; Consultant, Penumbra, Inc; Consultant, Boston Scientific Corporation; Consultant, Merit Medical Systems, Inc
Zachary Bercu, MD, Atlanta, GA (*Presenter*) Speaker, Terumo Medical Corporation; Grant, Coulter Translational Program, Steerable Robotic Guidewire
Aaron M. Fischman, MD, New York, NY (*Presenter*) Advisory Board and Consultant- Terumo Interventional Systems, Embolx Inc.; ; Speakers Bureau - Boston Scientfic, BTG; ; Royalties - Merit Medical; ; Investor - Adient Medical
Jafar Golzarian, MD, Minneapolis, MN (*Presenter*) Officer, EmboMedics Inc; Consultant, Boston Scientific Corporation; Consultant, Medtronic plc; Consultant, Penumbra, Inc

For information about this presentation, contact:

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aaron.fischman@mountsinai.org

zbercu@emory.edu

LEARNING OBJECTIVES

1) Discuss the most current PAE data. 2) Understand how to develop a PAE program. 3) Discuss pre- and post-treatment management.

ABSTRACT

Lesson 1: Patients come from many different sources. Lesson 2: Understand the urology perspective of PAE. Lesson 3: Stand your ground! PAE plays a critical role in the management of patients with lower urinary tract symptoms (LUTS) secondary to BPH. Lesson 4: Deal with the "learning curve." Lesson 5: The "details" - MRI? CTA? Radial? Femoral? Same day or overnight stay? y?

SPSH56

Controversies in Radiology: Optimized Screening and the Importance of DCIS

Thursday, Nov. 29 3:00PM - 4:00PM Room: E451A

BR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Mitchell D. Schnall, MD, PhD, Philadelphia, PA (*Moderator*) Nothing to Disclose
Emily F. Conant, MD, Philadelphia, PA (*Presenter*) Grant, Hologic, Inc; Consultant, Hologic, Inc; Grant, iCAD, Inc; Consultant, iCAD, Inc; Speaker, iiCME

Sub-Events

SPSH56A An Analysis of 11.3 Million Screening Tests Examining the Association between Recall and Cancer Detection Rates in the English NHS Breast Screening Programme

Participants
Roger G. Blanks, PhD, Oxford, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Rosalind M. Given-Wilson, FRCR,MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Sue Cohen, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Matthew G. Wallis, MD, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

matthew.wallis@addenbrookes.nhs.uk

PURPOSE

To model the relationship between cancer detection and recall rates to understand the optimal balance of harm and benefit

METHOD AND MATERIALS

Annual screening programme information for the 80 English breast screening units (11.3 million screening tests) supplemented by data from the Dutch screening programme. Non-linear models were used to produce modelled maximum values (MMV) of cancer detection for different grades. The recall rates at which 95% and 99% of the MMV is reached are termed the P95 and P99 recall rate values

RESULTS

For combined invasive/microinvasive and high grade DCIS (IHG) the detection rate reaches a near plateau with the P99 recall rate value of 7% prevalent and 4% incident screens. The model predicts above this almost all recalls are false positive.Low/intermediate DCIS (LIG) detection rate has no discernible plateau P99 value increasing linearly at a rate of 0.12(prevalent) and 0.18(incident) per 1000 for every 1% increase in recall rate.At recall rates below p95 values of 4.6% prevalent and 2.6% incident the models suggest an increasing drop off in IHG cancer detection rates.

CONCLUSION

Our model predicts that there is a recall rate range P97 to P99 that optimises detection of life threatening cancers whilst minimising harm. In the NHSBSP 99% of IHG cancers are detected at prevalent recall rate below 7% (incident below4%) and as recall rate increases more LIG are detected with a rapidly increasing rate of false positive referrals.

CLINICAL RELEVANCE/APPLICATION

Screening programmes should consider setting both upper and lower limits to recall rate to minimise harms and maximise benefits of screening.

FIGURE

http://abstract.rsna.org/uploads/2018/18010448/18010448_q7it.jpg

SPSH56B Digital Mammography Has Persistently Increased High Grade and Overall DCIS Detection without Altering Upgrade Rate

Participants
Colleen H. Neal, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Annette I. Joe, MD, Farmington Hills, MI (*Abstract Co-Author*) Nothing to Disclose
Stephanie K. Patterson, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Akshat C. Pujara, MD, Chicago, IL (*Abstract Co-Author*) Institutional Research Grant, General Electric Company
Mark A. Helvie, MD, Ann Arbor, MI (*Abstract Co-Author*) Institutional Grant, General Electric Company

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hawleyc@med.umich.edu

hawleyc@med.umich.edu

PURPOSE

To evaluate whether digital mammography (DM) has been associated with persistent increased detection of ductal carcinoma in situ (DCIS) or altered the upgrade of DCIS to invasive cancer.

METHOD AND MATERIALS

A HIPAA-compliant, IRB-approved retrospective single institution search identified DCIS diagnosed in women with mammographic calcifications between 2001 and 2014. Ipsilateral cancer within 2 years, masses, papillary DCIS, and patients with outside imaging were excluded, yielding a cohort of 484 cases. Medical records were reviewed for: features of mammographic calcifications, mammographic technique, and pathology outcomes. Mammograms were prospectively interpreted by MQSA-certified breast imaging radiologists and pathology by breast pathologists using standard criteria. The institution transitioned from film screen mammography (FSM) at study inception to exclusive DM by 2010. DBT was not used. Statistical analyses were performed using chi-square test.

RESULTS

Of 484 cases of DCIS, 158 (33%) were detected using FSM and 326 (67%) were detected with DM. The detection rate was higher with DM (1.4/1000 mammograms) than FSM (0.7/1000 mammograms), $p<0.0001$. The detection rate of high-grade DCIS also doubled with DM (0.8/1000) compared to FSM (0.4/1000), $p<0.0001$. The prevalent peak of DM-detected DCIS was 2008 at 2.7/1000. Subsequent incident DM detection remained double FSM (1.3 vs 0.7/1000). Similar proportions of high-grade DICS vs. Low/intermediate-grade were detected with DM and FSM. There was no significant difference in the upgrade rate of DCIS to invasive cancer between DM 10.4% (34/326) and FSM-9.5% (15/158), $p=0.74$. High-grade DCIS led to 71% (35/49) of upgrades to invasive cancer. The median size of calcifications was 10 mm for both modalities. The most common calcification distribution and morphology were clustered pleomorphic calcifications.

CONCLUSION

DM was associated with a significant doubling in the detection of DCIS and high-grade DCIS which persisted after the prevalent peak. The majority of upgrades to invasive cancer arose from high-grade DCIS. DM was not associated with decreased upgrade to invasive cancer.

CLINICAL RELEVANCE/APPLICATION

Improved detection of DCIS may result in reduced treatment morbidity and prevention of invasive breast cancer. Similar proportions of high-grade DCIS suggest that DM has not resulted in overdiagnosis.

MSCB52

Case-based Review of Breast (Interactive Session)

Thursday, Nov. 29 3:30PM - 5:00PM Room: N228

BR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jiyon Lee, MD, New York, NY (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify appropriate application of multi-modality breast imaging for routine screening, supplemental screening, and diagnostic indications. 2) Select appropriate methods for image-guided percutaneous biopsy and perform post-biopsy radiologic-pathologic correlation for next management recommendation. 3) Review appropriateness criteria and performance benchmarks, and guidelines for ongoing breast imaging audits as they apply. 4) Appreciate the range of reassuringly common and sometimes not-so common among the international faculty's portrayal of their piece of the globe.

ABSTRACT

Title: Managing expectations in breast imaging around the world. "Best" versus sufficient? Abstract: Our case-based review course will use the interactive audience response system (ARS) to walk and skip through the fundamentals of breast imaging. We will present how we use mammography, ultrasound, and MRI in daily screening and diagnostic scenarios, along with reminders of the overarching principles of BI-RADS lexicon for effective communication, and ACR appropriateness criteria and performance metrics as applicable or as adapted around the world. Our international faculty (sessions 1 and 2) will also add depth, and the fun added dimensions of how breast imaging works around the world. Varying breast cancer statistics, possible innate ethnic variations, differing cultural expectations and socioeconomic context can and do impact how we carry out our discretionary work. Such interesting details will inform the narrative of the speakers' case scenarios, while the core diagnostic radiology skills aim to be constant, and teachable. The focus is using lots of cases to demonstrate breast imaging now and evolving. Please join us for smart fun!

Active Handout:Jiyon Lee

http://abstract.rsna.org/uploads/2018/18001613/MSCB51 52.pdf

Sub-Events

MSCB52A Breast Care for 'Challenging' Populations

Participants
Cherie M. Kuzmiak, DO, Chapel Hill, NC (*Presenter*) Research Grant, Delphinus Medical Technologies, Inc

LEARNING OBJECTIVES

1) Describe and discuss how to appropriately image and manage patients with special needs.

Active Handout:Cherie M. Kuzmiak

http://abstract.rsna.org/uploads/2018/18001614/US Prison System Health Care MSCB52A.pdf

MSCB52B Greek Philosophy and Cases to Ponder Personalized Screening

Participants
Athina Vourtsi, MD, Athens, Greece (*Presenter*) Consultant, General Electric Company; Educator, ABUS

LEARNING OBJECTIVES

1) To assess the benefits of DBT, US, and MRI in various screening and diagnostic studies. 2) Identify the applications of multi-modality breast imaging of supplemental screening in women of average, intermediate, and high risk for developing breast cancer. 3) Appreciate some of the Greek life style trends and health care system details with respect to breast cancer detection and clinical management.

Active Handout:Athina Vourtsi

http://abstract.rsna.org/uploads/2018/18001615/RSNA-6. Vourtsis. Greece MSCB52B.pdf

MSCB52C False Positives and False Negatives: How to Minimize the Bunch

Participants
Elizabeth S. McDonald, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define false negative exam and identify common reasons for cancer misses in breast imaging and how to avoid them. 2) Define false positive exam and discuss radiologic signs indicating that breast biopsy is not needed.

MSCB52D J-Start and Breast Density in the Land of the Rising Sun

Participants
Youichi Machida, MD, PhD, Chuo-City, Japan (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

machida.yoichi@kameda.jp

LEARNING OBJECTIVES

1) Learn how 'dense breasts' are recognized by Japanese women and physicians, and how they will be involved in breast cancer screening in Japan. 2) Learn the low examination rate of breast cancer screening, as well as other problems we are facing in breast cancer care. 3) Learn the results of J-START, and the concept of 'combined assessment guideline', published by Japan Association of Breast Cancer Screening.

Active Handout:Youichi Machida

http://abstract.rsna.org/uploads/2018/18001617/MSCB52D.pdf

MSCU52

Case-based Review of Ultrasound (Interactive Session)

Thursday, Nov. 29 3:30PM - 5:00PM Room: E450B

GU IR PD US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Deborah J. Rubens, MD, Rochester, NY (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn current techniques and advances in ultrasound imaging. 2) Become familiar with state of the art guidelines for diagnosis and management of imaging findings. 3) Review critical physiology and pathology as it is depicted by ultrasound. 4) Understand the vital role of ultrasound imaging in modern-day patient care.

ABSTRACT

This course is designed to highlight the vital role ultrasound plays in imaging and diagnosis in all parts of radiology. Special emphasis will be placed on technical advances including ultrasound contrast, elastography and interventional guidance. The wide range of ultrasound applications will be covered incuding vascular, general abdominal, pediatric, gynecology, small parts and obstetrics. Our goal is to provide a broad update in the field while addressing new opportunities and challenges for everyday practice.

Sub-Events

MSCU52A Gynecologic and Endovaginal Ultrasound

Participants
Mindy M. Horrow, MD, Philadelphia, PA (*Presenter*) Spouse, Employee, Merck & Co, Inc

For information about this presentation, contact:

horrowm@einstein.edu

LEARNING OBJECTIVES

View Learning Objectives under main course title.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Mindy M. Horrow, MD - 2013 Honored EducatorMindy M. Horrow, MD - 2016 Honored Educator

MSCU52B Interventional Ultrasound

Participants
Hisham A. Tchelepi, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

MSCU52C Pediatric Ultrasound

Participants
Harriet J. Paltiel, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be able to discuss the US imaging features of several common pediatric disorders.

ABSTRACT

USimaging plays a critical role in the clinical evaluation of many pediatric disorders. The sonographic imaging features of a number of important pediatric abnormalities will be reviewed.

MSCU52D Small Parts Ultrasound

Participants
William D. Middleton, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be able to interpret high resolution ultrasound images from superficial structures in different parts of the body.

ABSTRACT

Ultrasound is often the modality of choice to image superficial structures. The sonographic imaging features of a number of important abnormalities of superficial structures will be reviewed.

RC701

Imaging of Thoracic Neoplasms: Update 2018 (Interactive Session)

Thursday, Nov. 29 4:30PM - 6:00PM Room: E450A

CH CT MR OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Edith M. Marom, MD, Tel Aviv, Israel (*Moderator*) Speaker, Bristol-Myers Squibb Company; Speaker, Boehringer Ingelheim GmbH;

For information about this presentation, contact:

edith.marom@gmail.com

LEARNING OBJECTIVES

1) Utilize MR for imaging lung cancer. 2) Evaluate tumor response. 3) Image thymoma. 4) Stage lung cancer with the 8th edition TNM staging.

Sub-Events

RC701A Lung Nodule Management

Participants
Jin Mo Goo, MD, PhD, Seoul, Korea, Republic Of (*Presenter*) Research Grant, Samsung Electronics Co, Ltd; Research Grant, Lunit Inc

For information about this presentation, contact:

jmgoo@plaza.snu.ac.kr

LEARNING OBJECTIVES

1) List the major components in determining lung nodule management. 2) Compare the management guidelines for lung cancer screening and those for incidental nodules. 3) Describe how to measure lung nodules at CT.

RC701B Lung Cancer Staging: TNM 8th Edition

Participants
Girish S. Shroff, MD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review revisions to the TNM staging system. 2) Review how the new TNM staging system addresses lung adenocarcinoma.

RC701C Advances in MR Imaging of Lung Cancer

Participants
Yoshiharu Ohno, MD, PhD, Kobe, Japan (*Presenter*) Research Grant, Canon Medical Systems Corporation; Research Grant, Koninklijke Philips NV; Research Grant, Bayer AG; Research Grant, DAIICHI SANKYO Group; Research Grant, Fuji Pharma Co, Ltd; Research Grant, Guerbet SA;

For information about this presentation, contact:

yosirad@kobe-u.ac.jp

LEARNING OBJECTIVES

1) Understand the appropriate MR sequence for answering each clinical question, especially lung cancer patients. 2) Identify the clinical relevance of MR imaging as compared with other modalities in not only lung cancer, but also pulmonary nodule and mass. 3) Recognize the potential of state-of-the-art MR imaging for thoracic oncologic patients.

ABSTRACT

Since the clinical application of MR imaging in thoracic diseases, numerous basic and clinical researchers reported technical advances in sequencing, scanners and coils, image acquisition and reconstruction techniques, contrast media utilization, and development of post-processing tools. As a result, state-of-the art thoracic MR imaging now has the potential to be used as a substitute for traditional imaging techniques and/or play a complimentary role in patient management. In this lecture, I will have a lecture for 1) understanding the appropriate MR sequence for answering each clinical question, especially lung cancer patients, 2) demonstrating the clinical relevance of MR imaging as compared with other modalities in not only lung cancer, but also pulmonary nodule and mass, and 3) showing the potential of state-of-the-art MR imaging for thoracic oncologic patients.

RC701D Evaluating Tumor Response

Participants
Tina D. Tailor, MD, Durham, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the role of CT for tumor response assessment. 2) Discuss limitations for traditional CT response criteria, including WHO and RECIST. 3) Discuss therapy response in the setting of novel lung cancer therapies, including immunotherapy.

Active Handout:Tina Dinesh Tailor

http://abstract.rsna.org/uploads/2018/17000321/Handout_Tailor_TumorResponse_RSNA2018 RC701D.pdf

RC701E Imaging of Thymoma

Participants
Edith M. Marom, MD, Tel Aviv, Israel (*Presenter*) Speaker, Bristol-Myers Squibb Company; Speaker, Boehringer Ingelheim GmbH;

For information about this presentation, contact:

edith.marom@gmail.com

LEARNING OBJECTIVES

1) Identify an incidental thymoma. 2) Apply the most appropriate imaging modality for the evaluation of thymoma. 3) Assign the newly proposed TNM stage to a newly diagnosed thymoma.

Active Handout:Edith Michelle Marom

http://abstract.rsna.org/uploads/2018/17000322/STAGING THYMOMA RC701E.pdf

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RC702

Education Survival Techniques: Often Overlooked Educational Issues

Thursday, Nov. 29 4:30PM - 6:00PM Room: S403B

ED

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Tara M. Catanzano, MD, Springfield, MA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

tara.catanzano@bhs.org

LEARNING OBJECTIVES

1) 'How my learning today differs from when I was a child' and how to apply that for teaching new generation students? 2) Principles of learning including 'problem centered' than only 'content oriented' learning etc. 3) Understanding 'Five Stages of Skill Acquisition'. 4) Understanding types of Bloom's taxonomy - cognitive, affective and psychomotor. 5) Is dedicated classroom teaching is obsolete? 6) Identify challenges encountered by female trainees during residency and fellowship. 7) Apply new approaches to assist female trainees navigate the academic environment. 8) Recognize the importance of wellness for faculty and trainees. 9) Describe signs and symptoms of burnout. 10) Identify ways to create a sustainable culture of wellness and mental resiliency.

Sub-Events

RC702A The Adult Learner: A Neglected Species

Participants
Dhiraj Baruah, MD, Milwaukee, WI (*Presenter*) Educator, Boehringer Ingelheim GmbH;

For information about this presentation, contact:

dbaruah@mcw.edu

LEARNING OBJECTIVES

1) 'How my learning today differs from when I was a child' and how to apply that for teaching new generation students? 2) Principles of learning including 'problem centered' than only 'content oriented' learning etc. 3) Understanding 'Five Stages of Skill Acquisition'. 4) Understanding types of Bloom's taxonomy - cognitive, affective and psychomotor. 5) Is dedicated classroom teaching is obsolete?

ABSTRACT

There are different theories of learning and that may be not similar for an adult as compared to a child. This was laid down by Malcolm Shepherd Knowles for adult learning in his 1973 publication 'The Adult Learner: A neglected species'. Goal of this presentation will be to highlight Knowles ideas and expanding that with current literature on learning. I will highlight some facts that I learned from my experiences in learning and how it changed from my childhood.

RC702B Women in Radiology: An Underrepresented Group

Participants
Tara M. Catanzano, MD, Springfield, MA (*Presenter*) Nothing to Disclose
Amy M. Oliveira, MD, Springfield, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

tara.catanzano@bhs.org

amy.oliveira@bhs.org

LEARNING OBJECTIVES

1) Identify challenges encountered by female trainees during residency and fellowship. 2) Apply new approaches to assist female trainees navigate the academic environment.

RC702C Faculty and Trainee Wellness: An Often Overlooked Concern

Participants
Chloe M. Chhor, MD, Brooklyn, NY (*Presenter*) Nothing to Disclose
Cecilia L. Mercado, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the importance of wellness for faculty and trainees. 2) Describe signs and symptoms of burnout. 3) Identify ways to

create a sustainable culture of wellness and mental resiliency.

RC703

Infections and Inflammatory Cardiac Disorders

Thursday, Nov. 29 4:30PM - 6:00PM Room: S402AB

CA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Pamela K. Woodard, MD, Saint Louis, MO (*Moderator*) Research agreement, Siemens AG; Research, Eli Lilly and Company; Research, F. Hoffmann-La Roche Ltd; ; ; ; ; ;

For information about this presentation, contact:

woodardp@wustl.edu

Sub-Events

RC703A Endocarditis (Including Loefflers)

Participants
Harold Goerne, MD, Zapopan, Mexico (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

haroldgoerne@hotmail.com

LEARNING OBJECTIVES

1) To identify the imaging features of endocarditis. 2) To apply diagnostic algorithm using different imaging modalities. 3) To illustrate the appearance of endocarditis and its complications. 4) To recognize several differential diagnosis.

RC703B Pericarditis

Participants
Diana Litmanovich, MD, Haifa, Israel (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dlitmano@bidmc.harvard.edu

LEARNING OBJECTIVES

1) To identify the imaging features of pericarditis. 2) To apply diagnostic algorithm using different imaging modalities. 3) To illustrate the appearance of pericarditis and its complications. 4) To be familiar with differential diagnosis of percarditis.

RC703C Myocarditis

Participants
Jens Bremerich, MD, Basel, Switzerland (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jens.bremerich@usb.ch

LEARNING OBJECTIVES

1) To understand pathophysiology of myocarditis. 2) To review the impact of imaging on clinical decision making. 3) To enhance knowledge of technical aspects of imaging.

RC703D Cardiovascular Manifestations of HIV

Participants
Prabhakar Rajiah, MD, FRCR, Dallas, TX (*Presenter*) Nothing to Disclose
Harold Goerne, MD, Zapopan, Mexico (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the cardiovascular manifestations of HIV. 2) To illustrate the imaging features of cardiovascular manifestations of HIV. 3) To describe the impact of cardiovascular disease in HIV.

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educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Prabhakar Rajiah, MD, FRCR - 2014 Honored Educator

RC703E Chagas Disease and other Cardiovascular Infections

Participants
Carlos E. Rochitte, MD,PhD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

rochitte@incor.usp.br

LEARNING OBJECTIVES

1) Recognize MRI characteristics of Chagas disease and other infectious diseases affecting the heart and understand their basic pathophysiology. 2) Gain information on new and recent research data on MRI use to investigate and understand pathophysiology of Chagas disease and other infectious disease. 3) Recognize signs in cardiovascular MR images to suspect or make the probable diagnosis of Chagas disease and other infections.

RC704

Imaging of the Hand and Wrist: How to Add Value

Thursday, Nov. 29 4:30PM - 6:00PM Room: S406B

MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Soterios Gyftopoulos, MD, Scarsdale, NY (*Director*) Nothing to Disclose

For information about this presentation, contact:

Soterios.Gyftopoulos@nyumc.org

llenchik@wakehealth.edu

LEARNING OBJECTIVES

1) Review the most common bone, ligamentous, and tendon conditions found in the hand and wrist. 2) Review the imaging options for common hand and wrist pathologies. 3) Describe how to accurately diagnose common hand and wrist bone, ligamentous, and tendon conditions using imaging.

Sub-Events

RC704A Bones

Participants
Laura W. Bancroft, MD, Orlando, FL (*Presenter*) Author with royalties, Wolters Kluwer nv; Speaker, World Class CME; Editor, Thieme Medical Publishers, Inc; Travel support, Thieme Medical Publishers, Inc ; ;

For information about this presentation, contact:

laura.bancroft.md@flhosp.org

LEARNING OBJECTIVES

1) Review which imaging modalities can add value to the diagnostic evaluation of hand and wrist injuries. 2) Review specific osseous injury patterns in the hand and wrist.

RC704B Tendons

Participants
Scott D. Wuertzer, MD, MS, Winston-Salem, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be able to recognize the normal and abnormal MRI appearance of tendons in the hand and wrist. 2) Be familiar with the relevant anatomy associated with these tendons. 3) Be able to diagnose common pathologic conditions of tendons in the hand and wrist.

RC704C Ligaments

Participants
Christine B. Chung, MD, La Jolla, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify current challenges and gaps in clinical practice for evaluation of intrinsic and extrinsic wrist ligaments. 2) Apply diagnostic algorithms that improve diagnosis and characterization of wrist ligaments.

RC704D TFCC

Participants
Soterios Gyftopoulos, MD, Scarsdale, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Soterios.Gyftopoulos@nyumc.org

LEARNING OBJECTIVES

1) Review the normal anatomy of the TFCC. 2) Review the most common types of acute and chronic TFCC pathology and their locations.

RC705

Spine Imaging: Diagnosis & Intervention

Thursday, Nov. 29 4:30PM - 6:00PM Room: S504AB

NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Wende N. Gibbs, MD,MA, Pasadena, CA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

wende.gibbs@med.usc.edu

Sub-Events

RC705A Advanced Imaging of the Spine in Clinical Practice: What Works

Participants
Vinil Shah, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

vinil.shah@ucsf.edu

LEARNING OBJECTIVES

1) Describe advanced imaging techniques of the spinal cord and peripheral nerves that can be implemented in daily clinical practice, with a particular emphasis on diffusion tensor imaging (DTI). 2) Understand how DTI can play an important problem-solving role in patients with spinal cord pathology and peripheral nerve diseases. 3) Describe the practical value of DTI in preoperative planning, differentiating benign from malignant entities, assessing severity of nerve injury, and monitoring early nerve regeneration.

RC705B Practical Neurography: Brachial and Lumbosacral Plexus

Participants
Carlos H. Torres, MD,FRCPC, Ottawa, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

catorres@toh.ca

LEARNING OBJECTIVES

1) Simplify the complex imaging anatomy of the brachial and lumbosacral plexi. 2) Outline different MR protocols to image the brachial plexus and the lumbosacral plexus. 3) Review brachial plexus and lumbosacral plexus pathologies, using a case-based approach.

ABSTRACT

Magnetic Resonance Imaging (MRI) is the imaging modality of choice for the evaluation of the brachial plexus and lumbosacral plexus due to its superior soft tissue resolution and multiplanar capabilities. The evaluation of both plexi however represents a diagnostic challenge for the clinician and the radiologist. The imaging assessment of the brachial and lumbosacral plexi has been traditionally challenging due to the complexity of the anatomy and due to technical factors. The presentation will emphasize the different MR protocols that could be used at 1.5T and 3T in order to improve the visualization of the different segments of the brachial and lumbosacral plexi. In addition, the normal anatomy as well as the common and infrequent pathologies involving both plexi will be reviewed.

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RC705C Optimized Imaging of the Postoperative Spine: Artifact Reduction

Participants
Lawrence N. Tanenbaum, MD, New York, NY (*Presenter*) Speaker, General Electric Company; Speaker, Siemens AG; Speaker, Guerbet SA; Speaker, Koninklijke Philips NV; Consultant, Enlitic, Inc; Consultant, icoMetrix NV; Consultant, CorTechs Labs, Inc; Consultant, Arterys Inc

For information about this presentation, contact:

nuromri@gmail.com

LEARNING OBJECTIVES

1) Learn the fundamental and more advanced principles used to mitigate the susceptibility related challenges associated with metal implants in postoperative spine MR examinations. 2) Understand and apply fundamental and more advanced techniques such as dual energy imaging and metal artifact reduction software to mitigate the instrumentation related challenges associated with metal implants in postoperative spine CT examinations

ABSTRACT

RC705D Spine Oncology: Improving Quality and Adding Value in Patient Care

Participants
Wende N. Gibbs, MD,MA, Pasadena, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

wende.gibbs@med.usc.edu

LEARNING OBJECTIVES

1) Describe advances in spine oncology and the new algorithms that guide management. 2) Understand the vital role of the radiologist in multidisciplinary decision-making and treatment. 3) Explain methods of increasing our value through optimized reporting, and the role this will play in enhanced patient care, quality improvement, and research.

RC706

12 AM Head & Neck Radiology: Emergency Presentations of Head and Neck Pathology

Thursday, Nov. 29 4:30PM - 6:00PM Room: E350

ER HN NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

For information about this presentation, contact:

shatzkes@hotmail.com

LEARNING OBJECTIVES

1) Define the facial buttresses. 2) Classify the common fracture patterns of the face. 3) Identify imaging features that may impact patient management. 4) Explain the role of multidetector CT in recognizing and classifying temporal bone fractures. 5) Identify the imaging signs of injury to critical structures in the temporal bone with attention to the information most relevant to referring physicians. 6) Detect the imaging features of the complications and sequelae of temporal bone trauma. 7) Identify common causes of facial swelling in the emergency setting. 8) Anticipate the subsequent management of the various causes of facial swelling in the emergency setting.

Sub-Events

RC706A Facial Trauma

Participants
Robert E. Morales, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the common approaches to facial fracture reporting. 2) Classify the common fracture patterns of the face. 3) Identify imaging features that may impact patient management.

RC706B Temporal Bone Trauma

Participants
Hillary R. Kelly, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hillary.kelly@mgh.harvard.edu

LEARNING OBJECTIVES

1) Explain the role of multidetector CT in recognizing and classifying temporal bone fractures. 2) Identify the imaging signs of injury to critical structures in the temporal bone with attention to the information most relevant to referring physicians. 3) Detect the imaging features of the complications and sequelae of temporal bone trauma.

RC706C Neck/Face Swelling

Participants
Tabassum A. Kennedy, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

tkennedy@uwhealth.org

LEARNING OBJECTIVES

1) Identify common causes of facial swelling in the emergency setting. 2) Anticipate the subsequent management of the various causes of facial swelling in the emergency setting.

RC706D Dysphagia/Odynophagia

Participants
Tanya J. Rath, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Differentiate oropharyngeal dysphagia from odynophagia. 2) Recommend the appropriate imaging modality for evaluation of adult patients presenting to the emergency room with oropharyngeal dysphagia and odynophagia. 3) Identify and describe the imaging features of the most common diseases causing emergent oropharyngeal dysphagia or odynophagia.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC707

Imaging Assessment of Advanced Genitourinary Malignancies Treated with Novel Anticancer Agents: What Your Reports Should Include

Thursday, Nov. 29 4:30PM - 6:00PM Room: E351

GU OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

Atul B. Shinagare, MD, Boston, MA (*Moderator*) Advisory Board, Arog Pharmaceuticals, Inc; Research Grant, GTx, Inc
Priya R. Bhosale, MD, Bellaire, TX (*Presenter*) Nothing to Disclose
Andrew D. Smith, MD,PhD, Birmingham, AL (*Presenter*) President and Owner, Radiostics LLC; President and Owner, eRadioMetrics LLC ; President and Owner, Liver Nodularity LLC ; President and Owner, Color Enhanced Detection LLC ; Patent holder
Atul B. Shinagare, MD, Boston, MA (*Presenter*) Advisory Board, Arog Pharmaceuticals, Inc; Research Grant, GTx, Inc

For information about this presentation, contact:

ashinagare@bwh.harvard.edu

andrewdennissmith@uabmc.edu

LEARNING OBJECTIVES

1) Know the mechanisms of action and rationale behind use of various novel anticancer agents available to treat advanced renal, bladder, prostate and gynecologic malignancies. 2) Identify the typical and atypical patterns of tumor response with the novel anticancer agents using a combination of size-based, morphologic and immune-response criteria, and avoid common pitfalls in response assessment. 3) Detect adverse events and complications associated with the novel anticancer agents including immune-related adverse events, and understand the role of certain adverse events as imaging biomarkers.

ABSTRACT

Molecular targeted therapies, immune checkpoint inhibitors and hormonal therapies represent three classes of novel anticancer agents with distinct mechanisms of action, response patterns and toxicities. With the burgeoning use of these agents to treat advanced GU malignancies, the role of the radiologist as a key member of the treatment team has evolved. After attending this course, attendees will know how novel anticancer agents change the radiologic assessment of advanced genitourinary cancers, including their typical and atypical response patterns and common toxicities seen on imaging. This knowledge will inform the radiologists how to render appropriate reports of imaging exams and conduct an effective dialogue with the referring physicians about the management of genitourinary cancers.

Active Handout:Atul Bhanudas Shinagare

http://abstract.rsna.org/uploads/2018/18000682/RSNA Refresher Course Handout RC707.pdf

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RC708

Mass Casualty and Forensic Imaging: Thinking About the Unthinkable

Thursday, Nov. 29 4:30PM - 6:00PM Room: E352

ER

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Barry D. Daly, MD, Baltimore, MD (*Moderator*) Nothing to Disclose
Howard T. Harcke, MD, Wilmington, DE (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

bdaly@umm.edu

howard.harcke@gmail.com

LEARNING OBJECTIVES

1) Explain radiology involvement in the phases of mass casualty and disaster operations. 2) Recognize the complex injury patterns that occur when imaging casualties from a disaster event. 3) Identify areas where virtual autopsy and forensic imaging concepts are used to assist mass casualty and disaster mortuary operations.

ABSTRACT

When disaster and mass casualty events occur radiology facilities will be called upon to support operations during all phases of the response. Active management of acute casualties will be governed by the facility Disaster Management Plan. Disasters often have a high dead to wounded ratio and radiology may be called upon to assist mortuary operations. Here the employment of virtual autopsy forensic imaging is being utilized.

Sub-Events

RC708A Mass Casualty Imaging: The Radiologist's Perspective

Participants
Ferco H. Berger, MD, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ferco.berger@sunnybrook.ca

LEARNING OBJECTIVES

1) Describe the setting of an MCI and the impact on radiologist. 2) Develop participation of the radiology department in preparation for disaster management plan activations. 3) Explain why simulation is crucial and recommend strategies to increase effectiveness of simulation drills.

ABSTRACT

In the setting of mass casualty incidents (MCIs), hospitals need to divert from normal routine to delivering the best possible care to the largest number of victims. This should be accomplished by activating an established hospital disaster management plan (DMP) known to all staff through prior training drills. Over the recent decades, imaging has increasingly been used to evaluate critically ill patients. It can also be used to increase the accuracy of triaging MCI victims, since overtriage (falsely higher triage category) and undertriage (falsely lower triage category) can severely impact resource availability and mortality rates, respectively. This presentation emphasizes the importance of including the radiology department in hospital preparations for a MCI and highlights factors expected to influence performance during hospital DMP activation including issues pertinent to effective simulation, such as establishing proper learning objectives. After action reviews including performance evaluation and debriefing on issues are invaluable following simulation drills and DMP activation, in order to improve subsequent preparedness. Historically, most hospital DMPs have not adequately included radiology department operations, and they have not or to a little extent been integrated in the DMP activation simulation. This presentation aims to increase awareness of the need for radiology department engagement in order to increase radiology department preparedness for DMP activation after a MCI occurs.

Active Handout:Ferco H. Berger

http://abstract.rsna.org/uploads/2018/18000606/Handout MCI RSNA 2018 RC708A.pdf

RC708B Ballistic Trauma

Participants
Noah G. Ditkofsky, MD, Toronto, ON (*Presenter*) Grant, NVIDIA Corporation

For information about this presentation, contact:

ditkofsky@gmail.com

LEARNING OBJECTIVES

1) Understand and be able to explain the mechanism of Ballistic injuries. 2) Define the term 'permanant tract'. 3) Describe injuries associated with the permanent tract. 4) Define the term 'temporary cavity'. 5) Describe injuries associated with the temporary cavity. 6) Be able to detect these injuries. 7) Recognize characteristic patterns of injury associated with gunshot wounds.

ABSTRACT

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RC708C Introduction to the Virtual Autopsy

Participants
Barry D. Daly, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the technological advances in both multi-detector row CT and high resolution whole body 3D imaging leading to the recent development of postmortem CT (PMCT) as a potential noninvasive 'Virtual Autopsy' tool. 2) To describe the early applications of PMCT by diagnostic radiologists and forensic pathologists who foresaw a valuable role for this new technique in the investigation of death. 3) To address the potential development of infrastructure and logistics that would allow PMCT to become a valuable tool in mass casualty situations.

ABSTRACT

The introduction of faster multi-detector row CT scanners and high resolution 3D whole body imaging 2 decades ago attracted the interest of forensic pathologists who foresaw a valuable role for postmortem CT (PMCT) as a noninvasive 'Virtual Autopsy' in the investigation of death. The role of PMCT has become well-established for non-invasive investigation of many different causes of death including blunt force and projectile or blast injuries, burns, drowning, suspected pediatric abuse or elder abuse. It also has a role in cases of undetermined cause of death and for evaluation of decomposed or unidentified bodies. In some cases it may replace or curtail the extent of autopsy, of great importance in mass casualty situations.

RC708D The Virtual Autopsy: Current Concepts

Participants
Howard T. Harcke, MD, Wilmington, DE (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

howard.harcke@gmail.com

LEARNING OBJECTIVES

1) List potential benefits of CT assisted autopsy in mass casualty and disaster events. 2) Explain the major limitations of postmortem CT in trauma compared to anatomic autopsy.

ABSTRACT

The military has acquired considerable experience with application of virtual autopsy in mass casualty and disaster events. These events demonstrate the variety of injury encountered (blast, ballistic, blunt force, thermal) often in combination. CT prior to autopsy enhances performance and accuracy of the autopsy. Currently external examination by the forensic pathologist coupled with CT findings has been used to replace full autopsy in some situations.

RC709

LI-RADS Update (Interactive Session)

Thursday, Nov. 29 4:30PM - 6:00PM Room: S406A

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Claude B. Sirlin, MD, San Diego, CA (*Moderator*) Research Grant, Gilead Sciences, Inc; Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Bayer AG; Research Grant, ACR Innovation; Research Grant, Koninklijke Philips NV; Research Grant, Celgene Corporation; Consultant, General Electric Company; Consultant, Bayer AG; Consultant, Boehringer Ingelheim GmbH; Consultant, AMRA AB; Consultant, Fulcrum Therapeutics; Consultant, IBM Corporation; Consultant, Exact Sciences Corporation; Advisory Board, AMRA AB; Advisory Board, Guerbet SA; Advisory Board, VirtualScopics, Inc; Speakers Bureau, General Electric Company; Author, Medscape, LLC; Author, Resoundant, Inc; Lab service agreement, Gilead Sciences, Inc; Lab service agreement, ICON plc; Lab service agreement, Intercept Pharmaceuticals, Inc; Lab service agreement, Shire plc; Lab service agreement, Enanta; Lab service agreement, Virtualscopics, Inc; Lab service agreement, Alexion Pharmaceuticals, Inc; Lab service agreement, Takeda Pharmaceutical Company Limited; Lab service agreement, sanofi-aventis Group; Lab service agreement, Johnson & Johnson; Lab service agreement, NuSirt Biopharma, Inc ; Contract, Epigenomics; Contract, Arterys Inc
Khaled M. Elsayes, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC709A Major LI-RADS Features

Participants
Elizabeth M. Hecht, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ehecht@columbia.edu

LEARNING OBJECTIVES

1) Explain the rationale behind and scientific evidence supporting LI-RADS major features for CT and MRI diagnosis of hepatocellular carcinoma (HCC). 2) Define and describe the major CT and MRI imaging features used in LI-RADS to categorize LI-RADS 3, 4 and 5 lesions using the LI-RADS lexicon. Features discussed include arterial phase hyper enhancement, washout appearance, capsule appearance, size and threshold growth. 3) Identify LI-RADS CT/MRI major features through case examples using extracellular and hepatobiliary specific contrast agents. 4) Categorize observations using the CT/MR LI-RADS algorithm with emphasis on major features.

ABSTRACT

NA

RC709B Ancillary LI-RADS Features

Participants
Victoria Chernyak, MD,MS, Bronx, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

vichka17@hotmail.com

LEARNING OBJECTIVES

1) To learn the appearance, biological rationale and scientific evidence supporting use of ancillary features (AFs) in LI-RADS categorization. 2) To know and correctly use the rules for application of the AFs in LI-RADS v2017. 3) To apply the knowledge of AFs and their applications for various practice cases.

RC709C LI-RADS Treatment Response

Participants
Richard Kinh Gian Do, MD, PhD, New York, NY (*Presenter*) Consultant, Bayer AG

LEARNING OBJECTIVES

1) Identify differences and similarities between locoregional therapies for HCC. 2) Compare response criteria for HCC. 3) Apply the LI-RADS Treatment Response Algorithm.

ABSTRACT

HCC treatment response to locoregional therapy is assessed routinely by diagnostic radiologists. However, assessment of treatment response is complicated by the proliferation of response criteria and guidelines in recent years. Differences between locoregional therapies, from radiofrequency ablation for solitary masses to transarterial radioembolization of entire lobes, further complicate standardization of response assessment. This lecture will provide an overview of commonly used locoregional therapies for HCC and compare existing response criteria, such as Response Evaluation in Solid Tumors (RECIST) and modified RECIST. These provide context for the recent development of the LI-RADS Treatment Response Algorithm, which will be illustrated in selected cases.

RC709D Challenging LI-RADS Topics

Participants
Mustafa R. Bashir, MD, Cary, NC (*Presenter*) Research Grant, Siemens AG; Research Grant, General Electric Company; Research Grant, NGM Biopharmaceuticals, Inc; Research Grant, TaiwanJ Pharmaceuticals Co, Ltd; Research Grant, Madrigal Pharmaceuticals, Inc; Research Consultant, RadMD

For information about this presentation, contact:

mustafa.bashir@duke.edu

LEARNING OBJECTIVES

1) Review challenging topics in 2017 CT/MRI LI-RADS, including hepatobiliary agents, LR-M criteria, and the patient populations in which LI-RADS is/is not applicable.

ABSTRACT

2017 CT/MRI LI-RADS provides guidelines for diagnosis of hepatocellular carcinoma and risk stratification of hepatocellular nodules that are not clearly malignant. However, the assessment of patients who may or may not be at elevated risk for developing hepatocellular carcinoma is more nuanced and requires an understanding of a number of additional concepts. This discussion will focus on the use of hepatobiliary contrast agents, the diagnosis of non-hepatoceillular malignancy, and patient populations in which LI-RADS should or should not be applied.

RC710

Vascular Ultrasound and Doppler

Thursday, Nov. 29 4:30PM - 6:00PM Room: N226

US VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Sub-Events

RC710A The Aorta and Its Branches

Participants
Leslie M. Scoutt, MD, New Haven, CT (*Presenter*) Speaker, Koninklijke Philips NV

For information about this presentation, contact:

leslie.scoutt@yale.edu

LEARNING OBJECTIVES

1) Discuss the ultrasound approach to screening for abdominal aortic aneurysms and follow up of patients who have undergone endograft repair of an abdominal aortic aneurysm. 2) Describe the US findings of dissections of the abdominal aorta and mesenteric arteries. 3) Discuss the US criteria for the diagnosis of mesenteric ischemia.

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RC710B Carotid Doppler: Current Diagnostic Strategies

Participants
John S. Pellerito, MD, Manhasset, NY (*Presenter*) Research Grant, General Electric Company

For information about this presentation, contact:

jpelleri@northwell.edu

LEARNING OBJECTIVES

1) Apply current diagnostic criteria for diagnosis of carotid disease. 2) Determine appropriate diagnostic criteria for specific patterns of disease. 3) Recognize important pitfalls in diagnosis.

RC710C Lower Extremity Venous Doppler

Participants
Michelle L. Robbin, MD, Birmingham, AL (*Presenter*) Consultant, Koninklijke Philips NV; Speaker, Koninklijke Philips NV;

For information about this presentation, contact:

mrobbin@uabmc.edu

LEARNING OBJECTIVES

1) Review the indications and performance of the lower extremity ultrasound examination. 2) Discuss the results of the recent SRU consensus conference on the need to include calf veins in the routine lower extremity ultrasound. 3) Be able to describe the recommended calf vein ultrasound examination.

RC711

Improving PET Interpretation (Interactive Session)

Thursday, Nov. 29 4:30PM - 6:00PM Room: S504CD

CT NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

LEARNING OBJECTIVES

1) Understand the patient preparation issues with performing PET/CT. 2) Review recommendations on patient preparation prior to performing PET/CT. 3) Review the issues in performing PET/CT scans on diabetic patients and learn ways to optimize the glucose level. 4) With the aid of challenging case examples, this activity aims improve PET-CT interpretation through recognition of pitfalls and variants. In addition, it aims to review typical as well as unusual examples of commonly encountered oncologic diagnoses. 5) Learn how to discriminate malignancy from benign FDG-avid changes caused by surgery and procedures, radiation, and chemotherapy.

Sub-Events

RC711A Interpretive Pitfalls

Participants
Gary A. Ulaner, MD, PhD, New York, NY (*Presenter*) Research support, General Electric Company; Research support, F. Hoffmann-La Roche Ltd; Research support, Novartis AG

For information about this presentation, contact:

ulanerg@mskcc.org

LEARNING OBJECTIVES

1) Identify FDG-avid lesions caused by surgery, radiation, and chemotherapy that could be mistaken for malignancy. 2) Demonstrate how to integrate FDG PET and CT findings on FDG PET/CT to distinguish benign from malignancy causes of FDG-avidity.

RC711B Impact of Patient Preparation

Participants
Don C. Yoo, MD, E Greenwich, RI (*Presenter*) Consultant, Endocyte, Inc

For information about this presentation, contact:

dyoo@lifesapn.org

LEARNING OBJECTIVES

1) Understand the patient preparation issues with performing PET/CT. 2) Review recommendations on patient preparation prior to performing PET/CT. 3) Review the issues in performing PET/CT scans on diabetic patients and learn ways to optimize the glucose level.

ABSTRACT

F18-FDG PET/CT is a valuable tool for a variety of oncologic applications. The purpose of this educational activity is to discuss the importance of appropriate patient preparation prior to performing oncologic F18-FDG PET/CT scans. The recommendations from the American College of Radiology (ACR), the Society of Nuclear Medicine and Molecular Imaging (SNMMI), and the National Cancer Institute (NCI) for patient preparation will be discussed. Issues that will be discussed include fasting, limiting exercise, hydration, sedation, low carbohydrate meals, and diabetic patients. Patients are typically asked to fast for at least 4 hours before tracer injection for oncologic PET/CT scans. The ACR and SNMMI both recommend checking glucose levels on all patients prior to administration of F18-FDG. SNMMI guidelines recommend that patients with glucose of greater than 150-200 mg/dL should usually be rescheduled. Performing PET/CT scans in poorly controlled diabetic patients can result in a PET/CT scan with an altered biodistribution limiting interpretation of the study. In a poorly controlled diabetic patient with a glucose level of greater than 200 mg/dl, the study should usually be rescheduled if it does not critically affect patient care. Hyperglycemia will dilute the FDG uptake by tumors through competitive inhibition. Subcutaneous insulin should not be administered to a diabetic patient with high glucose within 4 hours of a PET/CT scan as insulin will stimulate FDG uptake by skeletal muscle resulting in an altered biodistribution which can severely limit interpretation.

RC711C Effective Reporting and Communication

Participants
Eric M. Rohren, MD, PhD, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Eric.Rohren@bcm.edu

LEARNING OBJECTIVES

1) With the aid of challenging case examples, this activity aims improve PET-CT interpretation through recognition of pitfalls and variants. 2) Aims to review typical as well as unusual examples of commonly encountered oncologic diagnoses.

ABSTRACT

Best practices in reporting are a critical aspect of a successful PET program. In this presentation, effective reporting methods will be demonstrated, along with common pitfalls in reporting that should be avoided.Emphasis will be placed on the eight 'C's' of effective reporting: Correctness, Completeness, Consistency, Communication, Clarity, Confidence, Concision, and Consultation.

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RC711D Challenging Case Examples

Participants
Esma A. Akin, MD, Washington, DC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

eakin@mfa.gwu.edu

LEARNING OBJECTIVES

1) Review challenging case examples of FDG PET-CT of the abdomen and pelvis with particular emphasis on genitourinary and gynecologic imaging.

ABSTRACT

FDG PET-CT is an effective modality for staging, restaging and treatment follow up of various malignancies. In this session, a review of challenging cases will be presented. Variants and pitfalls that may impact interpretation will be discussed with special emphasis on genitourinary and gynecologic imaging. Updtaes on imaging and interpretation parameters and guidlines will be reviewed.

RC712

Thoracic Aortic Emergencies (Interactive Session)

Thursday, Nov. 29 4:30PM - 6:00PM Room: S103AB

VA ER

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
John P. Lichtenberger III, MD, Bethesda, MD (*Moderator*) Nothing to Disclose
Daniel Vargas, MD, Aurora, CO (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

daniel.vargas@ucdenver.edu

jlichtenberger@mfa.gwu.edu

LEARNING OBJECTIVES

1) Implement and adapt various imaging modalities for imaging of aortic emergencies. 2) Appreciate the potential of advanced imaging in the clinical management of various aortic emergencies. 3) Identify the risk factors for aortic aneurysms and rupture. 4) Differentiate treatment options for patients with aortic emergencies.

Sub-Events

RC712A The Spectrum of Type A Dissection

Participants
Daniel Vargas, MD, Aurora, CO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

daniel.vargas@ucdenver.edu

LEARNING OBJECTIVES

1) Implement and adapt various imaging modalities for imaging of aortic emergencies. 2) Appreciate the potential of advanced imaging in the clinical management of various aortic emergencies. 3) Identify the risk factors for aortic aneurysms and rupture. 4) Differentiate treatment options for patients with aortic emergencies.

ABSTRACT

The traditional Stanford classification distinguishes between dissections involving the ascending aorta (Type A) from those that do not involve the ascending aorta (Type B). Type A aortic dissection is rare, but remains the most lethal of aortic disorders requiring prompt surgical intervention. The common pathologic denominator in patients with acute dissection is an abnormal aortic media ('cystic medial necrosis') which can be found in genetic/inherited diseases (e.g. Marfan's) but also in patients with severe hypertension. The CT imaging strategy of suspected acute aortic syndrome should always include (i) non-enhanced images to assess for intramural hematoma (IMH); when the index of suspicion for aortic dissection is high, also consider (ii) EKG-gating for motion-free evaluation of the aortic root/ascending aorta, and (iii) including common femoral arteries in the CTA scan range to assess lesion extent and identify a percutaneous access route. The spectrum of aortic dissection has recently been classified as the following: Class 1 classic dissection with true and false lumen separated by an intimal flap; Class 2 IMH; Class 3 limited intimal tear or limited dissection; Class 4 penetrating atherosclerotic ulcer (PAU); and Class 5 iatrogenic/traumatic. A clarification and modified conceptual classification of aortic dissection will be provided, along with illustrative examples of these aortic lesions. Particular focus will be given to the lesser known Class 3 'limited dissection' which is described as a subtle and eccentric bulge of the aortic wall. While it has been reported to elude current imaging techniques, emphasis will be made on recognizing subtle CTA imaging findings characteristic of this uncommon but important dissection variant.

Honored Educators

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RC712B Acute and Chronic Complications of Aortic Dissection

Participants
Anna M. Sailer, MD,PhD, West Hollywood, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the types of complications in aortic dissections. 2) Compare and illustrate the underlying pathophysiology of acute and chronic complications in aortic dissections. 3) Appreciate the potential of advanced aortic imaging in the clinical management of uncomplicated and complicated dissections. 4) Differentiate risk stratification and treatment options for patients with aortic dissections.

RC712C Traumatic Aortic Injuries

Participants
Savvas Nicolaou, MD, Vancouver, BC (*Presenter*) Institutional research agreement, Siemens AG

For information about this presentation, contact:

savvas.nicolaou@vch.ca

LEARNING OBJECTIVES

1) Discuss the mechanism of injury, pathophysiology, and types of traumatic aortic injuries including aortic dissection, laceration, transection, pseudoaneurysm and intramural hematoma. 2) Understand the role of various imaging modalities in work up of traumatic aortic injury wth emphasis on MDCT and problem solving techniques using Multi Energy CT. 3) Discuss the grading scheme for traumatic aortic injuries. 4) Demonstrate imaging pitfalls which can lead to misinterpretation of traumatic aortic injuries. 5) Review the management and treatment options.

RC712D Bicuspid Aortic Valve

Participants
John P. Lichtenberger III, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jlichtenberger@mfa.gwu.edu

LEARNING OBJECTIVES

1) Describe the current genetic and pathophysiologic understanding of bicuspid aortic valve and associated aortopathy. 2) List the emergent and long-term aortic complications associated with bicuspid aortic valve. 3) Illustrate a comprehensive imaging approach to bicuspid aortic valve evaluation with a focus on necessary data for clinical management and surgical planning. 4) Discuss treatment options for bicuspid aortic valve, emphasizing the imaging appearances of common complications.

ABSTRACT

Bicuspid aortic valve (BAV) is the most common cardiovascular malformation, occurring in 1-2% of the population. Rather than a discrete clinical entity, BAV encompasses a spectrum of fusion abnormalities of the normal trileaflet aortic valve. Similarly, the associated diseases of the aortic valve and aorta have a broad range. The diseased bicuspid valve may be complicated by aortic valve stenosis, regurgitation and endocarditis. The associated aortic diseases include aneurismal dilation of the ascending aorta, dissection and coarctation. Aneurismal dilation of the ascending aorta in patients with BAV is thought to be a consequence of an underlying aortopathy similar to that seen in connective tissue diseases. Understanding of bicuspid aortic valve associated aortopathy has changed the guidelines for intervention on ascending aortic aneurysm based on size. The precise imaging evaluation of BAV requires knowledge of phenotypic variance, associated aortopathy, clinical management, surgical repair and complications.

RC713

Pediatric Neuroimaging Emergencies

Thursday, Nov. 29 4:30PM - 6:00PM Room: S404AB

ER HN NR PD

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

RC713A Pediatric Brain Emergencies: Traumatic

Participants
V. Michelle Silvera, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

vmichellesilvera81@gmail.com

LEARNING OBJECTIVES

1) Identify basic patterns of acute traumatic head injury in children. 2) Recognize traumatic head injuries that are pediatric-specific. 3) Apply appropriate clinical recommendations for acute pediatric traumatic head injuries.

RC713B Pediatric Brain Emergencies: Non-traumatic

Participants
Sarah S. Milla, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

sarah.milla@emory.edu

LEARNING OBJECTIVES

Learning Objectives:1) Identify non traumatic emergencies including infectious and vascular conditions2) Illustrate subtle intracranial findings to help make accurate diagnoses3) Discuss CT and MR techniques to optimize diagnostic capabilities

RC713C Pediatric Head and Neck Emergencies

Participants
Alok I. Jaju, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ajaju@luriechildrens.org

LEARNING OBJECTIVES

1) Identify the imaging findings of common pediatric head and neck emergencies. 2) Describe the complications and routes of spread for pediatric head and neck pathological processes. 3) Recommend the next best step in imaging or management of these conditions.

Active Handout:Alok Indraprakash Jaju

http://abstract.rsna.org/uploads/2018/18000665/H&N Emerg_ Alok Jaju RC713C.pdf

RC713D Pediatric Spine Emergencies

Participants
Luke L. Linscott, MD, Salt Lake City, UT (*Presenter*) Author, Reed Elsevier

LEARNING OBJECTIVES

1) Identify the most important spine emergencies in children. 2) Understand the optimal imaging strategy for spine injuries in children.

RC714

Dialysis Interventions

Thursday, Nov. 29 4:30PM - 6:00PM Room: E353A

IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Charles E. Ray JR, MD,PhD, Chicago, IL (*Moderator*) Nothing to Disclose
James T. Bui, MD, Chicago, IL (*Moderator*) Stockholder, ImmersiveTouch

For information about this presentation, contact:

jtbui@uic.edu

LEARNING OBJECTIVES

1) Learn of updates in dialysis interventions. 2) Apply newer techniques into current practice of dialysis interventions.

ABSTRACT

n/a

Sub-Events

RC714A Surveillance of the Dialysis Circuit

Participants
Paul J. Rochon, MD, Aurora, CO (*Presenter*) Moderator and Speaker, Penumbra, Inc; Speakers Bureau, C. R. Bard, Inc; Speaker, Cook

LEARNING OBJECTIVES

1) To identify methods of surveillance of dialysis fistulas and grafts. 2) To identify advantages and disadvantages of surveillance methods. 3) To discuss future directions of dialysis circuit surveillance.

RC714B Nontraditional Dialysis Access

Participants
James T. Bui, MD, Chicago, IL (*Presenter*) Stockholder, ImmersiveTouch

For information about this presentation, contact:

jtbui@uic.edu

LEARNING OBJECTIVES

1) Describe nontraditional HD access options. 2) List when nontraditional HD options are clinically useful. 3) Apply nontraditional HD options to clinical practice.

ABSTRACT

n/a

RC714C Failing Access Circuits-Venous

Participants
Bulent Arslan, MD, Chicago, IL (*Presenter*) Advisory Board, Medtronic plc; Advisory Board, Guerbet SA; Speakers Bureau, Biocompatibles International plc; Speakers Bureau, C. R. Bard, Inc; Advisory Board and Speakers Bureau, Boston Scientific Corporation; Speakers Bureau, Penumbra, Inc

LEARNING OBJECTIVES

1) To recognize the pathologies that contribute to dialysis access failure. 2) To be familiar with standard technical approaches to treating dialysis access failure. 3) To describe the clinical outcome of dialysis access interventions.

RC714D Failing Access Circuits-Arterial

Participants
Charles E. Ray JR, MD,PhD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To discuss the common issues that may arise from arterial inflow that may affect the integrity of the dialysis access circuit.

ABSTRACT

n/a

RC715

Tomosynthesis

Thursday, Nov. 29 4:30PM - 6:00PM Room: E353C

BR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Margarita L. Zuley, MD, Pittsburgh, PA (*Moderator*) Investigator, Hologic, Inc

Sub-Events

RC715A Use in Screening

Participants
Emily F. Conant, MD, Philadelphia, PA (*Presenter*) Grant, Hologic, Inc; Consultant, Hologic, Inc; Grant, iCAD, Inc; Consultant, iCAD, Inc; Speaker, iiCME

For information about this presentation, contact:

emily.conant@uphs.upenn.edu

LEARNING OBJECTIVES

1) Review outcomes from breast cancer screening with digital breast tomosynthesis (DBT). 2) Discuss the implementation of synthetic imaging in DBT screening. 3) Demonstrate case-based examples of pearls and pitfalls in DBT screening.

RC715B Current Trials

Participants
Valentina Iotti, MD, Reggio Emilia, Italy (*Presenter*) Speaker fee and travel grants from GE Healthcare.

For information about this presentation, contact:

valentina.iotti@ausl.re.it

LEARNING OBJECTIVES

1) List the current trials with digital breast tomosynthesis. 2) Compare the different study designs, interventions and setting. 3) Examine the outcomes and potential impact on the future screening and clinical practice with tomosynthesis.

RC715C Use in Diagnostics

Participants
Margarita L. Zuley, MD, Pittsburgh, PA (*Presenter*) Investigator, Hologic, Inc

For information about this presentation, contact:

zuleyml@upmc.edu

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC716

The Newly Hired Radiologist: Noninterpretive Skills for Success (Sponsored by the RSNA Professionalism Committee)

Thursday, Nov. 29 4:30PM - 6:00PM Room: S503AB

PR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Brandon P. Brown, MD, MA, Indianapolis, IN (*Moderator*) Nothing to Disclose
Anastasia L. Hryhorczuk, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Kate Hanneman, MD, FRCPC, Toronto, ON (*Presenter*) Nothing to Disclose
Brent J. Wagner, MD, West Reading, PA (*Presenter*) Nothing to Disclose
Michael C. Veronesi, MD, PhD, Indianapolis, IN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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mverones@iu.edu

brpbrown@iu.edu

LEARNING OBJECTIVES

1) Describe the needs and challenges faced by the beginning radiologist, including how to find an expertise 'niche' and how to divide time between clinical work, committee volunteerism, and leadership roles. 2) Examine the impact of social media and patient portals on the physician-patient interaction and identify the risks and benefits of these new opportunities for communication. 3) Identify the issues facing a private practice group when incorporating a new partner including questions of fairness/transparency, patience with colleagues, formal and informal mentorship, and communicating expectations. 4) Discuss the ways in which a radiology group can assist a new radiologist transitioning out of training, in order to bring out the best in their new colleague and help them to live up to and exceed their highest potential.

ABSTRACT

While residency/fellowship training, board certification, and the job search are familiar topics among the radiology community, an equally important yet oft-neglected topic is that of the newly hired radiologist. Although formal training is focused on clinical and diagnostic skills, navigating professional practice requires building relationships, identifying areas of focus, and learning how best to collaborate with partners and other clinical colleagues. For the beginning faculty member, the demands of teaching and research create additional dilemmas in how best to prioritize time. In addition, new technologies and communication norms now face the practicing radiologist. Social media and patient portals provide radiologists with new forums for interacting with the public and patients. In theory, social media can be leveraged for professional outreach, to improve public understanding of radiologists' roles and to increase departmental profiles. However, it is imperative that radiologists balance this potential with the ethical and professional considerations surrounding patient privacy and autonomy. Finally, in both academic and private practice settings, unique challenges face the new partner, challenges not previously faced and for which training might not have fully prepared them. Although the new hire is full of promise, the impact of their colleagues in helping them rise to the challenge and fulfill expectations can be essential.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Kate Hanneman, MD, FRCPC - 2017 Honored EducatorKate Hanneman, MD, FRCPC - 2018 Honored Educator

RC717

Emerging Technology: Imaging of Dementias

Thursday, Nov. 29 4:30PM - 6:00PM Room: S505AB

CT MR NR NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Rathan M. Subramaniam, MD,PhD, Dallas, TX (*Moderator*) Consultant, Blue Earth Diagnostics Ltd; Speaker, Blue Earth Diagnostics Ltd

For information about this presentation, contact:

rathan.subramaniam@utsouthwestern.edu

LEARNING OBJECTIVES

1) To review the value of FDG and amyloid PET/CT in diganosis of dementia. 2) To review the value of MR imaging in diagnosis of dementia. 3) To review the value of tau PET/CT in diagnosis of dementia.

ABSTRACT

This session will review the importance and value of FDG PET, Amyloid PET, MRI and Tau PET imaging in diagnosis of dementia.

Sub-Events

RC717A Imaging Dementias 2018

Participants
Rathan M. Subramaniam, MD,PhD, Dallas, TX (*Presenter*) Consultant, Blue Earth Diagnostics Ltd; Speaker, Blue Earth Diagnostics Ltd

For information about this presentation, contact:

rathan.subramaniam@utsouthwestern.edu

LEARNING OBJECTIVES

1) To discuss the value of FDG brain PET/CT in differentiating various dementias in cognitive decline. 2) To discuss the value of Amyloid brain PET/CT in patients with cognitive decline and Alzheimer's disease.

RC717B Imaging Dementias: FDG and Amyloid PET/CT

Participants
William A. Moore, MD, Dallas, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand which FDA approved MR techniques are currently available for improving differential diagnosis in patients with dementia. 2) Improve basic knowlege of how MR results correspond to clinical dementia phenotypes. 3) Discuss recent technological advances including applications of dynamic susceptability contrast (DSC) MR, arterial spin labelling (ASL) and resting state functional connectivity MRI (rs-fcMRI) in the setting of patients with dementia.

RC717C Imaging Dementias: MRI

Participants
Kejal Kantarci, MD, Rochester, MN (*Presenter*) Data Safety Monitoring Board, Takeda Pharmaceutical Company Limited; Data Safety Monitoring Board, Pfizer Inc; Data Safety Monitoring Board, Johnson & Johnson; Research funded, Eli Lilly and Company

For information about this presentation, contact:

kantarci.kejal@mayo.edu

LEARNING OBJECTIVES

1) Describe the MRI techniques used in the imaging of cognitve impairment and dementia. 2) Understand the clinical utility. 3) Discuss the findings with pathologic confirmation.

RC717D Imaging Dementias: Tau PET/CT

Participants
Val J. Lowe, MD, Rochester, MN (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Eli Lilly and Company; Advisory Board, Merck & Co, Inc

LEARNING OBJECTIVES

1) Describe the basic science principles behind tau PET/CT imaging. 2) Understand the utility of tau PET/CT imaging in neurodegenerative disease. 3) Identify the findings of a positive tau PET/CT scan.

RC718

Interrogating Tumor Heterogeneity Using Imaging

Thursday, Nov. 29 4:30PM - 6:00PM Room: N229

OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Evis Sala, MD, PhD, Cambridge, United Kingdom (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Emphasize the role of oncologic imaging in the era of precision medicine. 2) Review the definitions of Radiomics and Radiogenomics. 3) Identify the gaps in imaging tumor heterogeneity and its metastatic potential.

Sub-Events

RC718A Cancer Genomics: Making Sense of Inter- and Intra-tumor Heterogeneity

Participants
Britta Weigelt, New York, NY (*Presenter*) Spouse, Advisor, Goldman Sachs; Spouse, Scientific Advisory Board, VolitionRx

LEARNING OBJECTIVES

1) Review the results of large-scale massively parallel sequencing endeavors of human cancers. 2) Assess the inter- and intra-tumor genetic heterogeneity found in human cancers. 3) Define the implications of genetic heterogeneity on the biological and clinial behavior of cancers.

RC718B Imaging Genomics-proteomics Interactions: New Frontiers Ahead

Participants
Evis Sala, MD, PhD, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Provide the rationale for assessing tumor heterogeneity. 2) Review the definitions of Radiomics, Radiogenomics and Proteomics. 3) Provide insights into the role of habitat imaging in unravelling tumor heterogeneity.

Honored Educators

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RC718C Making Sense of Big Imaging Data: What Comes Next?

Participants
Robert J. Gillies, PhD, Tampa, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

robert.gillies@moffitt.org

LEARNING OBJECTIVES

1) Describe a future role of radiologists in capturing and curating image data. 2) Differentiate conventional radiomic analyses from deep learning. 3) Outline the steps needed to curate useful data and ways that these can be automated. 4) Describe future approaches that may enable multi-institutional models to be built without sharing the actual data.

ABSTRACT

The practice of medicine is undergoing seismic shifts from being primarily experience-based to data-driven. Further, the emergence of data-driven quantitative diagnostic, prognostic, and predictive methods will see an exponential increase in coming years due to the emergence of tools that can mine large amounts of data across sites. Such systems are already in place for many data types, and tools for analyses of radiological data are just emerging, and are likely to change the practice of radiology forever from a semantic lexicon based discipline to one that is increasingly analytical, driven by machine learning algorithms. The power of these analytics is primarily limited by access to sufficiently large data sets of highly curated patients, with images, co-variates, treatments and outcomes. In the field of cancer, the Cancer Image Archive (TCIA) houses over 30 million radiographic images that can be mined for associations with multiple core data elements (CDE) and this has been used extensively to generate predictive and prognostic models. Although 30 million sounds like a lot, it is a mall fraction of the >100 million radiological exams that are acquired annually in the U.S. Going forward, tools are being developed that will allow sharing of processed image data along with CDEs without the need to share images themselves, lowing the barriers to building large cohorts. These will likely take decades to deploy, however. In the meantime tools are being deployed to prospectively capture data within single institutions to automatically

build and populate focused cohorts.

RC721

Advances in CT: Technologies, Applications, Operations - CT Practice

Thursday, Nov. 29 4:30PM - 6:00PM Room: S105AB

CT PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc
Lifeng Yu, PhD, Chicago, IL (*Coordinator*) Nothing to Disclose

ABSTRACT

CT has become a leading medical imaging modality, thanks to its superb spatial and temporal resolution to depict anatomical details. New advances have enabled extending the technology to depict physiological information. This has enabled a wide and expanding range of clinical applications. These advances are highlighted in this multi-session course. The course offers a comprehensive and topical depiction of these advances with material covering CT system innovations, CT operation, CT performance characterization, functional and quantitative applications, and CT systems devised for specific anatomical applications. The sessions include advances in CT system hardware and software, CT performance optimization, CT practice management and monitoring, spectral CT techniques, quantitative CT techniques, functional CT methods, and special CT use in breast, musculoskeletal, and interventional applications.

Sub-Events

RC721A Practice Management

Participants
Timothy P. Szczykutowicz, PhD, Madison, WI (*Presenter*) Equipment support, General Electric Company; License agreement, General Electric Company; Founder, Protocolshare.org LLC; Medical Advisory Board, medInt Holdings, LLC; Co-owner, LiteRay Medical LLC

For information about this presentation, contact:

tszczykutowicz@uwhealth.org

LEARNING OBJECTIVES

1) Apply the master protocol concept to their CT fleet to obtain protocol performance uniformity. 2) Understand what information is needed to document a CT protocol and how it impacts the diagnostic utility of the resulting CT images and/or CT exam workflow. 3) Apply the CT protocol documentation template and team model discussed in the course to your own CT practice.

ABSTRACT

The talk will cover two CT protocol management strategies. The first is called the master protocol concept. The concept groups together phases of indications requiring similar: levels of image quality, body regions, scan times, and contrast enhancement. Once grouped, 'master' acquisition parameters can be defined for each master protocol. We will show how this simplifies protocol management across a diverse fleet of CT scanners. In other words, it changes a three phase abdomen CTA protocol from being thought of as composed of three unique sets of acquisition parameters into: abdomen CTA master, then 2 phases using the routine abdomen master. The second management strategy is CT protocol documentation. All parameters and instructions influencing the diagnostic utility and workflow of executing a CT order will be reviewed. This review will motivate a comprehensive definition of what constitutes a CT protocol. Example templates for efficiently documenting this information will be presented so the audience member can implement a CT protocol documentation strategy at their own institution.

RC721B Practice Optimization

Participants
Mannudeep K. Kalra, MD, Boston, MA (*Presenter*) Research Grant, Siemens AG; Research Grant, Canon Medical Systems Corporation

For information about this presentation, contact:

mkalra@mgh.harvard.edu

LEARNING OBJECTIVES

1) Problems with practice optimization for CT protocols and radiation dose. 2) Role of peronnel and processes for optimizing CT protocols and radiation dose. 3) Best practices in CT practice optimization with a 'regional-indication' based approach.

RC721C Practice Monitoring

Participants
Joshua Wilson, PhD, Durham, NC (*Presenter*) License agreement, Sun Nuclear Corporation
Ehsan Samei, PhD, Durham, NC (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG; Advisory Board, medInt Holdings, LLC; License agreement, 12 Sigma Technologies; License agreement, Gammex, Inc

For information about this presentation, contact:

joshua.wilson@duke.edu

LEARNING OBJECTIVES

1) Describe conventional radiation dose monitoring workflows and analytics. 2) Understand the limitations and future potential value of dose monitoring solutions. 3) Identify opportunities for improving clinical operations and consistency using dose monitoring.

ABSTRACT

Recent legislative and accreditation requirements have driven rapid development and implementation of radiation dose monitoring platforms. Multiple solutions are available that require financial commitment and oversight. How can institutions derive added-value, beyond minimum regulatory requirements, from their monitoring program by improving the quality of their clinical performance? Global alert thresholds, the standard in commercial products, naïve to system model and patient size have limited value. Setting a threshold presupposes a clinically-relevant level is known. For an arbitrary level, appropriately-dosed obese patients triggered false alerts, but over-dosed small patients were missed. Numerous study parameters must be retained because chronologic trends, the industry standard, are rarely useful without controlling for other moderators. Dashboards must be interactive enabling dynamic drill-down into cohorts. Dose databases require curation tools and maintenance, largely absent from all solutions, because wrong information will be inadvertently entered, and the utility of the analytics is entirely dependent on the data quality. Dose monitoring can satisfy requirements with global alert thresholds and patient dose records, but a program's real value is in optimizing patient-specific protocols, balancing image quality trade-offs that dose-reduction strategies promise, and improving the performance and consistency of a clinical operation.

RC722

Machine Learning for Radiotherapy Applications

Thursday, Nov. 29 4:30PM - 6:00PM Room: N227B

AI PH RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jayashree Kalpathy-Cramer, MS, PhD, Charlestown, MA (*Moderator*) Consultant, Infotech Software Solution

Sub-Events

RC722A Deep Learning for Image Segmentation, Analysis and Reconstruction

Participants
Jonas Teuwen, MSc,PhD, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jonas.teuwen@radboudumc.nl

LEARNING OBJECTIVES

1) Learn about the types of clinical problems which are best suited for deep learning solutions. 2) Learn about the current state-of-the-art deep learning technology in the analysis and segmentation of medical images, and learn about the advantages of reconstructing images using deep learning technology. 3) Being able to critically estimate the impact and assess the applicability of newly developed deep learning technology.

ABSTRACT

Deep learning has recently attracted much interest from the medical community, mainly due the successful application to problems which were previously considered to be purely within the human realm. The availability of an ever growing amount of medical images, and the increasing availability of affordable computation resources allows to apply deep learning technologies to many different problems. However, the scope of problems for which deep learning currently performs on par or outperforms humans is rather narrow. The required human and financial effort makes it important to be able to determine clinical problems where deep learning could bring an advantage. After this refresher course, you will be aware of the state-of-the-art in deep learning for image segmentation, analysis and reconstruction. You will be able to critically assess the impact and applicability of deep learning technology and be able to find future clinical opportunities.

RC722B Machine Learning Tumor Classification

Participants
Jayashree Kalpathy-Cramer, MS, PhD, Charlestown, MA (*Presenter*) Consultant, Infotech Software Solution

For information about this presentation, contact:

kalpathy@nmr.mgh.harvard.edu

LEARNING OBJECTIVES

1) Learn about applications of machine learning including radiomics and deep learning in classifiying tumor sub-types. 2) Learn about risk stratification using machine learning of MR and CT images. 3) Understand the challenges when applying machine learning to tumor analysis. 4) Review best practices for applying machine learning in cancer imaging.

ABSTRACT

Machine learning has shown great potential for a range of applications in oncology from diagnosis to therapy planning and response assessment. Large repositories of clinical and imaging data typicially available at most institutions can be be used to train and validate models. We will discuss the use of machine learning including radiomics and deep learning for the analysis of CT and MR imaging in a variety of cancer types for risk stratification, radiogenomics and response assessment..

RC722C Machine Learning for Automated Treatment Planning

Participants
Laurence E. Court, PhD, Houston, TX (*Presenter*) Nothing to Disclose

RC723

Diagnostic Imaging: Contrast Makes all the Difference (Interactive Session)

Thursday, Nov. 29 4:30PM - 6:00PM Room: E353B

PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Charles E. Willis, PhD, Houston, TX (*Coordinator*) Medical Advisory Board, General Electric Company

For information about this presentation, contact:

chwillis@mdanderson.org

LEARNING OBJECTIVES

1) Define "contrast" as a fundamental descriptive metric in a diagnostic image. 2) Describe how contrast is developed during image formation in different diagnostic modalities. 3) Explain how contrast can degraded by the physical characteristics of acquisition and the patient. 4) Compare methods for improving contrast including advanced imaging technologies. 5) Assess how contrast affects the human observer's ability to detect important clinical features.

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC723A Diagnostic Imaging: Contrast Makes all the Difference 1

Participants
Andrew D. Maidment, PhD, Philadelphia, PA (*Presenter*) Research support, Hologic, Inc; Research support, Barco nv; Research support, Analogic Corporation; Spouse, Employee, Real-Time Tomography, LLC; Spouse, Stockholder, Real-Time Tomography, LLC; Scientific Advisory Board, Real-Time Tomography, LLC;

For information about this presentation, contact:

Andrew.Maidment@uphs.upenn.edu

LEARNING OBJECTIVES

1) Assess how contrast affects the human observer's ability to detect important clinical features. 2) Identify sources of noise in clinical images and explain how they affect contrast. 3) List other fundamental image properties that affect contrast.

RC723B Diagnostic Imaging: Contrast Makes all the Difference 2

Participants
J. Anthony Seibert, PhD, Sacramento, CA (*Presenter*) Advisory Board, Bayer AG

LEARNING OBJECTIVES

1) Explain how contrast can degraded by the physical characteristics of acquisition and the patient. 2) List countermeasures for enhancing, restoring, or preventing the loss of contrast. 3) Compare methods for improving contrast including advanced imaging technologies.

RC723C Diagnostic Imaging: Contrast Makes all the Difference 3

Participants
Robert L. Dixon, PhD, Winston-Salem, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define "contrast" as a fundamental descriptive metric in a diagnostic image. 2) Describe how contrast is developed during image formation in different diagnostic modalities. 3) Explain how contrast can degraded by the physical characteristics of acquisition and the patient.

RC724

The Human Side of Artificial Intelligence

Thursday, Nov. 29 4:30PM - 6:00PM Room: E451B

AI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Richard B. Gunderman, MD, PhD, Indianapolis, IN (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the respects in which, to be effective, artificial intelligence must serve human needs.

Sub-Events

RC724A Will We Trust AI?

Participants
Saurabh Jha, MD, Philadelphia, PA (*Presenter*) Speakers Bureau, Canon Medical Systems Corporation

For information about this presentation, contact:

saurabh.jha@uphs.upenn.edu

LEARNING OBJECTIVES

1) Understand the epistemic controversies regarding artificial intelligence. 2) Do we attach an inordinate importance on 'how' and 'why'? 3) Appreciate the implications of the 'incompleteness theorem' in formal logic.

ABSTRACT

The incompleteness theorem, in formal logic, states that a system cannot vouch for its own validity. This begs a broader question - how will we know if AI is speaking the truth? Will we be the machine's umpire or will the machine be our umpire? The answers to these questions have profound implications for the interaction between artificial intelligence and radiology

RC724B Voices of AI: Highlighting Perspective from the Radiology AI Journal Club

Participants
Judy W. Gichoya, MBChB,MS, Portland, OR (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jgichoya@iu.edu

RC724C How AI Can Go Ethically Awry

Participants
Richard B. Gunderman, MD, PhD, Indianapolis, IN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the respects in which artificial intelligence must meet ethical as well as technical needs.

Honored Educators

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RC725

Mini-course: Radiation Safety for Patients and Staff - Practice Tools and Approaches for Radiation Safety

Thursday, Nov. 29 4:30PM - 6:00PM Room: S102CD

PH SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Madan M. Rehani, PhD, Boston, MA (*Coordinator*) Nothing to Disclose

For information about this presentation, contact:

madan.rehani@gmail.com

Sub-Events

RC725A Decision Support Systems as Effective Tools

Participants
James A. Brink, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand how imaging utilization may be guided by robust appropriate use criteria. 2) To consider the impact that effective decision support mechanisms may have on utilization management. 3) To explore how computer-assisted reporting may reduce variation in follow-up imaging recommendations consequent to clinically significant findings.

RC725B Safety in CT of Children

Participants
Donald P. Frush, MD, Durham, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

donald.frush@duke.edu

LEARNING OBJECTIVES

1) Become familiar with the unique considerations relevant to safety for pediatric CT. 2) Understand the domain of safety for pediatric CT. 3) Learn risks of pedaitric CT. 4) Be able to apply strategies for safe practice for pediatric CT.

RC725C Safety in Nuclear Medical Procedures

Participants
Andrew J. Einstein, MD, PhD, New York, NY (*Presenter*) Consultant, General Electric Company; Research Grant, Canon Medical Systems Corporation

LEARNING OBJECTIVES

1) Explain how radiation from nuclear medicine procedures is quantified. 2) Compare radiation dose from a variety of nuclear medicine tests to other imaging tests. 3) Discuss approaches to optimizing radiation dose from nuclear medicine procedures.

RC725D Safety in Interventional Fluoroscopic Procedures

Participants
Donald Miller, MD, Silver Spring, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Integrate methods for radiation protection of patients into interventional fluoroscopy procedures. 2) Employ occupational radiation protection correctly. 3) Describe the components of a quality assurance program for radiation protection for interventional fluoroscopy.

Active Handout:Donald Miller

http://abstract.rsna.org/uploads/2018/18001519/Safety in Interventional Fluoroscopic Procedures RC725D.pdf

RC727

Physician Payment Reform and Radiology: Where Do We Stand and Where Are We Going?

Thursday, Nov. 29 4:30PM - 6:00PM Room: S103CD

HP

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Andrew B. Rosenkrantz, MD, New York, NY (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To describe recent federal legislation seeking to implement healthcare payment reform by linking physician payment to the quality and value of care. 2) To recognize the specific impact of such legislation on radiologists and how radiologists can best prepare for the legislation's implementation. 3) To explore examples of how such federal policy may be applied in breast imaging, interventional radiology, and quality and safety in radiology.

ABSTRACT

Recent federal legislation aims to reform Medicare's traditional fee-for-service approach through new payment models that will eventually base the large majority of physician payments on quality and value. Of note, the Medicare Access and CHIP Reauthorization Act (MACRA) of 2015 implements a new federal Quality Payment Program (QPP) through which physicians will be paid through Advanced Alternative Payment Models or the Merit-Based Incentive Payment System (MIPS). The QPP will result in physicians being subject to potentially substantial payment bonuses or penalties depending on their performance in new physician-focused evaluation systems. The QPP will grant special considerations in performance evaluation to physicians with unique practice patterns, such as radiologists. However, physicians will need to have a robust understanding of the legislation and prepare accordingly in order to achieve favorable outcomes. This session will provide background of recent federal physician payment reform as relevant to radiology and also actions that radiology practices should pursue, both generally and in specific contexts within radiology, to ultimately attain success in the new system.

Sub-Events

RC727A Quality and Safety: A Policy Perspective

Participants
Kimberly E. Applegate, MD, MS, Lexington, KY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

keapple@uky.edu

LEARNING OBJECTIVES

1) Introduce the participant to pertinent health policy language essential for understanding the Medicare Access and CHIP Reathorization Act of 2015 (MACRA). 2) Briefly review 3 broad clincian value based payment models outlined within MACRA: Merits-based Incentive Payment System (MIPS), Advanced Alternative Payment Models (AAPM), and Physician-focused Payment Models (MIPS). 3) Dive deeper into MIPS exploring the requirements for each of the 4 performance categories (Quality, Cost, Advancing Care Information, Improvement Activities) as they apply to the 2018 performance year.

RC727B The Need for Price Transparency in Radiology and How to Achieve It

Participants
David C. Levin, MD, Philadelphia, PA (*Presenter*) Consultant, HealthHelp, LLC; Board Member, Outpatient Imaging Affiliates, LLC

For information about this presentation, contact:

david.levin@jefferson.edu

LEARNING OBJECTIVES

1) Become aware of the misinformation that is often found at web sites purporting to help patients know what their imaging tests will cost. 2) Learn about possible ways to provide more accurate information to patients with high deductible health plans about what the true costs will be for their imaging exams.

RC727C MACRA and the MIPS: Impact for Radiology

Participants
Gregory N. Nicola, MD, River Edge, NJ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To be familiar with the radiology quality and safety metrics on the cms.gov compare site. 2) To explain some of the organizational resources available to the radiologist to measure and report quality and process improvement. 3) To explore how quality in radiology will be measured under emerging physician performance evaluation models.

RC727D Breast Screening Bundled Payments

Participants
Geraldine B. McGinty, MD,MBA, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

gbm9002@med.cornell.edu

LEARNING OBJECTIVES

1) Describe how bundled payments are created and how they are believed to impact health outcomes. 2) Describe how bundled payments have impacted imaging reimbursement. 3) Describe a potential model for a bundled payment for breast screening.

RC729

Pancreaticobiliary MR Imaging (Interactive Session)

Thursday, Nov. 29 4:30PM - 6:00PM Room: S404CD

GI MR OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Hero K. Hussain, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

Sub-Events

RC729A The Incidentally Detected Cystic Pancreatic Lesion: What to Do Next

Participants
Ihab R. Kamel, MD, PhD, Baltimore, MD (*Presenter*) Research Grant, Siemens AG

For information about this presentation, contact:

ikamel@jhmi.edu

LEARNING OBJECTIVES

1) Discuss the differential diagnosis of cystic pancreatic neoplasm. 2) Describe the role of MRI/MRCP in the diagnosis of these lesions. 3) Review the various guidelines for the follow up of cystic pancreatic lesions.

Honored Educators

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RC729B The Dilemma of Autoimmune Pancreatitis

Participants
Ashish R. Khandelwal, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

khandelwal.ashish@mayo.edu

LEARNING OBJECTIVES

1) Understand the current diagnostic criteria and subtypes of autoimmune pancreatitis (AIP). 2) Recognize the characteristic imaging manifestations of AIP. 3) Differentiate AIP from pancreatic cancer. 4) Attendees will know common complications and expected post-treatment appearance of AIP on imaging.

RC729C MRI Staging and Treatment Planning of Extrahepatic Cholangiocarcinoma

Participants
Peter S. Liu, MD, Solon, OH (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

liup3@ccf.org

LEARNING OBJECTIVES

1) Identify the various morphologic classifications of cholangiocarcinoma. 2) Describe modern MR techniques used to assess hilar cholangiocarcinoma. 3) Explain relevant anatomic relationships for potential hilar cholangiocarcinoma resection, including vascular and biliary involvement. 4) Discuss key features of modern cholangiocarcinoma staging systems and their imaging manifestations.

RC729D MRI for Staging and Assessment of Response of Pancreatic Cancer to Therapy

Participants
Marc Zins, MD, Paris Cedex 14, France (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mzins@hpsj.fr

LEARNING OBJECTIVES

1) To define the role of MRI in the staging of pancreatic ductal adenocarcinoma (PDA). 2) To specify the respective advantages and limitations of MRI and CT for PDA staging and to explain when one technique is more applicable and when the two modalities

should be associated. 3) To describe the basic principles and standards of imaging evaluation after neoadjuvant therapy of PDA and to identify the remaining limitations in that setting.

RC731

Image-guided Biopsy of the Spine (Hands-on)

Thursday, Nov. 29 4:30PM - 6:00PM Room: E263

MK NR IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
John L. Go, MD, Los Angeles, CA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss and demonstrate spine biopsy techniques including CT and fluoroscopic approaches, anatomic landmarks, needle selection, special technical considerations for dealing with soft tissue masses, and fluid accumulations, lytic and blastic lesions, and hypervascular conditions. 2) Hands on exposure will be provided in order to familiarize participants with the vast number of biopsy devices that are clinically available. 3) Training models will also be used in order to teach technical skills with respect to approach and technique. 4) Advantages and disadvantages of various biopsy devices and techniques, and improve their understanding of how to maximize the reliability and safety of these spine biopsy procedures.

Sub-Events

RC731A Pre- and Post Biopsy Assessment

Participants
Richard Silbergleit, MD, Royal Oak, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be familiar with all required aspects of the pre-biopsy work-up, including medications, laboratory values, and review of relevant prior imaging. 2) Be familiar with solutions to address complications or other unexpected events which may arise during the course of spine biopsy. 3) Be comfortable in performing the post procedure assessment of the patient after spinal biopsy.

RC731B Equipment Used for Image-guided Biopsies of the Spine

Participants
Michele H. Johnson, MD, New Haven, CT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Demonstrate the types of needles used for spine biopsy. 2) Selecting the proper types of needles used for spine biopsy. 3) Case demonstration of the proper use of single or coaxial needle sets for spine biopsy and the advantages or disadvantages of each.

RC731C Thoracic and Lumbar Biopsies

Participants
John L. Go, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the anatomy of the thoracic and lumbar spine relevant to spine biopsy. 2) Describe the approaches used to approach various anatomical regions within the thoracic and lumbar spine. 3) Provide case examples of various approaches used to biopsy the thoracic and lumbar spine.

RC731D Cervical Spine Biopsies

Participants
A. Orlando Ortiz, MD, MBA, Mineola, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Demonstrate the various approaches used to biopsy lesions of the cervical spine. 2) Determine the selection of the proper needles to use to biopsy the spine. 3) Provide case examples of cervical biopsies and the thought process used to perform these procedures.

ABSTRACT

Cervical spine biopsies can be challenging procedures to perform, hence they tend to be performed by a limited number of proceduralists. C-spine biopsy is often performed to evaluate potential neoplastic or infectious processes of the cervical spine. The key to performing these procedures effectively and safely is in appropriate patient selection, careful image analysis in order to properly position the patient and choose an approach, identification of critical structures (such as the carotid artery) and neck spaces that should be avoided, and use of coaxial biopsy techniques. The procedure can be safely performed with CT and/or CT fluoroscopy. Specimen sampling principles and specimen handling are also discussed they can help to optimize this procedure.

RC731E Disc Biopsy and Aspiration

Participants
Amish H. Doshi, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

amish.doshi@mountsinai.org

LEARNING OBJECTIVES

1) To reveiw the indications for spinal biopsies in the setting of discitis and osteomyelitis of the spine. 2) The various techniques and imaging modalities for these biopsies will be reviewed. 3) Sample collection and analysis as well as typical diagnostic yield will also be reviewed.

ABSTRACT

The lecture will focus on the indications for imaging guided biopsy in the setting of discitis/osteomyelitis and describe a variety of CT and Fluoroscopic guided techniques in obtaining aspirate and tissue sample. Additionally, the lecture will review of the various types of needles used in the procedures and in what setting specific needles should be used. A brief review of current literature on yield of imaging guided biopsy will also be discussed.

RC732

Physician Leadership Through Change

Thursday, Nov. 29 4:30PM - 6:00PM Room: E261

LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
John T. Wald, MD, Rochester, MN (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

wald.john2@mayo.edu

LEARNING OBJECTIVES

1) Develop a physician leadership skillset to gain influence and organizational support during change in your organization. 2) Gain a better understanding of dos and don'ts of physician leadership. 3) Define key physician leadership traits that allow physicians to position their organizations for success. 4) Discuss the Mayo Clinic model of physician/administrator leadership and its role in leading through change. 5) Determine appropriate and practical strategies to manage change in your organization.

Sub-Events

RC732A Physician Leadership Through Change

Participants
John T. Wald, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

wald.john2@mayo.edu

LEARNING OBJECTIVES

1) Develop a physician leadership skilllset to gain influence and organizational support during change in your organization. 2) Gain a better understanding of the 'dos and don'ts' of physician leadership. 3) Define key physician leadership traits that allow physicians to position organizations for success. 4) Discuss the Mayo Clinic model of physician/administrator leadership and its role in leading through change. 5) Determine appropriate and practical strategies to manage change in your organization.

RC732B Innovation Drives Change: Leading Your Organization Through a Successful Transformation

Participants
Amy L. Kotsenas, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kotsenas.amy@mayo.edu

LEARNING OBJECTIVES

1) Develop a physician leadership skillset to gain influence and organizational support during change in your organization. 2) Gain a better understanding of dos and donts of physician leadership. 3) Determine appropriate and practical strategies to manage change in your organization.

RC732C Leadings Teams to Face Challenges

Participants
Leonardo Vedolin, MD, PhD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

leonardo,vedolin@dasa.com.br

LEARNING OBJECTIVES

1) Review data, failures and learning points in chance management from a large healthcare provider. 2) Understand change management, strategy and leadership interaction and how these issues affect the leader's role. 3) Identify leadership skill sets to drive organization to success.

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RC750

MR Imaging-guided Breast Biopsy (Hands-on)

Thursday, Nov. 29 4:30PM - 6:00PM Room: E260

BR MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Amy L. Kerger, DO, Columbus, OH (*Presenter*) Nothing to Disclose
Rifat A. Wahab, DO, Cincinnati, OH (*Presenter*) Nothing to Disclose
Vandana M. Dialani, MD, Boston, MA (*Presenter*) Nothing to Disclose
Deepa Sheth, MD, Chicago, IL (*Presenter*) Research Grant, Guerbet SA
Lara D. Richmond, MD, Toronto, ON (*Presenter*) Nothing to Disclose
Gary J. Whitman, MD, Houston, TX (*Presenter*) Nothing to Disclose
Kirti M. Kulkarni, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Jill J. Schieda, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Brandy Griffith, DO, Columbus, OH (*Presenter*) Nothing to Disclose
Amado B. del Rosario, DO, Tucson, AZ (*Presenter*) Nothing to Disclose
Karla A. Sepulveda, MD, Houston, TX (*Presenter*) Nothing to Disclose
Wendi A. Owen, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Laurie R. Margolies, MD, New York, NY (*Presenter*) Research Consultant, FUJIFILM Holdings Corporation
Mitra Noroozian, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Jeffrey R. Hawley, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Nikki S. Ariaratnam, MD, Voorhees, NJ (*Presenter*) Nothing to Disclose
Su-Ju Lee, MD, Cincinnati, OH (*Presenter*) Spouse, Stockholder, General Electric Company; Spouse, Stockholder, Siemens AG
Mai A. Elezaby, MD, Madison, WI (*Presenter*) Research Grant, Exact Sciences Corporation
Anika N. Watson, MD, New York, NY (*Presenter*) Nothing to Disclose
Alena Levit, MD, Rochester, NY (*Presenter*) Nothing to Disclose
Esther N. Udoji, MD, Birmingham, AL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Brandy.Griffith@osumc.edu

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Jeffrey.hawley@osumc.edu

dsheth@radiology.bsd.uchicago.edu

NinaWatson@emory.edu

LEARNING OBJECTIVES

1) Explain why MR-guided breast biopsy is needed for patient care. 2) Identify relative and absolute contraindications to MR-guided breast biopsy. 3) Describe criteria for MR-guided breast biopsy patient selection. 4) Debate risks and benefits of pre-biopsy targeted ultrasound for suspicious MRI findings. 5) Understand the basic MR-guided biopsy procedure, protocol and requirements for appropriate coil, needle and approach selection. 6) Manage patients before, during and after MR-guided breast biopsy. 7) Define the benefits and limitations of MR-guided vacuum assisted breast biopsy. 8) How to problem shoot complicated cases due to lesion location, patient anatomy, etc.

ABSTRACT

This course is intended to provide basic didactic instruction and hands-on experience for MR-guided breast biopsy. Because of the established role of breast MRI in the evaluation of breast cancer through screening and staging, there is a proven need for MR-guided biopsy of the abnormalities that can only be identified at MRI. This course will be devoted to the understanding and identification of: 1) appropriate patient selection 2) optimal positioning for biopsy 3) target selection and confirmation 4) various biopsy technologies and techniques 5) potential problems and pitfalls and 6) practice audits. Participants will spend 30 minutes in didactic instruction followed by 60 minutes practicing MR-guided biopsy using provided phantoms. Various combinations of full size state-of-the-art breast MRI coils, biopsy localization equipment and needles from multiple different vendors will be available for hands-on practice. Some stations will have monitors loaded with targeting software. Expert breast imagers from around the world will be at each of 10 stations to provide live coaching, tips, techniques and advice.

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RC752

US-guided Interventional Breast Procedures (Hands-on)

Thursday, Nov. 29 4:30PM - 6:00PM Room: E264

BR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Karen S. Johnson, MD, Durham, NC (*Presenter*) Nothing to Disclose
Jocelyn A. Rapelyea, MD, Washington, DC (*Presenter*) Speakers Bureau, General Electric Company; Consultant, Transmed7;
Anita K. Mehta, MD, MSc, Washington DC, DC (*Presenter*) Nothing to Disclose
Kathleen R. Gundry, MD, Atlanta, GA (*Presenter*) Nothing to Disclose
Michael N. Linver, MD, Albuquerque, NM (*Presenter*) Medical Advisory Board, Solis; Scientific Advisory Board, Real Imaging Ltd; Scientific Advisory Board, Seno Medical Instruments, Inc
Tilden L. Childs III, MD, Fort Worth, TX (*Presenter*) Nothing to Disclose
Evguenia J. Karimova, MD, Memphis, TN (*Presenter*) Nothing to Disclose
Caroline M. Ling, MD, Darby, PA (*Presenter*) Nothing to Disclose
Sora C. Yoon, MD, Durham, NC (*Presenter*) Nothing to Disclose
Connie E. Kim, MD, Durham, NC (*Presenter*) Spouse, Consultant, ClarVista Medical, Inc Spouse, Royalties, Leica Biosystems Nussloch GmbH Spouse, Intellectual property, Leica Biosystems Nussloch GmbH
Mary S. Soo, MD, Durham, NC (*Presenter*) Nothing to Disclose
Christina G. Marks, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Margaret M. Szabunio, MD, Lexington, KY (*Presenter*) Nothing to Disclose
Jean M. Kunjummen, DO, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

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mary.soo@duke.edu

jrapelyea@mfa.gwu.edu

margaret.szabunio@uky.edu

LEARNING OBJECTIVES

1) Describe the equipment needed for ultrasound guided interventional breast procedures. 2) Review the basic principles of ultrasound guidance and performance of minimally invasive breast procedures. 3) Practice hands-on technique for ultrasound guided breast interventional procedures.

ABSTRACT

This course is intended to familiarize the participant with equipment and techniques in the application of US guided breast biopsy and needle localization. Participants will have both basic didactic instruction and hands-on opportunity to practice biopsy techniques on tissue models with sonographic guidance. The course will focus on the understanding and identification of: 1) optimal positioning for biopsy 2) imaging of adequate sampling confirmation 3) various biopsy technologies and techniques 4) potential problems and pitfalls

RC753

Platforms and Infrastructures for Accelerated Discoveries in Machine Learning and Radiomics

Thursday, Nov. 29 4:30PM - 6:00PM Room: E451A

AI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Katherine P. Andriole, PhD, Dedham, MA (*Moderator*) Research Grant, NVIDIA Corporation; Research Grant, General Electric Company; Research Grant, Nuance Communications, Inc; Advisory Board, McKinsey & Company, Inc

For information about this presentation, contact:

kandriole@bwh.harvard.edu

LEARNING OBJECTIVES

1) Understand the challenges involved in creating machine learning and radiomics experiments with standard clinical systems. 2) Review some of the tools that can bridge the gap between existing clinical systems and translational research in medical imaging. 3) Provide use case examples using open source tools.

ABSTRACT

Machine Learning and Radiomics promise to revolutionize the field of Radiology by allowing more quantification of medical images exposing previously "hidden" information within the imaging data. More recently, the combination machine learning techniques such as deep learning with radiomics, open new opportunities for researchers in this space. However, standard clinical systems are not suited for machine learning and radiomics experiments posing a significant challange for individuals together started. The pupose of this session is to review existing and custom developed infrastructures and platforms to bridge this gap.

Sub-Events

RC753A Overview of the R&D Process Pipeline for Machine Learning in Radiology

Participants
Mark H. Michalski, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand clinical data integration standards available to enable translational research in machine learning. 2) Gain introductory knowledge on enterprise data warehouses and understand how they can be used to augment machine learning systems. 3) Understand complexities associated with handling sensitive patient data.

RC753B Infrastructure and Software Platforms for Model Development, Training, Validation, and Clinical Integration

Participants
Neil Tenenholtz, PhD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ntenenholtz@partners.org

LEARNING OBJECTIVES

1) Identify cohorts for model development leveraging radiology reports and imaging metadata. 2) Rapidly annotate reports and imaging data on which machine learning models can be trained. 3) Build a pipeline for acquiring imaging data from a PACS for model development. 4) Train machine learning models on imaging data. 5) Validate machine learning models in the clinical workflow.

RC753C Machine Learning and Radiomics in Practice: Tools and Case Example

Participants
Daniel L. Rubin, MD, MS, Stanford, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

daniel.l.rubin@stanford.edu

LEARNING OBJECTIVES

1) To understand the role of image annotations in capuring essential information about images in radiomics. 2) To learn about tools, platforms, infrastructures, standards, and machine learning methods that can leverage medical images to better understand disease and enable decision support. 3) To see example use cases of radiomics and machine learning methods for accelerating research and improving clinical practice.

Honored Educators

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RC754

Value-based Imaging in the Accountable Care Organization Model

Thursday, Nov. 29 4:30PM - 6:00PM Room: N230B

HP IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
James Whitfill, MD, Scottsdale, AZ (*Moderator*) President, Lumetis LLC
James Whitfill, MD, Scottsdale, AZ (*Presenter*) President, Lumetis LLC
Rodney S. Owen, MD, Scottsdale, AZ (*Presenter*) Nothing to Disclose
Gary H. Dent, MD, Macon, GA (*Presenter*) Officer, Radius, LLC; Stockholder, Radius, LLC;

For information about this presentation, contact:

Dent_gh@mercer.edu

rowen@esmil.com

LEARNING OBJECTIVES

1) Review the forces at work which are pushing the US Healthcare system to adopt value based care models. 2) Learn the mechanisms currently used to contract for value based care contracts. 3) Learn how imaging and radiology currently relate to new value based care models. 4) Hear from radiologists who are active leaders in value based models in their community.

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RCA55

3D Printing Hands-on with Open Source Software Introduction (Hands-on)

Thursday, Nov. 29 4:30PM - 6:00PM Room: S401AB

IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Beth A. Ripley, MD, PhD, Seattle, WA (*Presenter*) Nothing to Disclose
Tatiana Kelil, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Michael W. Itagaki, MD, MBA, Lynnwood, WA (*Presenter*) Stockholder, Embodi3D, LLC
Anish Ghodadra, MD, New Haven, CT (*Presenter*) Advisory Board, axial3D Limited
Dmitry Levin, Seattle, WA (*Presenter*) Nothing to Disclose
Steve D. Pieper, PhD, Cambridge, MA (*Presenter*) CEO, Isomics, Inc ; Employee, Isomics, Inc ; Owner, Isomics, Inc ; Research collaboration, Siemens AG ; Research collaboration, Novartis AG; Consultant, MeBio ; Research collaboration, Boston Scientific Corporation; Consultant, Boston Scientific Corporation

For information about this presentation, contact:

beth.ripley2@va.gov

LEARNING OBJECTIVES

1) To learn about basic 3D printing technologies and file formats used in 3D printing. 2) To learn how to segment a medical imaging scan with free and open-source software and export that anatomy of interest into a digital 3D printable model. 3) To perform basic customizations to the digital 3D printable model with smoothing, text, cuts, and sculpting prior to physical creation with a 3D printer.

ABSTRACT

'3D printing' refers to fabrication of a physical object from a digital file with layer-by-layer deposition instead of conventional machining, and allows for creation of complex geometries, including anatomical objects derived from medical scans. 3D printing is increasingly used in medicine for surgical planning, education, and device testing. The purpose of this hands-on course is to teach the learner to convert a standard Digital Imaging and Communications in Medicine (DICOM) data set from a medical scan into a physical 3D printed model through a series of simple steps using free and open-source software. Basic methods of 3D printing will be reviewed. Initial steps include viewing and segmenting the imaging scan with 3D Slicer, an open-source software package. The anatomy will then be exported into stereolithography (STL) file format, the standard engineering format that 3D printers use. Then, further editing and manipulation such as smoothing, cutting, and applying text will be demonstrated using MeshMixer and Blender, both free software programs. Methods described will work with Windows, Macintosh, and Linux computers. The learner will be given access to comprehensive resources for self-study before and after the meeting, including an extensive training manual and online video tutorials.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Tatiana Kelil, MD - 2017 Honored Educator

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RCB55

Transpositions of the Great Arteries in Your Hands (Hands-on)

Thursday, Nov. 29 4:30PM - 6:00PM Room: S401CD

CA IN VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Shi-Joon Yoo, MD, Toronto, ON (*Presenter*) Owner, 3D HOPE Medical; CEO, IMIB-CHD; Spouse, CEO, 3D PrintHeart;
Cynthia K. Rigsby, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Rajesh Krishnamurthy, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Whal Lee, MD, PhD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hyun Woo Goo, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Andreas Giannopoulos, MD, Zurich, Switzerland (*Presenter*) Nothing to Disclose
Lorna Browne, MD, FRCR, Aurora, CO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

shi-joon.yoo@sickkids.ca

crigsby@luriechildrens.org

LEARNING OBJECTIVES

1) Understand the classic and complicated morphology of complete and congenitally corrected transposition in terms of relationship and connections among cardiac chambers and great arterial trunks and coronary arterial anatomy. 2) Learn the choices of surgical procedures for classic and complicated forms of transpositions. 3) Learn how to visualize the surgically important features of transpositions at CT and MR. 4) Correlate findings at 3D print models with imaging findings.

ABSTRACT

Complete and congenitally corrected transpositions of the great arteries are not uncommon congenital heart diseases that require surgical repair early or later in life. The surgical options and procedures vary according to the given intracardiac, extracardiac and coronary arterial anatomy. This hands-on congenital heart morphology session will provide the audience with an opportunity to learn the basic and complicated morphology of the two forms of transposition of the great arteries with special emphasis on surgical anatomy. The session will consist of 25-minute introductory lecture, 40-minute hands-on observation and 25-minute discussion and evaluation. Experts on congenital heart disease pathology will be available for guidance and answering questions throughout the session.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Rajesh Krishnamurthy, MD - 2017 Honored Educator

RCC55

Patient-Centric Radiology

Thursday, Nov. 29 4:30PM - 6:00PM Room: S501ABC

IN LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Olga R. Brook, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

obrook@bidmc.harvard.edu

LEARNING OBJECTIVES

1) To learn about strategies and initiatives for patient-centric radiology.

Sub-Events

RCC55A Leveraging Informatics Tools to Improve Patient Experience

Participants
Safwan Halabi, MD, Stanford, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

safwan.halabi@stanford.edu

LEARNING OBJECTIVES

1) Identify tools that can improve patient experience and satisfaction. 2) Discuss communication platforms including social media that can improve patient experience and satisfaction. 3) Discuss strengths, opportunities, weaknesses and threats to the physician-patient relationship.

ABSTRACT

As the health care industry moves towards value-based care, patient experience remains an untapped opportunity for increasing quality and value in patient care. Focusing on patient experience in imaging, a high volume area of health care, is critical to the success of a medical imaging group and healthcare system. One way of bridging the quality and value gap is to leverage digital tools that can help connect imaging experts to their referring providers and patients.

RCC55B Personal Health Portals: What Do Our Patients Want?

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (*Presenter*) Royalties, Osler Institute

For information about this presentation, contact:

tessa.cook@uphs.upenn.edu

LEARNING OBJECTIVES

1) Describe the features that patients desire from their health portals and how those pertain to radiology examinations and results.

RCC55C Direct Patient Access to Radiologists: A Patient's Perspective

Participants
Dana Habers, MPH, Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dhabers@umich.edu

LEARNING OBJECTIVES

1) Review a patient's perspective on direct access to the Radiologist & Radiology Reports. 2) Assess the impact of technology and patient portals on direct interaction between the Radiologist and patient. 3) Discuss whether this insight may modify practice style or systems in place in your own practice.

ABSTRACT

The interaction between patients and Radiologists is changing - as patients improve awareness of their conditions through online references, connect with others who have the same diagnosis through social media and other networking tools, or gain direct access to their own health records through online patient portals, the expectations of the level of interaction patients expect from their providers, Radiologists included, is evolving. In this session we will explore the patient's perspective - peeling apart patient

stories that lead us through the challenges and questions that arise from this phenomenon. We will explore it from both angles - the patient and the Radiologist - and land on a list of potential considerations for your own practice.

RCC55D Radiologists' Experience with Patient Interactions in the Era of Open Access of Patients to Radiology Reports

Participants
Olga R. Brook, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

obrook@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Learn from a large tertiary center experience where radiology reports are available for patients review during last 15 years.

ABSTRACT

Most respondents (78.7% [74 of 94]) found interactions with patients to be a satisfying experience. More than half of radiologists (54.3% [51 of 94]) desired more opportunities for patient interaction, with no significant difference in the proportion of staff and trainee radiologists who desired more patient interaction (56.9% [29 of 51] versus 51.2% [22 of 43], P = .58). Only 4.2% of radiologists (4 of 94) found patient interactions to be detrimental to normal workflow, with 19.1% of radiologists (18 of 94) reporting having to spend more than 15 min per patient interaction.

RCC55E Disclosing Medical Errors to the Patients: How to Do It

Participants
Stephen D. Brown, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

stephen.brown@childrens.harvard.edu

LEARNING OBJECTIVES

1) Explain basic principles of talking to patients directly about errors. 2) Appraise how approaches to the conversation may vary according to circumstances.

ABSTRACT

Talking to patients openly and honestly about errors is among the most difficult, stressful and high-stakes conversations in medicine. Quality and safety experts, bioethicists, and risk managers increasingly agree that it is "the right thing to do." However, most radiologists (like most physicians) lack training in how to proceed when these conversations are necessary. Such conversations are thankfully rare, but this only compounds the difficulty in approaching them when the need arises. This session will consider some practical aspects and basic principles of talking to patients about errors in imaging and reporting. It will consider a spectrum of cases in which discussion with patients about errors may be appropriate and/or necessary, and offer suggestions on how to proceed.

RCC55F Cultural Responsivity: Caring for Diverse, Marginalized, and Vulnerable Patients in Radiology

Participants
Hannah Perry, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand which patient groups may be considered diverse, marginalized, and vulnerable. 2) Gain familiarity with the spectrum of knowledge necessary to provide respectful and effective care to diverse, marginalized, and vulnerable patient populations.

RC802

Education Outcomes Research

Friday, Nov. 30 8:30AM - 10:00AM Room: E261

ED RS

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Pina C. Sanelli, MD, Manhasset, NY (*Moderator*) Research funded, Siemens AG;

Sub-Events

RC802A Education Outcomes Research: What Is It and How to Get Started

Participants
Pina C. Sanelli, MD, Manhasset, NY (*Presenter*) Research funded, Siemens AG;

LEARNING OBJECTIVES

1) Understand the components of education outcomes research. 2) Describe common methodology employed in education based research. 3) Maximize mentoring relationships from a mentor and mentee persepctive.

ABSTRACT

The learner will achieve the following objectives: 1. Understand the components of education outcomes research. 2. Describe common methodology employed in education based research. 3. Maximize mentoring relationships from a mentor and mentee persepctive.

RC802B Education Outcomes Research: Methods

Participants
Aine M. Kelly, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ainemariekelly@hotmail.com

LEARNING OBJECTIVES

1) Describe the scope of educational outcomes research. 2) Appraise published educational outcomes research. 3) Identify the most appropriate educational research method to answer your research question. 4) Define meaningful educational research outcomes.

Active Handout:Aine Marie Kelly

http://abstract.rsna.org/uploads/2018/18001091/Educational Outcomes Research Methods RC802B.pdf

RC802C Mentoring from the Mentor Point-of-View

Participants
Christopher M. Straus, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cstraus@uchicago.edu

LEARNING OBJECTIVES

1) The participant will be able to assemble and specify key elements pertaining to a high quality successful mentor. 2) Describe the characteristics of the current learner and what creates a successful mentor experience. 3) Mentors will be able to differentiate which of their skill set are pertinent in current educational forums.

RC802D Mentoring from the Mentee Point-of-View

Participants
Jordana Phillips, MD, Boston, MA (*Presenter*) Research Grant, General Electric Company; Consultant, General Electric Company

For information about this presentation, contact:

jphilli2@bidmc.harvard.edue

LEARNING OBJECTIVES

1) Define what is research. 2) Review different types of research projects. 3) Explore factors to consider when choosing a research project. 4) Emphasize the value of high-quality mentorship. 5) Identify opportunities to advance as a clinical researcher.

RC803

MR Imaging in the Thorax

Friday, Nov. 30 8:30AM - 10:00AM Room: E353C

CA CH MR VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Sub-Events

RC803A MR Imaging of Mediastinal Masses

Participants
Jeanne B. Ackman, MD, Boston, MA (*Presenter*) Spouse, Stockholder, Everest Digital Medicine; Spouse, Consultant, Everest Digital Medicine; Spouse, Stockholder, Cynvenio Biosystems, Inc; Spouse, Scientific Advisory Board, Cynvenio Biosystems, Inc; Spouse, Consultant, PAREXEL International Corporation

LEARNING OBJECTIVES

1) Comprehend value of Thoracic MRI as a problem solver in the mediastinum 2) Understand how MR assists with tissue diagnosis 3) Learn how MR can add diagnostic specificity beyond that of CT

RC803B MR Imaging of the Lung: A Practical Clinical Approach

Participants
Juergen Biederer, MD, Heidelberg, Germany (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

biederer@radiologie-darmstadt.de

LEARNING OBJECTIVES

1) To give an overview over appropriate indications for lung MRI. 2) To suggest a practical approach for the selection of suitable standard imaging protocols. 3) To discuss, how to adjust the standard examination for specific questions. 4) To make familiar with general aspects of lung MR image interpretation and the diagnostic scope of the technique.

Active Handout:Juergen Biederer

http://abstract.rsna.org/uploads/2018/18001065/2018.11.30 MRI of the Lung HandoutRC803B.pdf

RC803C MR Imaging of Cardiac Masses

Participants
Phillip M. Young, MD, Rochester, MN (*Presenter*) Consultant, Arterys Inc

For information about this presentation, contact:

young.phillip@mayo.edu

RC803D MR Imaging of Aortopathies

Participants
Cristina Fuss, MD, Portland, OR (*Presenter*) Spouse, Officer, ViewRay, Inc

For information about this presentation, contact:

fussc@ohsu.edu

LEARNING OBJECTIVES

1) To familiarize the learner with the most common familiar aortopathies, their clinical background, imaging appearance on MRI and specific considerations for MR acquisition planning.

ABSTRACT

Familial aortopahties comprise a grounp of inherited disorders of aortic aneurysms and/or dissection including. These include Thoracic Aortic Aneurysms and Aortic Dissections (TAAD), Marfan syndrome, Loeys-Dietz syndrome, and Ehlers-Danlos syndrome, only to name the most common ones.

RSNA 2018 TOMORROW'S RADIOLOGY TODAY
104th Scientific Assembly and Annual Meeting
November 25–30 | McCormick Place, Chicago

RC804

Ligamentous Injuries of the Knee: Mechanistic Approach with Emphasis on MR Imaging

Friday, Nov. 30 8:30AM - 10:00AM Room: E451A

MR MK

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Brady K. Huang, MD, San Diego, CA (*Director*) Nothing to Disclose
Tetyana A. Gorbachova, MD, Huntingdon Vy, PA (*Presenter*) Nothing to Disclose
Robert D. Boutin, MD, Davis, CA (*Presenter*) Nothing to Disclose
Brady K. Huang, MD, San Diego, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

llenchik@wakehealth.edu

LEARNING OBJECTIVES

1) To delineate the MR imaging features typical of a variety of ligamentous injuries of the knee. 2) To illustrate how MR imaging findings, including those related to abnormalities in the subchondral bone of the femur, tibia, and/or patella, provide critical clues to the specific mechanism involved in these ligamentous injuries. 3) To define the characteristic MR imaging features associated with translational, angular, and rotational mechanisms that lead to injury of the anterior and posterior cruciate ligaments and the medial and lateral supporting structures of the knee.

ABSTRACT

This course will emphasize a mechanistic approach to ligamentous injuries of the knee, emphasizing MR imaging. Individual speakers will use this approach in their discussions of such injuries with attention focused on the anterior cruciate and posterior cruciate ligaments and the medial and lateral supporting structures. The importance of the distribution and pattern of bone injury, especially that in the subchondral region of the femur, tibia, and/or patella, will be illustrated with analysis of hyperextension, hyperflexion, and translational, angular, and rotational injuries, among others.

Active Handout:Brady Kirk Huang

http://abstract.rsna.org/uploads/2018/17000347/RC804.FRIDAY.HUANG.ACL RC804.pdf

RC805

Getting Through the Tough Spots in Neuro: Head & Neck (Interactive Session)

Friday, Nov. 30 8:30AM - 10:00AM Room: E450B

HN NR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Deborah R. Shatzkes, MD, New York, NY (*Moderator*) Nothing to Disclose
Christopher P. Hess, MD, PhD, Mill Valley, CA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

shatzkes@hotmail.com

Sub-Events

RC805A Jugular Foramen

Participants
Mark D. Mamlouk, MD, Santa Clara, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mark.d.mamlouk@kp.org

LEARNING OBJECTIVES

1) Identify jugular foramen anatomy and help identify important landmarks. 2) Differentiate various lesions and mimics that can occur within the jugular foramen. 3) Recognize key features to include in the radiology report to aid surgical planning.

RC805B Orbital Apex

Participants
Stephen F. Kralik, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the normal anatomic structures that constitute the orbital apex and their relationships to adjacent spaces. 2) Determine the most appropriate imaging techniques for the evaluation of orbital apex pathology. 3) Develop an appropriate imaging differential diagnosis for orbital apex pathology.

RC805C Cavernous Sinus

Participants
Reza Forghani, MD,PhD, Cote-saint-Luc, QC (*Presenter*) Stockholder, Real-Time Medical, Inc; Founder, 4 Intel Inc; Stockholder, 4 Intel Inc; Consultant, General Electric Company; Speaker, General Electric Company

For information about this presentation, contact:

reza.forghani@mcgill.ca

LEARNING OBJECTIVES

1) Identify the normal anatomic structures that constitute the cavernous sinus and their relationship to adjacent spaces. 2) Apply the most appropriate imaging exam for the evaluation of the cavernous sinus. 3) Develop an approach for diagnostic evaluation of cavernous sinus pathology. 4) Assess and differentiate different pathologic entities affecting the cavernous sinus.

RC805D Pterygopalatine Fossa

Participants
Bruno A. Policeni, MD, Iowa City, IA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bruno-policeni@uiowa.edu

LEARNING OBJECTIVES

1) Identify the normal anatomic landmarks in the Pterygopalatine Fossa and relationships to adjacent spaces. 2) Review the most appropriate imaging techniques for the evaluation of the Pterygopalatine Fossa pathology. 3) Develop an appropriate differential diagnosis for Pterygopalatine Fossa lesions.

RC811

Review of Pediatric Nuclear Medicine

Friday, Nov. 30 8:30AM - 10:00AM Room: E263

GI GU MK NM PD

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

LEARNING OBJECTIVES

1) Review of Pediatric Nuclear medicine, particularly for radiologists and nuclear medicine physicians who may not specialize in pediatric patients, and for resident and fellow trainees.

Sub-Events

RC811A Pediatric Gastrointestinal

Participants
Helen R. Nadel, MD, Palo Alto, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hnadel@stanford.edu

LEARNING OBJECTIVES

1) Be able to list indications for GI scintigraphy in children. 2) Be able to describe scintigraphic patterns of disease on GI examinations in children.

RC811B Pediatric Genitourinary

Participants
Neha S. Kwatra, MBBS, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe pediatric renal diseases highlighting the complementary role of scintigraphy and other imaging modalities. 2) Explain pediatric-specific imaging considerations. 3) Identify important normal variants/pitfalls in interpretation.

RC811C Pediatric Musculoskeletal

Participants
Susan E. Sharp, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

susan.sharp@cchmc.org

LEARNING OBJECTIVES

1) Be able to describe the utilization and performance of nuclear medicine imaging for musculoskeletal indications in pediatric patients. 2) Be able to identify musculoskeletal findings on Tc-99m-MDP and F-18-FDG scans.

RC811D Case Presentation/Panel Discussion

Participants
Neha S. Kwatra, MBBS, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC813

Pediatric Sonography (Interactive Session)

Friday, Nov. 30 8:30AM - 10:00AM Room: E353B

PD US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

GENERAL INFORMATION

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC813A Imaging of Pediatric Breast Masses

Participants
Teresa Chapman, MD, MA, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

teresa.chapman@seattlechildrens.org

LEARNING OBJECTIVES

1) Recognize normal glandular tissue of the pediatric patient. 2) Apply appropriate management recommendations to breast ultrasound findings of a girl with a palpable abnormality. 3) Provide an appropriate differential diagnosis for a solid tissue finding in the pediatric breast.

Active Handout:Teresa Chapman

http://abstract.rsna.org/uploads/2018/18000657/Peds Breast Ultrasound_Chapman_RSNA2018 RC813A.pdf

RC813B Sonography of Vascular Malformations

Participants
Harriet J. Paltiel, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the ISSVA classification of vascular anomalies and US imaging features of a number of common pediatric vascular tumors and malformations.

RC813C Sonography of the Pediatric Neck

Participants
Susan J. Back, MD, Philadelphia, PA (*Presenter*) Consultant, Bracco Group; Grant, Bracco Group

For information about this presentation, contact:

backs@email.chop.edu

LEARNING OBJECTIVES

1) Describe the approach to ultrasound of the pediatric neck. 2) Recognize the sonographic appearance of common pediatric neck masses. 3) Develop an understanding of when other imaging modalities are needed to assess pediatric neck masses.

RC814

Interventional Series: Reproductive Health Interventions

Friday, Nov. 30 8:30AM - 12:00PM Room: E451B

GU IR

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants
Charles E. Ray JR, MD,PhD, Chicago, IL (*Moderator*) Nothing to Disclose

Sub-Events

RC814-01 Prostate Embolization: Technical Considerations

Friday, Nov. 30 8:30AM - 8:45AM Room: E451B

Participants
Jafar Golzarian, MD, Minneapolis, MN (*Presenter*) Officer, EmboMedics Inc; Consultant, Boston Scientific Corporation; Consultant, Medtronic plc; Consultant, Penumbra, Inc

LEARNING OBJECTIVES

1) To discuss the rationale for Prostate artery embolization. 2) To review the technique and challenges to perform the procedure. 3) To select best candidates for the PAE.

RC814-02 Prostate Embolization: Outcomes

Friday, Nov. 30 8:45AM - 9:00AM Room: E451B

Participants
Jafar Golzarian, MD, Minneapolis, MN (*Presenter*) Officer, EmboMedics Inc; Consultant, Boston Scientific Corporation; Consultant, Medtronic plc; Consultant, Penumbra, Inc

LEARNING OBJECTIVES

1) Understand indications and contraindications to prostatic artery embolization. 2) Understand the selection of patients who are ideally suited for prostatic artery embolization. 3) Become familiar with embolic materials used in PAE. 4) Identify and anticipate complications related to PAE. 5) Understand and interpret the existing literature on PAE and how this would translate into setting expectations for the procedure in a clinical setting. 6) Become familiar with the basic techniques of PAE.

RC814-03 PAE versus TURP: An Evidence-Based Comparison of Efficacy and Economic Cost in Current Literature Using the GRADE System

Friday, Nov. 30 9:00AM - 9:10AM Room: E451B

Awards
Trainee Research Prize - Medical Student

Participants
Patsy Lee, BSC, Hamilton, ON (*Presenter*) Nothing to Disclose
Oleg Mironov, MD, Hamilton, ON (*Abstract Co-Author*) Nothing to Disclose
Michael J. Connolly, MD, Hamilton, ON (*Abstract Co-Author*) Nothing to Disclose
Martin E. Simons, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Colm E. Boylan, MBBCh, FRCR, Hamilton, ON (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

patsywplee@gmail.com

PURPOSE

The purpose of this review is to use evidence-based evaluation to compare Prostatic Artery Embolization (PAE) with the gold-standard treatment for benign prostatic hypertrophy (BPH), transurethral resection of the prostate (TURP).

METHOD AND MATERIALS

We systematically reviewed evidence comparing TURP against the more recently-developed PAE. The key terms "BPH", "TURP", "PAE", "Quality of life" (QoL), and "International Prostate Symptoms Score" (IPSS) were used to identify 17 articles. Systematic reviews, literature reviews and protocols were excluded, leaving 8 articles which were evaluated using the GRADE system.

RESULTS

Moderate-level GRADE evidence on 45 patients and high-level GRADE evidence on 114 patients indicates equivalence in efficacy

between PAE and TURP at 12-month follow-up as evaluated by IPSS and QoL. Further, high-level GRADE evidence indicates equivalence through post-void residual volume and peak urinary flow at the 12-month follow-up. This equivalence in IPSS, QoL, post-void residual volume and peak urinary flow persists through to the 24-month follow-up. Moderate-level evidence indicates that there are no major complications associated with PAE. However, the same evidence demonstrates that 100% of patients undergoing TURP experience retrograde ejaculation, 26.7% experience urinary incontinence, and 2.9% require transfusion. In terms of minor complications, the same evidence indicates that all patients treated with TURP experience minor complications including hematuria, dysuria and pollakuria. Conversely, after PAE, patients experience self-limited post-embolization syndrome that does not require extended in-patient stay. Moderate-level evidence demonstrates that the in-hospital cost, out-of-hospital cost, and productivity-related cost due to absence from work are significantly less in PAE compared to TURP.

CONCLUSION

TURP and PAE are equivalent in efficacy at 12 and 24-months. TURP is associated with major complications such as retrograde ejaculation, urinary incontinence and transfusions. PAE is associated with only minor complications and lower cost.

CLINICAL RELEVANCE/APPLICATION

This article provides an evidence-based approach to support the treatment of BPH using PAE. BPH affects at least 50% of men by the age of 60 and increases in prevalence with age. Annual USA-wide expenditures are reported to total approximately $6 billion.

RC814-04 Comprehensive Assessment of Imaging Outcomes Following Prostate Artery Embolization (PAE) for Benign Prostatic Hyperplasia

Friday, Nov. 30 9:10AM - 9:20AM Room: E451B

Participants
Rehan Ali, MBBS, Forest Park, IL (*Presenter*) Nothing to Disclose
Ahmed Gabr, MD, MBBCh, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Samdeep Mouli, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Ronald A. Mora, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Nabeel Hamoui, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Joseph R. Kallini, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Ahsun Riaz, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Robert J. Lewandowski, MD, Chicago, IL (*Abstract Co-Author*) Consultant, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Advisory Board, ABK Biomedical Inc; Advisory Board, Accurate Medical; Consultant, C. R. Bard, Inc;
Frank H. Miller, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Siemens AG
Riad Salem, MD, MBA, Chicago, IL (*Abstract Co-Author*) Research Consultant, BTG International Ltd; Research Grant, BTG International Ltd; Consultant, Eisai Co, Ltd; Consultant, Exelixis, Inc; Consultant, Bristol-Myers Squibb Company; Consultant, Dove; ;

PURPOSE

To assess the change in volume of prostate and imaging findings following prostate artery embolization (PAE) for benign prostate hyperplasia (BPH).

METHOD AND MATERIALS

With IRB approval, we analyzed prospectively acquired MR data of PAE patients at baseline and 6-month following treatment from 2015-17. We reviewed prostate MRs looking for sequelae of embolization [changes in signal intensity and/or enhancement, infection/inflammation, infarction, edema, and change in intravesical prostatic protrusion (IPP)]. We calculated the total volume (TV) and central gland volumes (CGV) using DynaCAD® and measured change in volumes. Analyses were performed using SPSS with $P<0.05$ considered significant.

RESULTS

Forty-three patients (n=43) met our inclusion criteria. 93% (30/43) and 100% (43/43) showed a decrease in TV and CGV at 6-months respectively. At baseline, median TV was 86 cc (range: 29.4-232) and median CGV was 54.4 cc (range: 12.9- 165.5). Median decrease in TV was 18.2% (CI: 13.3-27.2) (p=0.0001) and median decrease in CGV was 26.7% (CI: 20.4-35.9) (p=0.0001). Thirty seven percent (16/43) of patients had IPP at baseline; 100% showed a decrease in size of median lobe at follow-up. At 6-month follow-up, 33% (14/43) showed imaging features of infarction, 79% (34/43) had decrease in T2-signal intensity, and 51% (22/43) showed a decrease in enhancement. None had edema, periprostatic fat changes or infection/inflammation.

CONCLUSION

PAE produces significant changes in both the TV and CGV of the prostate on MR imaging. These changes are most significant in patients with prostates > 80 cc in volume. Future studies will correlate changes in MR findings with clinical outcomes following PAE.

CLINICAL RELEVANCE/APPLICATION

Infarction is not significant finding in patients receiving PAE unlike fibroid embolization. PAE response can be assessed by measuring change in prostate volume and/or IPP change.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Frank H. Miller, MD - 2012 Honored EducatorFrank H. Miller, MD - 2014 Honored EducatorFrank H. Miller, MD - 2017 Honored EducatorFrank H. Miller, MD - 2018 Honored Educator

RC814-05 Uterine Fibroid Embolization: Techniques

Friday, Nov. 30 9:20AM - 9:35AM Room: E451B

Participants

Maureen P. Kohi, MD, San Francisco, CA (*Presenter*) Research Grant, Boston Scientific Corporation; Consultant, LaForce; Advisory Board, Boston Scientific Corporation; Advisory Board, AbbVie Inc

LEARNING OBJECTIVES

1) Understand the indications/contraindications to UAE. 2) Discuss procedural steps involved in simple and complex UAE. 3) Comprehend the periprocedural care of patients undergoing UAE.

RC814-06 Comparison of Reproductive Outcomes Following Uterine Fibroid Embolization (UFE) and Robotic-Assisted Laparoscopic Myomectomy in Patients with Symptomatic Uterine Fibroids and Correlation of MRI Characteristics with Pregnancy Outcomes after UFE

Friday, Nov. 30 9:35AM - 9:45AM Room: E451B

Participants
Maria A. Kotarska, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

majakotarska@me.com

PURPOSE

To analyze and compare differences in reproductive outcomes following uterine fibroid embolization (UFE) and robotic-assisted laparoscopic myomectomy in patients with symptomatic uterine fibroids and to correlate MRI characteristics with pregnancy outcomes after UFE.

METHOD AND MATERIALS

Forty patients undergoing fertility-sparing treatment for symptomatic uterine fibroids between 2006 and 2016 who achieved any subsequent pregnancy at the same institution were analyzed. In the UFE group pre and post procedure MRI imaging data was correlated with pregnancy outcomes. MRI was analyzed in the UFE patient group for uterine volume, number , size and location of fibroids, submucosal grade and cavity distortion.

RESULTS

Patients who underwent UFE were more likely to have bulk symptoms as their presenting fibroid symptom (p=0.001), and to have intramural fibroid location (p=0.043). Patients with pregnancy after UFE had a smaller average diameter of the dominant fibroid at the time of treatment (5.2cm vs 7.4cm; p=0.0306), but uterine volume at the time of treatment was similar for both groups. Rates of post-procedure spontaneous abortion, preterm cesarean delivery, term cesarean delivery, and vaginal delivery did not differ between the two groups. The rate of composite adverse pregnancy outcomes for deliveries over 24 weeks, including uterine rupture, postpartum hemorrhage, abruption, and intrauterine growth restriction, did not differ significantly between the UFE and laparoscopic myomectomy groups (36% vs 28%; p=0.728). In patients who had positive pregnancy outcomes after UFE were associated on MRI with greater uterine volume reduction and lesser cavity distortion post procedure. Pre-procedure uterine volume, number of uterine incisions at myomectomy, predominant fibroid location, and time from procedure to pregnancy event were not associated with the risk of adverse pregnancy outcomes.

CONCLUSION

UFE and robotic-assisted laparoscopic myomectomy have equivalent reproductive outcomes and comparable rates of adverse pregnancy outcomes. Positive pregnancy outcomes post UFE were positively correlated on MRI with absence of cavity distortion and uterine volume reduction post embolization.

CLINICAL RELEVANCE/APPLICATION

The study impacts all female patients with symptomatic fibroids who desire to preserve their fertility and provides evidence based framework for decision making between treatment options.

RC814-07 Uterine Fibroid Embolization: Outcomes

Friday, Nov. 30 9:45AM - 10:00AM Room: E451B

Participants
James B. Spies, MD, Washington, DC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the symptomatic improvement that typically occurs as a result of uterine embolization. 2) Understand the recurrence rate that might be anticipated after uterine embolization. 3) Understand the reproductive outcomes from uterine embolization. 4) Understand the factors that might impact outcome from the procedure.

RC814-08 High-intensity Focused Ultrasound in the Treatment of Uterine Fibroids

Friday, Nov. 30 10:00AM - 10:15AM Room: E451B

Participants
Maureen P. Kohi, MD, San Francisco, CA (*Presenter*) Research Grant, Boston Scientific Corporation; Consultant, LaForce; Advisory Board, Boston Scientific Corporation; Advisory Board, AbbVie Inc

LEARNING OBJECTIVES

1) Understand indications/contraindications to HIFU for symptomatic uterine fibroids. 2) Comprehend periprocedural patient care and procedural steps. 3) Learn procedural outcomes and how they compare to UAE.

RC814-09 Pelvic Congestion Syndrome

Friday, Nov. 30 10:30AM - 10:45AM Room: E451B

Participants
Gordon McLennan, MD, Chagrin Falls, OH (*Presenter*) Grant, Siemens AG; Grant, Surefire Medical, Inc; Speakers Bureau, Medtronic plc; Speakers Bureau, General Electric Company; Speakers Bureau, Stryker Corporation; Advisory Board, Siemens AG; Advisory Board, Surefire Medical, Inc; Advisory Board, Stealth Medical; Advisory Board, Rene Medical, Inc; Advisory Board, F. Hoffmann-La Roche Ltd; Advisory Board, Bristol-Myers Squibb Company; Advisory Board, B. Braun Melsungen AG; Advisory Board, General Electric Company;

For information about this presentation, contact:

mclenng@ccf.org

LEARNING OBJECTIVES

1) Describe the different causes of chronic pelvic pain in women. 2) Describe the literature evidence that supports the diagnosis of pelvic congestion syndrome and the embolization of ovarian veins. 3) Describe the technical approaches to embolization of the ovarian vein and abnormal varicose veins from the internal iliac vein.

ABSTRACT

Pelvic Congestion Syndrome is defined as chronic pelvic pain associated with ovarian vein reflux. In some patients, it is associated with internal iliac vein reflux and varicose veins of the legs. The management of chronic pelvic pain is best achieved with a multidisciplinary approach that inovlves gynecology, pain managnement, physical therapy, psychological therapy, and interventional radiology. We will review the literature supporting the diagnosis & treatment of this condition, highlight the differential diagnosis and other therapies that are often required and describe the technical approaches to ovarian vein embolization, internal iliac vein embolization and pudendal nerve block.

RC814-10 Efficacy of MR guided focused Ultrasound Surgery (MRgFUS) In Adenomyosis: A Study of 113 Symptomatic Adenomyosis in 92 Indian Patients

Friday, Nov. 30 10:45AM - 10:55AM Room: E451B

Participants
Ritu M. Kakkar, MBBS, DMRD, Mumbai, India (*Abstract Co-Author*) Nothing to Disclose
Shrinivas B. Desai, MD, Mumbai, India (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

riturupesh@gmail.com

PURPOSE

To assess the efficacy of MR guided focused ultrasound surgery (MRGFUS) in treating adenomyosis by evaluation of non-perfused volumes (NPV) and symptom severity score (SSS).

METHOD AND MATERIALS

92 Indian women with 113 significant symptomatic adenomyosis (SSS > 21) were selected after approval from ethics committee.Adenomyosis with definable treatable areas(>2cm) were included.Patients with SSS <21 and non definable treatable areas were excluded.Pre treatment raw and transformed SSS were calculated.Treatment was performed on a 1.5-T whole-body system (Signa; GE Healthcare) in the ExAblate 2000 (InSightec) device.During treatment the patient lies prone and a gel pad couples the patients abdomen to a phased array coil in a sealed water bath in the treatment table. The system generates a high intensity acoustic beam that is focused on target ,leading to tissue necrosis .Post treatment results were evaluated by assessing non perfused areas on contrast enhanced scans. Patients were called for follow up at 6 months .SSS was enquired and MRI pelvis with contrast was performed to calculate the non-perfused volume.

RESULTS

74% of our patients had significant reduction in symptom severity score following treatment.The reduction in mean raw and transformed SSS pre and 6 months post treatment was statistically significant .The mean volume of adenomyosis prior to treatment was 139.47± 102.497 SD, while non perfused volumes 6 months after treatment were 71.26 ± 51.15 SD.This difference was found to be statically significant (0.000134). We used Non-perfused Volume (NPV) and its percentage of the total adenomyotic volume before the treatment (NPV%) and correlated these with the Reduction in the Symptom Severity Score at 6 months and found the correlation strong and positively linear (Pearsons correlation of .644 and .928 with NPV and NPV %).

CONCLUSION

MRgFUS is able to achieve NPV values that will result in clinically significant reduction in symptoms. The reduction in the SSS and percentage of adenomyosis reduction follows the NPV very closely and linearly, which means that achieving greater NPV will essentially result in significant symptom reduction.

CLINICAL RELEVANCE/APPLICATION

MRgFUS is a non invasive ,safe and effective modality for the treatment of Adenomyosis providing good symptomatic relief and long term results

RC814-11 Efficacy of MR Guided Focused Ultrasound Surgery in Treatment of Uterine Fibroids: A Study of 1214 Fibroids-Indian Experience

Friday, Nov. 30 10:55AM - 11:05AM Room: E451B

Participants
Ritu M. Kakkar, MBBS, DMRD, Mumbai, India (*Abstract Co-Author*) Nothing to Disclose
Shrinivas B. Desai, MD, Mumbai, India (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

riturupesh@gmail.com

PURPOSE

To evaluate the role of MRgFUS in management of Uterine Fibroids in terms of clinical improvement in symptoms as suggested by decrease in Symptom Severity Score (SSS) and reduction in Non perfused volume ,and to access early and late adverse effects of treatment.

METHOD AND MATERIALS

• 1214 symptomatic fibroids in 717 Indian women were selected.Patients with uterine fibroids showing enhancement on screening MRI were recruited for the study.Patients with non enhancing /calcified fibroids were excluded.Pretreatment raw and transformed symptom severity score was was calculated.Treatment was performed on a 1.5-T whole-body system (Signa; GE Healthcare) in the ExAblate 2000 (InSightec) device. During treatment the patient lies prone and a gel pad couples the patients abdomen to a phased array coil in a sealed water bath .The system generates a high intensity acoustic beam that is focused on target,leading to tissue necrosis.Post treatment results were evaluated by assessing non perfused volume on contrast enhanced scans. All patients were followed up at 6 months with post contrast MR pelvis Symptom severity score and Non perfused volume was calculated ,delayed adverse events were enquired .

RESULTS

The reduction in both mean raw and transformed SSS before and 6 months post treatment was statistically significant (p=0.0001). The mean volume of fibroids before treatment was 145.76 cc with SD 81.22 cc .At 6 months follow up there was statistically significant reduction in the volume of fibroids with mean being 105.75 cc and SD 59.95 cc (p value 0.0001).The Non Perfused Volume (NPV) achieved after the procedure was 88.21% with a SD of 7.60%. And this has transformed into greater reduction of fibroid volume at 6 months.65%patients had no adverse effects following treatment .Leg pain was seen in 15% patients immediately after treatment and 2% continued having mild leg pain after 6 months .2 patients (0.2%)had intestinal perforation.

CONCLUSION

MRgFUS provides statistically significant reduction in symptom severity index and fibroid volumes at 6 month follow up The adverse effect profile is acceptable with major events occurring in a very small percentage of patients

CLINICAL RELEVANCE/APPLICATION

MRgFUS is a good ,safe, non invasive replacement to conventional invasive therapies like hysterectomy and myomectomy for uterine fibroids with comparable success rates and lower side effect profile .

RC814-12 Contraceptive Implant Migration and Removal

Friday, Nov. 30 11:05AM - 11:20AM Room: E451B

Participants
Paul J. Rochon, MD, Aurora, CO (*Presenter*) Moderator and Speaker, Penumbra, Inc; Speakers Bureau, C. R. Bard, Inc; Speaker, Cook

LEARNING OBJECTIVES

1) Understand the types of subcutaneous hormonal contraceptive implants. 2) Understand the risks factors and complications associated with placing these implants. 3) Understand methods used in interventional radiology to remove complex contraceptive implants.

RC814-13 Post-partum Hemorrhage

Friday, Nov. 30 11:20AM - 11:35AM Room: E451B

Participants
Matthew A. Brown, MD, Aurora, CO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review risk factors for postpartum hemorrhage. 2) Describe treatment options for postpartum hemorrhage and role of transcatheter embolization. 3) Discuss procedural technique and challenges of pelvic artery embolization for postpartum hemorrhage.

RC814-14 Uterine Artery Embolization to Reduce Operative Blood Loss and Transfusion Requirements during Cesarean-Hysterectomy in Patients with Invasive Placenta

Friday, Nov. 30 11:35AM - 11:45AM Room: E451B

Awards
Student Travel Stipend Award

Participants
Melinda Wang, New York, NY (*Presenter*) Nothing to Disclose
Alana Wade, MD, Tacoma, WA (*Abstract Co-Author*) Nothing to Disclose
Deddeh M. Ballah, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Maureen P. Kohi, MD, San Francisco, CA (*Abstract Co-Author*) Research Grant, Boston Scientific Corporation; Consultant, LaForce; Advisory Board, Boston Scientific Corporation; Advisory Board, AbbVie Inc

PURPOSE

Invasive placenta (IP) is a life-threatening pathology with maternal mortality as high as 7%. With an increasing number of IP diagnoses in the US, advance planning allows for the use of prophylactic measures to decrease morbidity and mortality. This study aims to evaluate the efficacy of uterine artery embolization (UAE) after cesarean delivery and prior to hysterectomy in patients with IP for decreasing blood loss and transfusion requirements when compared to either Cesarean-hysterectomy (C-hyst) alone or C-hyst with uterine artery ligation (UAL).

METHOD AND MATERIALS

This is a retrospective observational study including patients with IP treated with C-hyst at our institution from 5/2014-10/2017. Patients included were divided into three groups depending on procedure received (UAE, UAL, or C-hyst alone). Emergent cases, patients who did not undergo hysterectomy, and patients without pathologic diagnosis of IP were excluded. Primary outcomes were estimated blood loss (EBL) and blood transfusion requirements.

RESULTS

A total of 33 patients were included in the study (UAE group: n=6; UAL group: n=7; control group: n=20). Mean EBL in the UAE group was 1233 mL (SD: ±605 mL) compared to 3120 mL (SD: ±1722 mL) in the control group (p=0.03) and 2700 mL (SD: ±1095 mL) in the UAL group (p=0.06). Mean transfusion requirement, including pRBC and Cell Saver, in the UAE group was 258 mL (SD: ±325 mL) compared to 1210 mL (SD: ±1441 mL) in the control group (p=0.18) and 1481 mL (SD: ±1174 mL) in the UAL group (p=0.27). No differences were seen between the UAL and control groups in EBL (p=0.89) or transfusion requirements (p=0.89). There were no substantial differences in length of postpartum stay, surgical complication rates, or ICU admission rates.

CONCLUSION

C-hyst is the current standard of management in IP but itself carries significant mortality and morbidity. In our study, prophylactic UAE significantly decreases intraoperative blood loss when compared to C-hyst alone and marginally decreases EBL when compared to C-hyst with UAL. Decreased transfusion requirements in cases with UAE were not statistically significant but may be clinically significant. UAE appears to be a feasible and potentially advantageous option within a multidisciplinary approach to IP.

CLINICAL RELEVANCE/APPLICATION

In patients with invasive placenta, UAE prior to hysterectomy may offer a multidisciplinary option to decrease blood loss compared to hysterectomy alone.

RC814-15 Gender Differences in Peripheral Vascular Disease

Friday, Nov. 30 11:45AM - 12:00PM Room: E451B

Participants
Kristofer M. Schramm, MD, Aurora, CO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Learning Objectives: To describe trends in female vascular diseaseTo review barriers to female access to care and treatment of vascular diseaseTo establish differences in outcomes in open and endovascular repair of female vascular disease

LEARNING OBJECTIVES

1) To highlight differences in the risk factors for, presentation of, and sequelae of peripheral artery disease in men and women. 2) To highlight treatment related differences in peripheral artery disease in men and women. 3) To review the existing data regarding endovascular management of peripheral artery disease in women.

ABSTRACT

In the last 20 years, peripheral artery disease (PAD) has been increasingly recognized as a significant cause of morbidity and mortality in the United States. PAD has traditionally been identified as a male dominant disease; however, recent population trends and studies in PAD suggest that women are affected at least as often as men. Women comprise a larger population of the elderly than men, as well as an increasing proportion of patients with PAD. Much of the existing research on PAD has focused on whole populations, and gender specific data on PAD is sparse. This review focuses on gender specific differences in presentation, management, and outcomes of PAD intervention that are important considerations for the interventional radiologist.

RC815

Radiologist's Value in the Multidisciplinary Team

Friday, Nov. 30 8:30AM - 10:00AM Room: E350

BR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Cherie M. Kuzmiak, DO, Chapel Hill, NC (*Moderator*) Research Grant, Delphinus Medical Technologies, Inc

LEARNING OBJECTIVES

1) Define high-risk lesions. 2) Review radiologic-pathologic features and characteristics of high-risk lesions. 3) Discuss approaches to high-risk lesions with attention to management considerations and controversies. 4) Describe and discuss the imaging features of the major subtypes of invasive breast cancer with integration of pathology. 5) Understand the molecular classification of breast cancer and its impact on patient prognosis. 6) Describe patients' perspectives of breast imaging experiences with a focus on pain, anxiety, and emotional distress relating to abnormal results and biopsy procedures. 7) Define interventions for reducing patients' negative experiences related to abnormal results and biopsy procedures.

Sub-Events

RC815A Management of High Risk Lesions

Participants
Samantha L. Heller, MD, PhD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Samantha.Heller@nyumc.org

LEARNING OBJECTIVES

1) Define high-risk lesions. 2) Review radiologic-pathologic features and characteristics of high-risk lesions. 3) Discuss approaches to high-risk lesions with attention to management considerations and controversies.

RC815B Imaging Appearance of Cancer Subtypes

Participants
Cherie M. Kuzmiak, DO, Chapel Hill, NC (*Presenter*) Research Grant, Delphinus Medical Technologies, Inc

LEARNING OBJECTIVES

1) Describe and discuss the imaging features of the major subtypes of invasive breast cancer with integration of pathology. 2) Understand the molecular classification of breast cancer and its impact on patient prognosis.

RC815C Improving the Patient's Experience

Participants
Mary S. Soo, MD, Durham, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mary.soo@duke.edu

LEARNING OBJECTIVES

1) Describe patients' perspectives of breast imaging experiences with a focus on pain, anxiety, and emotional distress relating to abnormal results and biopsy procedures. 2) Define interventions for reducing patients' negative experiences related to abnormal results and biopsy procedures.

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RC816

Interacting Effectively with Referring Physicians in the Digital Age (Sponsored by RSNA Public Information Committee)

Friday, Nov. 30 8:30AM - 10:00AM Room: E352

PR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Max Wintermark, MD, Lausanne, Switzerland (*Moderator*) Advisory Board, General Electric Company; Consultant, More Health; Consultant, Magnetic Insight; Consultant, Icometrix; Consultant, Nines;
Annette J. Johnson, MD, Augusta, GA (*Presenter*) Nothing to Disclose
Andrew B. Rosenkrantz, MD, New York, NY (*Presenter*) Nothing to Disclose
Tarik K. Alkasab, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

max.wintermark@gmail.com

LEARNING OBJECTIVES

1) Discern what referring physicians want and need from radiologists in the digital age. 2) Better implement virtual radiology rounds and other digital tools. 3) Leverage enterprise IT to improve radiology communication and collaboration.

ABSTRACT

In transitioning to a value-based practice in the digital age, it is imperative that the radiologist learn to interact efficiently and effectively with other members of the patient's healthcare team. In this course, attendees will learn how to harness the growing number of digital tools and reporting capabilities to improve their interactions with referring clinicians.

RC823

CT Radiation Dose Reduction: Techniques and Clinical Implementation

Friday, Nov. 30 8:30AM - 10:00AM Room: E253CD

CT PH SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Lifeng Yu, PhD, Chicago, IL (*Coordinator*) Nothing to Disclose

For information about this presentation, contact:

yu.lifeng@mayo.edu

LEARNING OBJECTIVES

1) Review techniques that are currently available for radiation dose reduction. 2) Understand general dose management and optimization strategies and how they are implemented in adult CT. 3) Understand strategies to optimize scanning protocols in pediatric CT.

ABSTRACT

This course will provide an overview of techniques and clincial implementations of radiation dose reduction in CT.

Sub-Events

RC823A Overview of Technology for Radiation Dose Reduction

Participants
Joseph W. Stayman, PhD, Baltimore, MD (*Presenter*) Research Grant, Canon Medical Systems Corporation; Research Grant, Carestream Health, Inc; Research Grant, Elekta AB; Research collaboration, Fischer Medical; Research Grant, Medtronic plc; Research collaboration, Koninklijke Philips NV; Research Grant, Siemens AG

LEARNING OBJECTIVES

1) Identify targets for radiation dose reductions in x-ray CT. 2) Gain an understanding of dose reduction strategies based on innovations in hardware design and development. 3) Gain an understanding of dose reduction strategies based on data processing chain improvements including iterative reconstruction methods. 4) Understand some of the trade-offs in dose reduction as well as limitations on dose reduction.

RC823B Dose Optimization Strategy and Clinical Implementation in Adult CT

Participants
Lifeng Yu, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

yu.lifeng@mayo.edu

LEARNING OBJECTIVES

1) Introduce dose management and optimization strategies in adult CT. 2) Describe how dose reduction techniques are clinical implemented in adult CT, including neuro, chest, abdominal, cardiovascular, and MSK.

RC823C Dose Reduction and Protocol Optimization in Pediatric CT

Participants
Robert MacDougall, MSc, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

robert.d.macdougall@childrens.harvard.edu

LEARNING OBJECTIVES

1) Recognize the important of clinical indication on CT protocol design. 2) Describe the different commercial implementations of kV and mA modulation algorithms and understand methods of standardizing image quality across platforms. 3) Understand the effect of reconstruction algorithms on acquisition parameter selection in pediatric CT.

RC829

Six Common Difficult Problems in GI and GU MRI: The Experts' Approach

Friday, Nov. 30 8:30AM - 10:00AM Room: E351

GI GU MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Hero K. Hussain, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

Sub-Events

RC829A The CT Indeterminate Lesion in the Non-Cirrhotic Liver: Extracellular or Hepatobiliary Contrast-Enhanced MRI

Participants
Hero K. Hussain, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hh141@aub.edu.lb

LEARNING OBJECTIVES

1) Describe the difference between extracellular and hepatobiliary contrast with regard to the mechanism of action and effect on post contrast phases. 2) Explain the types of liver lesions seen on CT that may benefit from imaging with hepatobiliary contrast.

RC829B Is MRI Needed to Further Evaluate a CT Indeterminate Renal Mass?

Participants
Hersh Chandarana, MD, New York, NY (*Presenter*) Equipment support, Siemens AG; Software support, Siemens AG; Advisory Board, Siemens AG; Speaker, Bayer AG;

For information about this presentation, contact:

hersh.chandarana@nyumc.org

LEARNING OBJECTIVES

1) Limitation of CT imaging in characterization of small renal masses (with focus on discriminating benign/indolent renal tumors from aggressive renal cancer). 2) Role of MRI as a problem solving tool in characterizing cystic and solid renal masses. 3) Evolving role of MRI in renal mass (histologic) subtyping and assessment of renal tumor aggressiveness.

RC829C Perianal Fistulae: What Does the Surgeon Want to Know?

Participants
Mahmoud M. Al-Hawary, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review normal anatomy of the anal sphincter complex and surrounding pelvic structures. 2) Discuss etiology, pathophysiology and classification of perianal fistulas. 3) Correlate implication of imaging findings on disease management.

RC829D How Do I Perform and Interpret MRI of Pelvic Floor Weakness?

Participants
Victoria Chernyak, MD,MS, Bronx, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

vichka17@hotmail.com

LEARNING OBJECTIVES

1) Familiarize themselves with MR protocol for assessment of pelvic floor dysfunction. 2) Learn techniques for improving patient cooperation for dynamic images. 3) Identify normal anatomy of anterior, middle and posterior compartments. 3) Apply reference lines and angles used in assessment of pelvic floor dysfunction. 4) Identify and grade the severity of pelvic floor relaxation. 5) Identify and grade the severity of pelvic organ prolapse.

RC829E Is MRI the Next Step After US to Evaluate Non-Obstetric Pelvic Pain in Pregnancy?

Participants
Reena C. Jha, MD, Washington, DC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the common causes of non obstetric pelvic pain in pregnancy. 2) Recognize the unique diagnostic and therapeutic challenges in the pregnant patient with pelvic pain. 3) Discuss the safety considerations of imaging in pregnancy. 4) Review the evolving imaging and clinical literature on appropriate investigation of acute pelvic pain pregnancy. 5) Discuss the utility of MRI as a supplement to US in the pregnant patient.

RC829F How Do I Perform a Diagnostic MRI in a Non-Cooperative Patient?

Participants
Mustafa R. Bashir, MD, Cary, NC (*Presenter*) Research Grant, Siemens AG; Research Grant, General Electric Company; Research Grant, NGM Biopharmaceuticals, Inc; Research Grant, TaiwanJ Pharmaceuticals Co, Ltd; Research Grant, Madrigal Pharmaceuticals, Inc; Research Consultant, RadMD

For information about this presentation, contact:

mustafa.bashir@duke.edu

LEARNING OBJECTIVES

1) Describe patient and technical factors that may contribute to suboptimal or nondiagnostic body MRI examinations.2) Discuss methods for reducing the impact of the above factors using clinically-available MRI techniques.

ABSTRACT

Patient motion is a major issue in abdominal MRI. Not only are some patients unable to sustain a breath-hold, but breathing motion can be unpredictable. In this talk we will discuss a variety of techniques for combating motion, including fast imaging, special k-space filling trajectories, and respiratory gating using extrinsic and intrinsic signals.

RC832

Radiology Compensation and Finance

Friday, Nov. 30 8:30AM - 10:00AM Room: E353A

HP LM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Vincent P. Mathews, MD, Hartland, WI (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

vmathews@mcw.edu

LEARNING OBJECTIVES

See subsection Objectives.

Sub-Events

RC832A Health Care Reform and Radiology Reimbursement

Participants
Robert J. Witte, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

witte.robert@mayo.edu

LEARNING OBJECTIVES

1) Provide a history of important legislation and policies that have had a significant impact on health care reform. 2) Review recent transformative health care legislation and policies impacting radiology reimbursement.

RC832B The Financial Impact of Accountable Care Organization on Radiology

Participants
Suresh K. Mukherji, MD, Northville, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review that impact of ACO's on Radiologist's compensation.

RC832C Radiology Compensation Benchmarks

Participants
Vincent P. Mathews, MD, Hartland, WI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

vmathews@mcw.edu

LEARNING OBJECTIVES

1) To learn about the implementation of fair market valuse compensation plans. 2) To understand the importance of utilizing appropriate benchmarks for clinical productivity measures.

RC832D Testifying as an Expert Witness: Rules, Compensation and other Rewards, and Penalties

Participants
Leonard Berlin, MD, Wilmette, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lberlin@live.com

LEARNING OBJECTIVES

1) Understand the need for and the purpose of requiring expert witnesses to be presenting and give testimony in medical malpractice courtroom trials. 2) Recognize the positions taken by the ACR and state medical licensing boards regarding expert witness testimony. 3) Learn what is expected of expert witnesses regarding their testimony - specifically what they can say and cannot say - when testifying under oath in a court of law.

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RC852

Breast Elastography (Hands-on)

Friday, Nov. 30 8:30AM - 10:00AM Room: E264

BR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Richard G. Barr, MD, PhD, Campbell, OH (*Presenter*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Canon Medical Systems Corporation; Research Grant, Esaote SpA; Research Grant, BK Ultrasound; Research Grant, Hitachi, Ltd
Stamatia V. Destounis, MD, Scottsville, NY (*Presenter*) Research Grant, Hologic, Inc; Research Grant, Delphinus Medical Technologies, Inc
Rajas N. Chaubal, MBBS,MD, Thane, India (*Presenter*) Nothing to Disclose
Nitin G. Chaubal, MD, MBBS, Mumbai, India (*Presenter*) Nothing to Disclose
Chander Lulla, MBBS, Mumbai, India (*Presenter*) Nothing to Disclose
Vito Cantisani, MD, Rome, Italy (*Presenter*) Speaker, Canon Medical Systems Corporation; Speaker, Bracco Group; Speaker, Samsung Electronics Co, Ltd;
Maija Radzina, MD, PhD, Riga, Latvia (*Presenter*) Nothing to Disclose
Phan T. Huynh, MD, Houston, TX (*Presenter*) Nothing to Disclose
Paula B. Gordon, MD, Vancouver, BC (*Presenter*) Stockholder, OncoGenex Pharmaceuticals, Inc ; Stockholder, Volpara Health Technologies Limited; Scientific Advisory Board, Real Imaging Ltd; Scientific Advisory Board, DenseBreast-info, Inc;
Tanya W. Moseley, MD, Houston, TX (*Presenter*) Nothing to Disclose
Catherine W. Piccoli, MD, Voorhees, NJ (*Presenter*) Stockholder, Qualgenix LLC;
Gary J. Whitman, MD, Houston, TX (*Presenter*) Nothing to Disclose
Anna I. Holbrook, MD, Atlanta, GA (*Presenter*) Nothing to Disclose
Rachna Dutta, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Valerio Forte, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Daniele Fresilli, Roma, Italy (*Presenter*) Nothing to Disclose
Giuseppe Schillizzi, Roma, Italy (*Presenter*) Nothing to Disclose
Gregorio Alagna, Rome, Italy (*Presenter*) Nothing to Disclose
Valeria de Soccio, JD, Rome, Italy (*Presenter*) Nothing to Disclose

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rdutta@metrohealth.org

LEARNING OBJECTIVES

1) To explain the difference between strain and shear wave elastography. 2) To review how to characterize breast lesions as benign or malignant on elastography. 3) To demonstrate how to perform both strain and shear wave elastography for breast imaging.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Richard G. Barr, MD, PhD - 2017 Honored Educator

RC854

Want to Learn More About Imaging Informatics? Education, Resources and Certifications

Friday, Nov. 30 8:30AM - 10:00AM Room: E260

ED IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Christopher J. Roth, MD, Raleigh, NC (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Summarize the forces driving physician adoption and leadership in local and national informatics initiatives. 2) Outline freely available educational resources to expand imaging informatics understanding. 3) Describe available imaging informatics courses and fellowships. 4) Detail common certifications available to imaging and non-imaging informatics leaders to demonstrate their knowledge. 5) Know the current imaging informatics 'hot topics.'

Sub-Events

RC854A Landscape of Online Resources for Informatics Self-Study

Participants
Marc D. Kohli, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify online sources of content for didactic informatics self-study. 2) Identify online resources for hands-on study of database and programming concepts.

RC854B Formal Opportunities and Resources for Imaging Informatics Training

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (*Presenter*) Royalties, Osler Institute

For information about this presentation, contact:

tessa.cook@uphs.upenn.edu

LEARNING OBJECTIVES

1) Discuss currently available options for basic and advanced training in imaging informatics available to radiologists at all levels of training and career stage.

RC854C Imaging and Nonimaging Informatics Society Certifications: What is Out There and is it Valuable?

Participants
Christopher J. Roth, MD, Raleigh, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the value of obtaining certifications as an informatics leader. 2) Compare available opportunities for pursuing three common informatics certifications relevant to RSNA members and attendees: American Board of Imaging Informatics Certified Imaging Informatics Professional (ABII CIIP) certification, the American Board of Preventative Medicine Clinical Informatics (ABPM CI) ABMS board certification, and Healthcare Information and Management Systems Society Certified Professional in Health Information & Management System (HIMSS CPHIMS).

SPIS61

International Symposium in Musculoskeletal Radiology (In Conjunction with Asian Musculoskeletal Society (AMS), European Society of Musculoskeletal Radiology (ESSR), German Society of Musculoskeletal Radiology (DGMSR), International Skeletal Society (ISS), Korean Society of Musculoskeletal Radiology (KSMR) and Society of Skeletal Radiology (SSR))

Friday, Nov. 30 9:30AM - 12:30PM Room: E450A

CT MR MK

AMA PRA Category 1 Credits ™: 3.00
ARRT Category A+ Credits: 3.50

FDA Discussions may include off-label uses.

Sub-Events

SPIS61A Top Tips in MSK Radiology: MSK Techniques

Friday, Nov. 30 9:30AM - 10:30AM Room: E450A

Participants
Laura W. Bancroft, MD, Orlando, FL (*Moderator*) Author with royalties, Wolters Kluwer nv; Speaker, World Class CME; Editor, Thieme Medical Publishers, Inc; Travel support, Thieme Medical Publishers, Inc ; ;

For information about this presentation, contact:

laura.bancroft.md@flhosp.org

LEARNING OBJECTIVES

1) Review the salient imaging features of some of the most commonly encountered musculoskeletal diagnoses.

SPIS61B Top Tips to Reduce Artifacts in MSK MRI

Friday, Nov. 30 9:30AM - 9:45AM Room: E450A

Participants
David A. Rubin, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

rubinda@wustl.edu

LEARNING OBJECTIVES

1) Recognize the source of common artifacts on MSK MIR images. 2) Anticipate artifacts before they occur. 3) Devise simple interventions to reduce or eliminate artifacts without sacrificing time or SNR. 4) Communicate with their technologists regarding MRI techniques.

SPIS61C Top Tips for Functional MRI

Friday, Nov. 30 9:45AM - 10:00AM Room: E450A

Participants
Won-Hee Jee, MD, Seoul, Korea, Republic Of (*Presenter*) Research Grant, Bayer AG;

For information about this presentation, contact:

whjee12@gmail.com

LEARNING OBJECTIVES

1) Describe the role of functional MRI in MSK imaging. 2) Apply functional MRI to MSK imaging in clinical practice. 3) List the top benefits of functional MRI in MSK imaging.

SPIS61D Top Tips for MR/CT Arthrography

Friday, Nov. 30 10:00AM - 10:15AM Room: E450A

Participants
Reto Sutter, MD, Zurich, Switzerland (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Know and assess indications of MR and CT arthrography for different joints. 2) Identify the classic approaches for joint injections. 3) Compare the benefits of MR and CT arthrograms versus non-contrast MR and CT imaging. 4) Recognize diagnostic pitfalls of MR and CT arthrography.

SPIS61E Discussion

Friday, Nov. 30 10:15AM - 10:30AM Room: E450A

SPIS61F Top Tips in MSK Radiology: MSK Pitfalls

Friday, Nov. 30 10:30AM - 11:30AM Room: E450A

Participants
Jung-Ah Choi, MD, Seoul, Korea, Republic Of (*Moderator*) Research Grant, Bracco Group;
Andrew J. Grainger, MRCP, FRCR, Leeds, United Kingdom (*Moderator*) Consultant, Levicept Ltd; Director, The LivingCare Group;

For information about this presentation, contact:

andrewgrainger@nhs.net

LEARNING OBJECTIVES

1) Review the imaging characteristics of commonly encountered musculoskeletal entities with similar or overlapping features.

SPIS61G Top Pitfalls in Fracture Diagnosis

Friday, Nov. 30 10:30AM - 10:45AM Room: E450A

Participants
Mini N. Pathria, MD, San Diego, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Develop a systematic approach to evaluating radiographs in the injured patient, focusing on soft tissue indicators of injury, articular alignment, and assessment of the bone cortex. 2) Detect patient characteristics (such as advanced age etc) and imaging limitations (poor positioning etc) that lead to interpretation errors. 3) Identify radiographic imaging findings that indicate underlying musculoskeletal injury and the need for further imaging.

Active Handout:Mini Nutan Pathria

http://abstract.rsna.org/uploads/2018/18003680/Pitfalls Fracture Diagnosis RSNA 2018 SPIS61I.pdf

SPIS61H Top Pitfalls in Groin Pain

Friday, Nov. 30 10:45AM - 11:00AM Room: E450A

Participants
Philip Robinson, MBChB, Leeds, United Kingdom (*Presenter*) Director, The LivingCare Group

For information about this presentation, contact:

philip.robinson10@nhs.net

LEARNING OBJECTIVES

1) Explain the biomechanics and functional anatomy of the anterior pelvis (groin) in relation to athletes. 2) Compare the theories and nomenclature for the pathogenesis of chronic groin pain in athletes. 3) Contrast the Imaging findings in symptomatic and asymptomatic athletes focussing on MR imaging. 4) Critique the interpretation of these findings and what research shows they relate to in terms of diagnosis, prognosis and decision making for treatment.

ABSTRACT

Groin pain in the athlete is a complex process with different surgical and radiological researchers focusing on different structures in the hope of identifying the primary cause for chronic groin pain. There is a resulting confusion over terminology with, for example, osteitis pubis, adductor pain and sportsman's hernia encompassing many different potential conditions for different clinicians.In reality there is a lot of crossover with many or all of the anatomical region thought to be involved by chronic shearing forces acting through the symphysis pubis and surrounding soft tissues contributing to the development of groin pain. Research is also now increasingly showing that previous imaging findings thought to be pathognomonic for groin pain are found in asymptomatic kicking athletes. This talk will review such potential pitfalls and offer a reporting strategy.

SPIS61I Top Pitfalls of Osteoporosis

Friday, Nov. 30 11:00AM - 11:15AM Room: E450A

Participants
James F. Griffith, MD, Shatin, Hong Kong (*Presenter*) Nothing to Disclose

SPIS61J Discussion

Friday, Nov. 30 11:15AM - 11:30AM Room: E450A

SPIS61K Top Tips in MSK Radiology: MSK Research Trends

Friday, Nov. 30 11:30AM - 12:30PM Room: E450A

Participants
James F. Griffith, MD, Shatin, Hong Kong (*Moderator*) Nothing to Disclose
Lawrence M. White, MD, FRCPC, Toronto, ON (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

lawrence.white@uhn.ca

LEARNING OBJECTIVES

1) Review some of the common musculoskeletal research trends with current clinical applications in patient care.

SPIS61L Top Trends in Tumor Imaging

Friday, Nov. 30 11:30AM - 11:45AM Room: E450A

Participants
Takatoshi Aoki, MD, PhD, Kitakyusyu, Japan (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the advanced techniques in musculoskeletal oncology. 2) Describe the radiomics for bone and soft tissue tumor imaging. 3) List the newly updated entities of bone and soft tissue tumors.

SPIS61M Top Trends in Marrow Imaging

Friday, Nov. 30 11:45AM - 12:00PM Room: E450A

Participants
Frederic E. Lecouvet, MD, Brussels, Belgium (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify achievements, indications and future developments of whole skeleton MRI in oncology. Know new treatment paradigms and expectations from imaging in oncology. 2) Understand the growing importance of multiparametric approaches and radiomics in oncologic marrow imaging. 3) Differentiate various spontaneaous epiphyseal lesions sharing bone marrow edema at MRI as common feature. 4) Understand the prognostic role of MRI. 5) Identify the upcoming technical developments and new indications of MRI and dual energy CT in bone marrow pathology.

SPIS61N Top Trends in Extremity Imaging

Friday, Nov. 30 12:00PM - 12:15PM Room: E450A

Participants
Christine B. Chung, MD, La Jolla, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify current challenges and gaps in clinical practice for evaluation of musculoskeletal tumors, bone marrow and extremity pathology. 2) Apply novel imaging and post-processing techniques that improve diagnosis and characterization of musculoskeletal tumors, bone marrow and extremity pathology.

SPIS61O Discussion

Friday, Nov. 30 12:15PM - 12:30PM Room: E450A

SPFR61

Friday Imaging Symposium: Screening with Imaging in 2018: Who Benefits?

Friday, Nov. 30 12:30PM - 3:00PM Room: E350

BR CH GI GU OI

AMA PRA Category 1 Credits ™: 2.50
ARRT Category A+ Credits: 3.00

FDA Discussions may include off-label uses.

Participants
Hebert Alberto Vargas, MD, Cambridge, United Kingdom (*Moderator*) Nothing to Disclose
Dow-Mu Koh, MD,FRCR, Sutton, United Kingdom (*Moderator*) Nothing to Disclose

Sub-Events

SPFR61A Breast Cancer Screening: Lessons Learned from Where it all Started

Participants
Victoria L. Mango, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mangov@mskcc.org

LEARNING OBJECTIVES

1) Discuss early mammography screening trials for breast cancer. 2) Analayze recent multi-modality breast cancer screening literature. 3) Apply lessons learned from breast cancer screening to future screening for other diseases.

ABSTRACT

N/A

URL

N/A

SPFR61B Emerging CRC Screening Options

Participants
Perry J. Pickhardt, MD, Madison, WI (*Presenter*) Stockholder, SHINE Medical Technologies, Inc; Stockholder, Elucent Medical; Advisor, Bracco Group;

LEARNING OBJECTIVES

1) To Understand the various CRC screening options, with emphasis on newer emerging strategies.

ABSTRACT

N/A

URL

N/A

Honored Educators

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SPFR61C Liver Cancer Screening: Who Benefits?

Participants
Bachir Taouli, MD, New York, NY (*Presenter*) Research Grant, Guerbet SA; Research Grant, Bayer AG

For information about this presentation, contact:

bachir.taouli@mountsinai.org

LEARNING OBJECTIVES

1) Review current guidelines for liver cancer screening, including target population and methods used. 2) Review the limitations of blood markers and ultrasound for liver cancer screening. 3) Review new methods such as abbreviated MRI for liver cancer

screening.

ABSTRACT

Hepatocellular carcinoma (HCC) is the 2nd leading cause of cancer-related death worldwide, and the fastest growing cause of cancer death in the USA. The most important risk factor for HCC is cirrhosis. In this presentation, we will discuss the rationale of HCC screening, the most recent AASLD guidelines for HCC screening and surveillance using ultrasound (US) with or without alpha-fetoprotein (AFP). We will review the current results and limitations of this strategy. We will also review recent developments in the use of abbreviated MRI protocols for HCC screening and surveillance.

SPFR61D Lung Cancer: Should We Be Screening Patients with Other Cancers?

Participants
Michelle S. Ginsberg, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the approach to the inclusion of patients with a previous history of malignancy in lung cancer screening studies. 2) To discuss the need for lung cancer screening in survivors of other cancers.

SPFR61E Prostate Cancer Screening: Will it Ever Happen?

Participants
Harriet C. Thoeny, MD, Bern, Switzerland (*Presenter*) Advisory Board, Guerbet SA

LEARNING OBJECTIVES

1) To identify the disadvantages of the current gold standard of prostate cancer detection. 2) To differentiate significant form insignificant PCa and to understand its impact on management. 3) To assess the prerequisites of mpMRI as a screening tool of prostate cancer detction.

ABSTRACT

Prostate cancer (PCa) is the most frequent malignant tumor in men in Europe and the USA. Up to date systematic transrectal ultrasound guided- (TRUS) biopsy based on a rise in PSA and/or a suspicious digital rectal examinaition is the gold standard in PCa detection. However, this approach is unsatisfactory as it leads to over-and underdiagnosis of PCa. MpMRI is now an integrated part in the workup of PCa in many institutions and MR/TRUS-fuion guided instead of systematic blind biospies are more frequently used leading to a higher detection rate of significant PCa on one hand and a lower detection rate of insignificant PCa on the other hand. The NPV of mpMRI to detect significant PCa is reported between 63-98% depening on patient selection. mpMRI improves PCa detection and might therefore be a valuable tool for PCa screening however, the prerequisities include excellent image quality, a dedicated and experienced radiologist, availabilty of MRI and a short imaging protocol without contrast medium administration to make the healthcare authoritites considering mpMRI as a cost effective screening tool. Furthermore, an improved NPV might reduce the number of unnecessary biopsies in a high number of men and therefore decrease costs for the healthcare system.

SPFR61F Ovarian Cancer Screening: Have We Given Up Yet?

Participants
Andrea G. Rockall, FRCR,MRCP, London, United Kingdom (*Presenter*) Speaker, Guerbet SA

LEARNING OBJECTIVES

1) To know about the results of ovarian cancer screening studies. 2) To understand the possible reasons for failure. 3) To be aware of screening studies in high risk patients.

Honored Educators

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SPFR61G Non-cancer Screening: Should We Screen for Cardiovascular Diseases with Imaging?

Participants
Mathias Prokop, PhD, Nijmegen, Netherlands (*Presenter*) Speakers Bureau, Bracco Group; Speakers Bureau, Bayer AG; Research Grant, Canon Medical Systems Corporation; Speakers Bureau, Canon Medical Systems Corporation; Research Grant, Siemens AG ; Speakers Bureau, Siemens AG ; Departmental spinoff, Thirona; Departmental licence agreement, Varian Medical Systems, Inc; ;

SPFR61H Whole-body Screening for Multiple Cancers: Is a One-Stop-Shop Approach Feasible?

Participants
Giuseppe Petralia, MD, Milan, Italy (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the most appropriate imaging technique for whole-body cancer screening. 2) Arrange a whole-body MRI scanning protocol in their home Institutions. 3) Describe findings observed in a whole-body MRI performed for cancer screening in a Likert scale. 4) Recommend the whole-body MRI for cancer screening to the appropriate population.