ANNUAL REPORT 2020

SCHOOL OF PHARMACEUTICAL SCIENCES (ISPSO)

INTRODUCTION FROM THE PRESIDENCY

Comme chaque année, nous éditons le rapport annuel de la Section des sciences pharmaceutiques (ISPSO). Le rapport 2020 décrit les activités administratives et d'enseignement de la Section (ISPSO) ainsi que les activités de toutes les unités de recherche qui lui sont rattachées.

Cette année a été particulière avec la crise sanitaire qui a bloqué puis réduit toutes les activités de l'Université à partir du 15 mars 2020. Malgré cette situation inédite, notre Section a mis en place rapidement, avec l'aide de tous les services de l'Université, des outils qui ont permis d'assumer pleinement notre mission. Les cours ont été organisés en non-présentiel et le télétravail a été mis en place pour tous les membres de la Section (ISPSO). Les activités de recherche en laboratoire ont pu reprendre dans des conditions sanitaires respectées à partir du mois de mai.

A la lecture du rapport d'activité, il apparait que non seulement la Section (ISPSO) a réussi à remplir complètement ses missions, mais a même réussi à obtenir plus de fonds externes compétitifs et à maintenir le nombre d'étudiant-es inscrit-es ainsi que le nombre de doctorant-es et post-doctorant-es. Concernant les activités scientifiques (page 14 du rapport), celles-ci ont été maintenues, voire même développées, à l'exception des participations à des congrès.

La Présidence de la Section est très reconnaissante envers toutes ses collaboratrices et tous ses collaborateurs de leur engagement et de leur résilience durant cette année 2020, ce qui a permis de maintenir la qualité reconnue mondialement de notre Section (ISPSO).

As every year, we publish the annual report of the School of Pharmaceutical Sciences (ISPSO). The report 2020 describes the administrative and teaching activities of the School (ISPSO) as well as the activities of all the research units.

The uniquely difficult circumstances caused by COVID-19 brought the University's "normal" activities to a halt on March 15, 2020 followed by a gradual and limited resumption. Despite this situation, our School adapted quickly and, with the help of the University's services, tools were put in place that made it possible to fulfil our mission. The courses were organised and made available online and "tele-working" was authorised and enabled for all members of the School (ISPSO). In May 2020, laboratory research activities resumed but were restricted and respected strict health and safety rules.

On reading this activity report, it is clear that the School not only succeeded in completely fulfilling its missions, but despite the problems faced, was also successful in obtaining more competitive external funds. The number of registered students as well as the number of doctoral and post-doctoral students were also maintained. In addition, research activities (page 14) were maintained or even developed further, although participation in national/international conferences was understandably reduced.

The Presidency of the School thanks all its collaborators for their commitment and their resilience during this year 2020 in order to maintain the internationally recognised quality of our School (ISPSO).

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DIRECTION AND ADMINISTRATION

BOARD MEMBERS

Prof Eric Allémann, President (until July 2020), Vice President (from July 2020)
Prof Jean-Luc Veuthey, President (from July 2020)
Prof Chantal Csajka, Vice President
Prof Yogeshvar Kalia, Vice President (until July 2020)

ADMINISTRATION

Mrs Françoise Védy, Administrator, 100%
Mrs Danielle Coosemans, Administrative Assistant, 60%
Mrs Sylvia Passaquay Rion, Administrative Assistant, 50%

STUDENTS SECRETARY

Dr Elisabeth Rivara-Minten, Student Advisor, 40%
Mrs Elena Onate, Administrative Assistant, 90%
Mrs Elisa Masson, Secretary, 80%

IT STAFF

Mr Christophe Francey, Devops IT, 50% (since November 2020)
Mr Loris Franco, System Administrator, 100%
Mr Yann Manet, System Administrator, 100%
Mr Xavier Melich, Helpdesk Support, 80%

DOCTORAL PROGRAM

Dr Beatrice Kaufmann, Coordinator, 15%
Mrs Florence Von Ow, Secretary, 20%

ABBREVIATIONS

PO	*Full Professor*
PAS	*Associate Professor*
PAST	*Assistant Professor*
PTI	*Adjunct Professor*
PI	*Visiting Professor*
PD	*Privat-Docent*
MER / CC	*Senior Lecturer*
CE	*Lecturer*
CS	*Research Associate and Senior Research Associate*
MA	*Senior Research and Teaching Assistant*
POSTDOC	*Postdoctoral Scholar*
ASS	*Research and Teaching Assistant*

RESEARCH UNITS

ANALYTICAL SCIENCES

Prof Jean-Luc VEUTHEY, PO
Prof Serge RUDAZ, PAS
Dr Davy GUILLARME, CC, MER

BIOMOLECULAR AND PHARMACEUTICAL MODELLING

Prof Francesco Luigi GERVASIO, PO

BIOPHARMACY

Prof Gerrit BORCHARD, PO
Dr Olivier JORDAN, MER

CLINICAL PHARMACOLOGY AND TOXICOLOGY

Prof Jules DESMEULES, PO

CLINICAL PHARMACY SCIENCES

Prof Chantal CSAJKA, PO

COMMUNITY PHARMACY PRACTICE

Prof Olivier BUGNON, PAS *(†13.05.2020)*
Dr Jérôme BERGER, CE
Dr Philippe LAURENT, CC
Dr Martin BERNHARDT, CC

HOSPITAL PHARMACY (HUG / CHUV)

Prof Pascal BONNABRY, PAS
Prof Farshid SADEGHIPOUR, PTI

IMMUNOPHARMACOLOGY OF CANCER

Prof Carole BOURQUIN, PO

MOLECULAR PHARMACOLOGY

Prof Patrycja NOWAK-SLIWINSKA, PA

PHARMACEUTICAL BIOCHEMISTRY

Prof Leonardo SCAPOZZA, PO
Prof Yogeshvar KALIA, PAS
Dr Emmanuel VARESIO, MER

PHARMACEUTICAL TECHNOLOGY

Prof Eric ALLÉMANN, PO
Prof Norbert LANGE, PAS
Dr Florence DELIE-SALMON, MER

PHARMACOGNOSY

Prof Muriel CUENDET, PAS
Dr Philippe CHRISTEN, MER *(until 31.10.2020)*

PHYTOCHEMISTRY & BIOACTIVE NATURAL PRODUCTS

Prof Jean-Luc WOLFENDER, PO
Dr Emerson FERREIRA-QUEIROZ, MER

MEDICATION ADHERENCE AND INTERPROFESSIONALITY

Prof Marie-Paule SCHNEIDER, PTI

DATA ANAYTICS LAB

Prof Stéphane GUERRIER, PAST

SCHOOL OF PHARMACEUTICAL SCIENCES
COMMITTEE SITUATION ON JANUARY 1st, 2020

TEACHING COMMITTEE – President: Prof Jean-Luc Veuthey (until September 2020), Prof Muriel Cuendet (since September 2020)

REGULATIONS AND EQUIVALENCE COMMITTEE – President: Prof Muriel Cuendet (until September 2020), Prof Serge Rudaz (since September 2020)

GRADES, EXAMINATIONS AND DEROGATIONS COMMITTEE – President: Prof Eric Allémann (until September 2020), Prof Jean-Luc Veuthey (since September 2020)

CONTINUING EDUCATION AND PUBLIC COURSES COMMITTEE – President: Prof Gerrit Borchard

EXTERNAL DOCTORAL STUDENTS AND TRAINEES ADMISSION COMMITTEE – President: Prof Gerrit Borchard

DOCTORAL PROGRAMME COMMITTEE – President: Prof Yogeshvar Kalia

SECONDARY EDUCATION COMMITTEE – President: Elena Onate

BUDGET COMMITTEE – President: Prof Eric Allémann (until September 2020), Prof Carole Bourquin (since September 2020)

IT COMMITTEE – President: Prof Norbert Lange (until September 2020), Prof Francesco Luigi Gervasio (since September 2020)

SECURITY AND PREMISES COMMITTEE – President: Prof Eric Allémann (until September 2020), Prof Jean-Luc Veuthey (since September 2020)

SCIENTIFIC COMMITTEE – Presidents: Prof Francesco Luigi Gervasio and Prof Leonardo Scapozza

GLOBAL PHARMACY COMMITTEE – President: Prof Pascal Bonnabry

SHARED INSTRUMENTATION COMMITTEE – President: Prof Yogeshvar Kalia (until September 2020), Prof Eric Allémann (since September 2020)

PRACTICAL WORK COMMITTEE – President: Florence Delie

VISIBILITY COMMITTEE – President: Prof G. Borchard (since September 2020)

BIOMEDICAL SCIENCES TEACHING COMMITTEE – Presidents: Prof Pierre Cosson (Medicine) and Prof Leonardo Scapozza

CMU LIBRARY INSTANCE – Responsible: Prof Jean-Luc Veuthey (until September 2020), Prof Serge Rudaz (since September 2020)

STAFF

PROFESSORS

Eric ALLÉMANN, 100%
Tudor ARVINTE, 10%
Pascal BONNABRY, 15% (+HUG)
Gerrit BORCHARD, 100%
Carole BOURQUIN, 80% (+20% APSIC, but 100% payed by the Section)
Olivier BUGNON, 50% (+Unisanté) *(†13.05.2020)*
Chantal CSAJKA, 50% (+UNIL)
Muriel CUENDET, 100%
Jules DESMEULES, 20 % (payed by Faculty of Medicine)
Francesco Luigi GERVASIO, 100% (since February 2020)
Stéphane GUERRIER, 50% (+ 50% GSEM)
Yogeshvar KALIA, 100%
Norbert LANGE, 100%
Patrycja NOWAK-SLIWINSKA, 100%
Serge RUDAZ, 100%
Farshid SADEGHIPOUR, 15% (+CHUV)
Leonardo SCAPOZZA, 100%
Marie-Paule SCHNEIDER, 50% (+Pharma24)
Jean-Luc VEUTHEY, 100%
Jean-Luc WOLFENDER, 100%
Frédéric ZENHAUSERN, 20% (bénévole)

SENIOR LECTURERS

Philippe CHRISTEN, 100% *(until October 2020)*
Florence DELIE-SALMON, 100%
Emerson FERREIRA QUEIROZ, 100%
Davy GUILLARME, 100%
Olivier JORDAN, 100%
Philippe LAURENT, 12.5%
Alain MERKLI, 5%
Emmanuel VARESIO, 50% (+50% Faculty of Sciences)

INVITED RESEARCHERS

Lia TSIKLAURI (01.08.2019 to 31.01.2020)

LECTURERS

Jérôme BERGER, 20% (+Unisanté)
Martin BERNHARDT, 10%
Chin Bin EAP, 10% (+UNIL)
Pascal FURRER, 100%
Karl PERRON, 40% (+ 60% BIVEG)
Christian KOLLER, 5%
Elisabeth RIVARA-MINTEN, 40%
Philippe LAURENT, 12.5%

PRIVAT DOCENTS

Johnny BENEY
Youssef DAALI (+ 20% Faculty of Medicine)
Sandrine FLEURY SOUVERAIN
Marco PRUNOTTO
Pierre VOIROL
Nicolas WIDMER

SENIOR RESEARCH ASSOCIATES

Yvonne ARNOLD, 80% *(until 31.08.2020)*
Julien BOCCARD, 100%
Livia BRUNNER, 50% *(until 29.02.2020)*
Sylvian CRETTON, 100%
Olivier DORCHIES, 100%
Carolina ESTARELLAS MARTIN, 20% *(since 01.10.2020)*
Szabolcs FEKETE, 100%
Victor GONZALEZ RUIZ, 100%
Thomas GURRY, 100 %
Beatrice KAUFMANN, 55 % (+15% Faculty)
Maria LAPTEVA, 80% *(since 01.09.2020)*
Laurence NEFF, 80%
Sophie WURTH, 40% *(since 01.09.2020)*
Magali ZEISSER-LABOUEBE, 80%

SENIOR RESEARCH AND TEACHING ASSISTANTS

Pierre-Marie ALLARD, 100%
Valentina D'ATRI, 100% *(since 01.07.2020)*
Hesham HAMED, 100%
David PEJOSKI, 100% *(since 01.10.2020)*
Aurélien POMMIER, 100%, 80% *(since 01.11.2020)*
Viola PUDDINU, 100% *(since 01.11.2020)*
Sébastien TARDY, 100%
Elena TOBOLKINA, 100%
Narasimha UDA, 100%

POSTDOCTORAL SCHOLARS

Ali BAKIRI, 100% *(until 29.02.2020)*
Santiago CODESIDO SANCHEZ, 100% *(until 30.04.2020)*
Valentina D'ATRI, 100% *(until 30.06.2020)*
Isabel FERNANDEZ COIRA, 100%

Si GOU, 85% *(since 01.06.2020)*
Nicolas GUICHARD, 50% *(until 31.05.2020)*
Ladislav HOVAN, 85% *(since 01.06.2020)*
Nasreddine KANFAR, 90% *(since 01.04.2020)*
Maria LAPTEVA, 85% *(until 31.08.2020)*
Gioia LENZONI, 100%
Eulalia OLESTI MUNOZ, 100%
Viorica PATRULEA, 100% *(until 31.07.2020)*
Julian PEZZATTI, 100% *(since 01.09.2020)*
Viola PUDDINU, 85% *(until 31.10.2020)*
Patricia QUINTANA BARCENA, 60% *(until 30.11.2020)*
Sakthikumar RAGUPATHY, 85%
Carlos RODRIGUEZ NOGALEZ, 100% *(since 01.12.2020)*
Martha SIERRA ARREGUI, 100% (Marie Curie) *(until 31.07.2020)*
Francesca TESSARO, 85% *(since 01.09.2020)*
Stefan ZWEIFEL, 100% *(until 31.08.2020)*

RESEARCH AND TEACHING ASSISTANTS

Kenza ABOUIR
Souad ADRIOUACH
Adlin AFZAN
Abdulelah ALFATTANI
Carole BANDIERA
Cintìa BAPTISTA MARQUES
Beatriz BASTOS SOARES DOS SANTOS
Noura BAWAB
William BELLO
Léa BODEN
Bart BOERSMA
Alberto BORSATTO
Théo BRILLATZ
Christel BRUGGMANN
Joël BRUNNER
Benjamin BUGNON
Damien CATEAU
Anne CAYRON
Carlotta CECCHINI
Aude COUMAU
Claire COUMAU
Aditya DARADE
Carlota DE LACERDA SALGADO
Marianne DOR
Eloïse DUCREY
Bastian DUIVELSHOF
Eloïse DUPUYCHAFFRAY
Radhia EL MORABIT
Radhia EL PHIL
Akram FARHAT
Micaela FARIA FREITAS
Jonathan FARO BARROS
Sabrina FERRE
Angelica FERRO
Audrey FLORNOY
Ioannis GALDADAS
Alexandra GARNIER
Laure GARNIER
Frédéric GASPAR
Arnaud GAUDRY
Elinam GAYI
Sergey GIREL
Paula GONZALEZ FERNANDEZ
Laura GONZALEZ IGLESIAS
Si GOU
Ghali GUEDIRA
Dina HANY
Margaux HERITIER
Sébastien HEVIN
Sandra HOCEVAR
Ladislav HOVAN
Robin HUBER
Mégane JERMINI
Maurice KARRENBROCK
Martin KIENING
Olivier Auguste KIRCHHOFFER
Marko KRSTIC
Honorine LARDEUX
Céline LEMOINE
Camille LENOIR
Angela LISIBACH
Sophie LONCHAMPT
Luca Gioacchino LOSACCO
Gaëlle MAGLIOCCO
Blanca MARIN BOSCH
Franck MARQUET
Josep MASSANA-CODINA
Julianne MAURIN
Tamara MELNIK
Stéphanie MENA
Hugo MORIN
Amarande MURISIER
Aline MUTABAZI
Sara PANNILUNGHI
Allegra PELETTA
Léonie PELLISSIER
Marija PETROVIC
Julian PEZZATTI
Laeticia PINTO
Hélène POINOT

Alexandre PORCELLO
Julie QUARTIER
Luis QUIROS-GUERRERO
M. Adèle RAKOTONIRINA
George RAMZY
Magdalena RAUSCH
Rafael RINCON
Benjamin ROSSIER
Thomas RUDOLF VON ROHR
Adriano RUTZ
Carlotta SALGADO
Ece SAHI
Suzanne SAHRAOUI
Phedra SAHRAOUI
Sara SANSALONI PASTOR
Noémie SARAUX
Laurence SCHUMACHER
Ozlem SEVIK
Whitney SHATZ
Elodie SIMI
Christian SKALAFOURIS
Isabelle SOMMER
Weronika SPALENIAK
Sofia SPATARO
Nathalie STEINHOFF
Camille SUESS
Betül TASKOPARAN
Francesca TESSARO
Gioele VISCONTI
Vassily VOROBIEV
Tatjana VUJIC
Julia WAGNER
Marloes ZOETEMELK

RESEARCH ASSISTANTS (ARE)

Lenaic Arnold BALLY
Massimo CONTESSE
Albin DEDA
Ildir FELIHA
Catarina GONCALVES MILHO
Harry HAGEN
Viktor KOH
Oriane MARTIN-PELLAUD
Luca MORICI
Nikola NOWTARSKA
Pierre REPITON
Mark TROPIN
Martine MIR

INTERNSHIP STUDENTS / VISITING SCHOLARS

Giane CORREA FERREIRA (March – May 2020)
Filippo DONATI (October – November 2020)
Noëlla GROSSI (September 2020 – August 2021)
Narjara LARANJA (October 2020 – February 2021)
Honorine LARDEUX (February – August 2020)
José Antonio NAVARO HUERTA (September – December 2020)
Pauline RATHIER (April – August 2020)
Gajraj RATHORE (September 2020 – March 2021)
Katia SAYAF (March – August 2020)
Mattia STANCHIERI (October – March 2020)
Julien MASSARI (February - July 2020)

JOINTLY SUPERVISED PHD STUDENTS AND JOINTLY SUPERVISED PHD STUDENTS FROM ANOTHER UNIVERSITY

Perrine COURLET (C. Csajka ISPSO / L. Décosterd UNIL)
Alexandra LITVINENKO (Geneva University: Radiology Department / ISPSO)
Solène MASLOH (Artois University (France) / Geneva University)

ADMINISTRATIVE STAFF

Nathalie CHIAVAROLI, 50%
Danielle COOSEMANS, 60%
Marilyn FREIRE BARJA ZLASSI, 80%
Nathalie GOFFIN, 80%
Dominique HUNZIKER, 80%
Elisa MASSON, 80%
Elena ONATE, 90%
Sylvia PASSAQUAY-RION, 50%
Miroslava REBETEZ-GRALEWICZ, 50% (auxiliary)
Natalie SCHREGLE, 80%
Françoise VÉDY, 100%
Florence VON OW, 90% (20% progdoc + 50% Research unit secretary +20% secretary for the Faculty)
Anne-Françoise WITTA, 50%

IT STAFF
Christophe FRANCEY, 50% (since November 2020)
Loris FRANCO, 100%
Yann MANET, 100%
Xavier MELICH, 80%

TECHNICAL STAFF

Montserrat ALVAREZ, 100%
Frédéric BORLAT, 100%
Nathalie BOULENS, 60%
Carole DUPRAZ, 35%
Christophe FRANCEY, 100% (incl. 50% Devops IT since November 2020)
Sarah GARDI, 100%
Aurélie GOUILLER, 90%
Tayeb JBILOU, 80%
Sara LEONI, 20% (until March 2020)
Laurence MARCOURT, 100%
Aristea MASSARAS, 100%
Xavier MELICH, 100% (incl. 80% IT Helpdesk support)
Hélène MOTTAZ, 50%
Jessica ORTELLI, 90%
Marco PERDIGAO, 100%
Olivier PETERMANN, 80%
Barbara PINHEIRO, 40%
Colette SAUTY, 50% (until March 2020) then 25%
Cédric SCHELLING, 100%
Marie SOTTAS, 40% (until April 2020)
Emmanuelle SUBLET, 60% (70% since February 2020)

BUDGET

SALARY AND OPERATIONAL BUDGETS (CHF)	2020	2019	2018	2017	2016
Staff salary (incl. social charges)	12 054 874	11 851 759	11 969 356	11 844 570	11 736 363
Operational budget	1 149 166	1 143 666	1 133 916	1 137 693	1 180 411
Total	**13 204 040**	**12 995 425**	**13 103 272**	**12 982 263**	**12 916 774**

INVESTMENT BUDGET (CHF)	2020	2019	2018	2017	2016
Faculty investment	292 653	246 855	248 218	213 993	454 276
Section investment	290 979	290 979	290 979	279 787	290 979
Total	**583 632**	**537 834**	**539 197**	**493 780**	**745 255**

EXTERNAL FUNDS (CHF)	2020	2019 (*)
Research funds (SNSF and others)	6 724 496	5 535 149
Service agreements and related activities	890 169	1 160 619
Total	**7 614 665**	**6 695 768**

(*) Modification in 2020 of the funds calculation rule for J. Desmeules in order to take into account his activity rate (20%) in the Section

EXTERNAL FUNDS (CHF)	2018	2017	2016
Total	**4 391 261**	**5 420 959**	**4 939 950**

TOTAL BUDGET (CHF)	2020	2019 (*)	2018	2017	2016
Total	**21 402 337**	**20 229 027**	**18 033 730**	**18 897 002**	**18 601 979**

(*) Modification in 2020 of the funds calculation rule for J. Desmeules in order to take into account his activity rate (20%) in the Section

STAFF SCHOOL OF PHARMACEUTICAL SCIENCES	2020	2019	2018	2017	2016
Total	249	254	242	216	230

2020 AT A GLANCE

2020 TOTAL BUDGET (CHF)	21 402 337

TOTAL STUDENTS	2020	2019	2018	2017	2016
Bachelor	337	352	339	309	287
Master	182	170	152	152	159
Master of advanced studies	24	20	20	19	19
Total	**543**	**542**	**511**	**480**	**465**

TOTAL Ph.D STUDENTS AND POSTDOCTORALS	2020	2019	2018	2017	2016
Ph.D. Students	113	111	100	90	76
Postdoctorals	20	23	26	18	32
MA	9	7	8	9	8
Total	**142**	**141**	**134**	**117**	**116**

SCIENTIFIC ACTIVITIES	2020	2019
Publications with impact factor	251	212
Publications without impact factor	45	91
Patents	9	6
Books and chapters	7	8
Congresses / conferences organisation	21	40
Posters presentations	58	179
Oral presentations	42	134
Invited oral presentations	77	177
Number of projects at FNRS and assimilated (Research funds)	85	79
Service agreements and related activities	23	38
Ph.D. theses presented	22	18
Awards and distinctions	23	31
Public outreach activities	45	48

2020 KEY EVENTS

Prof. Olivier Bugnon, professor of community pharmacy, died on 13 May 2020. His sudden departure is a loss for teaching and research in community pharmacy of which he was a nationally and internationally recognised pioneer.

Classification (ranking) by domains of QS World University

Our School of Pharmaceutical Sciences obtained an excellent ranking of 33 according to QS World University Rankings by Subject.
This ranking identifies the world's strongest universities in 51 disciplines, grouped into five broad subject areas (Arts & Humanities, Engineering and Technology, Life Sciences & Medicine, Natural Sciences and Social Sciences & Management).
Research citations, along with the results of major global surveys of employers and academics are used to rank universities. They are compiled annually in order to identify the leading universities in a particular subject.

New professor (PO) Francesco Luigi Gervasio

Prof. Francesco Luigi Gervasio joined in 2019 as the head of the Biomolecular and Pharmaceutical Modelling group.
Before joining our section he was full professor and chair of Biomolecular Modelling in the departments of Chemistry and the Institute of Structural and Molecular Biology of the University College London, where he still holds a part-time position. He is the editor in chief of Frontiers in Biological Modeling and Simulations and the Director of the JC Maxwell CECAM node.
His research focuses on the development and application of computational methods, in particular enhanced sampling algorithms, to study complex biomolecular systems, understand allosteric regulation and design novel drugs.

ANALYTICAL SCIENCES

Professor Serge RUDAZ
Professor Jean-Luc VEUTHEY
Doctor Davy GUILLARME

General description of the Unit

The group focuses its activities on separation techniques mainly liquid chromatography (LC), capillary electrophoresis (CE) and supercritical fluid chromatography (SFC) coupled with various detectors, including mass spectrometry (MS) for the analysis and bioanalysis of pharmaceutical substances. New chromatographic supports and sample preparation approaches are evaluated and original strategies to gain selectivity and/or sensitivity of the analytical process are developed. Reduction of the total analysis time is also studied. Special focus is given to the analytical characterization of biopharmaceutical products, including monoclonal antibodies and related compounds, as well as oligonucleotides.

The research of this group also aims at the development of new strategies for targeted and untargeted metabolomic analyses with a focus on the analysis of low molecular weight compounds in biological matrices. Since 2010, the group is also investigating original approaches dedicated to the analysis of data produced by MS couplings, including CE. The use of chemometric tools for developing analytical methods, determining optimized or robust conditions, as well as for analyzing data with pattern recognition techniques are applied in many projects within the School of Pharmaceutical Sciences and numerous external academic and/or industrial collaborations. Aspects of dimensionality reduction and multi-block analysis are addressed through collaborative projects in the fields of toxicology, biology, biochemistry, and pharmacology.

Specific research fields

- Liquid chromatography (LC)
- Capillary electrophoresis (CE)
- Supercritical fluid chromatography (SFC)
- Hyphenation to mass spectrometry (MS)
- Sample preparation
- Analytical Method Validation
- Chemometrics
- Metabolomics
- Toxicology
- Oligonucleotides
- Monoclonal antibodies

2020 at a glance

- Publications with impact factor : 50
- Publications without impact factor : 5
- Patents : 0
- Book and chapters : 4

- Congresses / conferences organisation : 3
- Posters presentations : 5
- Oral presentations : 10
- Invited oral presentations : 28
- Number of projects at FNRS and assimilated (Research funds) : 5
- Service agreements and related activities : 1
- Ph.D. Theses presented in 2020 : 2
- Awards and distinctions: 6
- Public outreach activities : 0

Research funds

Ferring International Center S.A.
Analytical characterization of FERRING monoclonal antibody
Main applicant: Davy Guillarme
Total funding of the project: CHF 88'148.-
Total duration of the project: 2 years
Allocation 2020: CHF 44'000.-
Starting date: 01.10.2019

Merck Sharp & Dohme Corp.
Exacting modifier additive and decompression cooling effects in analytical and preparative SFC using infrared thermal imaging and other techniques
Main applicant: Davy Guillarme
Total funding of the project: $ 50'000.-
Total duration of the project: 2 years
Allocation 2020: $ 25'000.- (CHF 24'024,50)
Starting date: 01.06.2020

OMICS-RUSSIA
Development and application of extended steroid profiling to clinical practice: a metabolomics approach
Main applicant: Serge Rudaz
Total funding of the project: 17'000.-
Total duration of the project: 2 years
Allocation 2020: CHF 13'600.-
Starting date: 01.10.2020

SCAHTSCAHT
Metabolomic profile alteration by neuroinflammatory conditions
Main applicant: Serge Rudaz
Total funding of the project: CHF 415'566.-
Total duration of the project: 4 years (new contract: 31.12.2020)
Allocation 2020: CHF 207'783.-
Starting date: 01.01.2017

Waters Technologies Corporation
Improving chromatographic strategies for the analytical characterization of proteins biopharmaceuticals
Main applicant: Davy Guillarme
Total funding of the project: $100'000.-
Total duration of the project: 1 year
Allocation 2020: $ 50'000.- (CHF 48'200.-)
Starting date: 01.05.2019

Total amount for all research funds for 2020: CHF 337'607.50

Service agreements and related activities

Debiopharm International SA
Method development and validation for a Debiopharm molecule
Main applicant: Davy Guillarme
Total funding of the project: CHF 25'274.-
Total duration of the project: 2 months
Allocation 2020: CHF 25'274.-
Starting date: 01.11.2020

Total amount (for all service agreements and related activities) for 2020: CHF 25'274.-

Scientific publications (with impact factor)

Guillarme, D.; West, C., Editorial for the virtual special issue SEP 2019. J Chromatogr A 2020, 1619, 460888. *4.049*

D'Atri, V.; Murisier, A.; Fekete, S.; Veuthey, J.-L.; Guillarme, D., Current and future trends in reversed-phase liquid chromatography-mass spectrometry of therapeutic proteins. TrAC Trends in Analytical Chemistry 2020, 130. *9.801*

Camperi, J.; Guillarme, D.; Lei, M.; Stella, C., Automated middle-up approach for the characterization of biotherapeutic products by combining on-line hinge-specific digestion with RPLC-HRMS analysis. J Pharm Biomed Anal 2020, 182, 113130. *3.209*

Guichard, N.; Tobolkina, E.; El Morabit, L.; Bonnabry, P.; Vernaz, N.; Rudaz, S., Determination of antiretroviral drugs for buyers' club in Switzerland using capillary electrophoresis methods. Electrophoresis 2020. *3.081*

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Guillarme, D.; Sandra K., Editorial for the special issue entitled “Advances in pharmaceutical analysis”, LC-GC Europe 2020, 33(s10), 5. *1.482*

Losacco, G. L.; Ismail, O.; Pezzatti, J.; Gonzalez-Ruiz, V.; Boccard, J.; Rudaz, S.; Veuthey, J. L.; Guillarme, D., Applicability of Supercritical fluid chromatography-Mass spectrometry to metabolomics. II-Assessment of a comprehensive library of metabolites and evaluation of biological matrices. J Chromatogr A 2020, 1620, 461021. *4.049*

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Publications without impact factor

Barbas C.; Chankvetadze B.; Furlanetto S.; Ganzera M.; Haginaka J.; Li S.; Moaddel R.; Ozkan S.; and Veuthey J.-L; Preface, Journal of Pharmaceutical and Biomedical Analysis 2020, 182, 113162.

Borcic, V.; Calmy, A.; Hurst, S.; Jackson, Y.;Negro, F.; Perrier, A.; Wolff, H.; Getaz, L.; Bréchet, A.-C.; Valladores, P.; Rudaz, S.; Vernaz, N., Buyers club an alternative for access to treatment. Rev Med Suisse 2020, 16, 2228-2231.

Rudaz, S., The Bioanalysis Glossary Member of the Bioanalysis Glossary Panel, Bioanalysis 2020, 4th Edition, vol. 12, 21, suppl.1.

Codesido, S.; Drouin, N.; Ferre, S.; Schappler, J.; Rudaz, S.; González-Ruiz V, A mature ROMANCE: a matter of quantity and how two can be better than one, ChemRxiv 2020.

Gagnebin, Y.; Pezzatti, J.; Lescuyer, P.; Boccard, J.; Ponte, B.; Rudaz, S., Chronic Kidney Disease, Toward a Better Understanding of the Disease Using Metabolomics, G.I.T. Laboratory Journal 2020, 24, 30.

Books or books chapters

Boccard, J.; Rudaz, S., Analysis of metabolomic data – A chemometrics perspective [In] Comprehensive Chemometrics (Second Edition), R. Tauler, Editor, Elsevier, 2020 483-505.

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Goyon, A.; Veuthey, J.L.; Guillarme, D.; Fekete, S., Size exclusion chromatography method development for therapeutic proteins [In] Chromatographic method development, Webster, G., Kott, L., Editors, Pan Stanford, 2020, 471-495.

Wagner-Rousset E.; Colas O.; Francois Y.; Heinisch S.; Guillarme D.; Cianferani S.; Beck A., Drug loading and distribution of ADCs after reduction or IdeS digestion and reduction, [in] Antibody-drug conjugates: methods and protocols, Methods in molecular biology, 2020, 2078, 187-195.

Congresses / conferences and Symposia

- Congresses / conferences organisation : 3
- Posters presentations : 5
- Oral presentations : 10
- Invited oral presentations : 28

Ph.D. Theses presented in 2020

- Blanca Marin Bosch
  Effects of acute physical exercise on memory
  Serge Rudaz and Sophie Schwartz

- Julian Pezzatti
  Application and Evaluation of Liquid Chromatography – High Resolution Mass Spectrometry in Untargeted Metabolomics for Compound Annotations in Biological Matrices
  Serge Rudaz

Awards and distinction

Codesido, S.; González-Ruiz, V.; Olesti, E.; Boccard, J.; Rudaz, S., Biosource-guided network annotation and visualization for untargeted metabolomics. **Best flash presentation award**, 1st prize. RFMF-Metabomeeting, 22-24 January 2020, Toulouse (France).

Codesido, S.; Boccard, J.; Rudaz, S., Interpretable class prediction in metabolomics: Bayes meets PLS trees. **Best Oral Presentation,** 2nd price – Young Chemometrician Award, Chimiométrie 2020, Liège (Belgium).

Fekete, S., **Emerging Leader of Chromatography Award**, LCGC, 2020 March, Pittcon, Chicago (USA).

Guillarme, D., **Elected among the top 10 most influential people in analytical sciences in Europa** – ranking reported in the analytical scientist, 2020, 91, 16-40

Olesti, E.; Codesido, S.; Garcia, A.; Rahban, R.; Rossier M.; Boccard, J.; Nef S.; Gónzalez-Ruiz, V.; Rudaz S., Steroid profile in human seminal fluid: is it linked to sperm quality? **Young Scientist AFSEP Award,** 35th International Symposium on Microscale Separations and Bioanalysis (e-MSB 2020), September 27-30, 2020.

Visconti, G.; Olesti, E.; González-Ruiz, V.; Rudaz, S., Alternative quantification of endogenous steroids with one-point calibration, **Runner-up Poster MSB 2020,** 35th International Symposium on Microscale Separations and Bioanalysis (e-MSB 2020), September 27-30, 2020.

BIOMOLECULAR AND PHARMACEUTICAL MODELLING

Professor Francesco Luigi GERVASIO

General description of Unit

The research group Biomolecular and pharmaceutical modelling, led by Prof. Francesco Luigi Gervasio, focusses on the development of methods for biomolecular simulations with emphasis on enhanced sampling methods, as well as multiscale and coarse-grained models. The group crucially contributed to the development of methods for overcoming the timescale problem (metadynamics, parallel-tempering metadynamics, path collective variables, SWISH), which are widely used across different fields ranging from drug discovery and biophysics to nanotechnology.

The research group applies these methods to develop new drugs and to study a multitude of complex biophysical phenomena, including protein dynamics and folding, ligand binding, allosteric mechanisms, the formation of cryptic binding sites and the modes of action of cancer-causing mutations. The simulations conducted by the group have guided the design of several allosteric inhibitors that are now in pre-clinical development as anticancer drugs. The group has a fruitful line of experimental research (NMR, SPR, mutagenesis) to validate the computational predictions, as well as a number of successful collaborations with pharmaceutical companies (such as UCB and AstraZeneca).

Specific research fields

- Modelling the regulation of therapeutic proteins by allosteric mechanisms and post-translational modification.
- Prediction of binding kinetics and its optimization to increase the efficacy and decrease the toxicity of drugs.
- Understanding cryptic binding sites and predicting their location on pharmaceutical targets.
- Computing accurate absolute ligand binding free energies.
- Multi-scale simulation approach to engineer nanocarriers.
- Understanding the activation mechanisms of drug targets such as kinases and GPCRs.
- Combining experiments and simulations to model the dynamics of biomacromolecules.
- Quantifying the effects of genetic mutations on protein structure and function.

2020 at a glance

- Publications with impact factor : 4
- Publications without impact factor : 1
- Patents : 0
- Book and chapters : 0
- Congresses / conferences organisation : 1 (postponed to 2021)
- Posters presentations : 0
- Oral presentations : 0
- Invited oral presentations : 5
- Number of projects at FNRS and assimilated (Research funds) : 3
- Service agreements and related activities : 0
- Ph.D. Theses presented in 2020 : 1
- Awards and distinctions: 0
- Public outreach activities : 0

Research funds

PRACE COVID-Fasttrack grant 6 million core-hours on HAWK (GCS@HLRS, Germany)
Main applicant: F.L GERVASIO
Total funding of the project: CHF 7'228
Funding duration: 1 year
Allocation 2020: CHF 7'228
Starting date: 01.05.2020

PRACE COVID-Fasttrack grant 30 mio core-hours on HAWK (GCS@HLRS, Germany)
Main applicant: F.L GERVASIO
Total funding of the project: CHF 36'150
Funding duration: 1 year
Allocation 2020: CHF 36'150
Starting date: 01.05.2020

CSCS – Production Project: "Understanding and comparing the mechanisms of activation of class A and class B G-protein-coupled receptors"
Main applicant: F.L GERVASIO
Total funding of the project: CHF 140'000
Funding duration: 3 months
Allocation 2020: CHF 140'000
Starting date: 01.10.2020

Total amount for all research funds for 2020: CHF 183'379

Service agreements and related activities

Total amount (for all service agreements and related activities) for 2020: CHF 0

Scientific publications (with impact factor)

Evans, R.; Hovan, L.; Tribello G.A.; Cossins, B.P.; Estarellas, C.; Gervasio, F.L., Combining Machine Learning and Enhanced Sampling Techniques for Efficient and Accurate Calculation of Absolute Binding Free Energies.
Journal of Chemical Theory and computation 2020, 16 (7), 4641-4654 *5.01*

Mattedi, G.; Acosta-Gutiérrez, S.; Clark, T.; Gervasio, F.L., A combined activation mechanism for the glucagon receptor. Proceedings of the National Academy of Sciences of the United States of America 2020, 117 (27), 15414-15422 9.41

Galdadas, I.; Gervasio F.L.; Cournia, Z., Unravelling the effect of the E545K mutation on PI3K alpha kinase. Chemical Science 2020, 11 (13), 3511-3515 *9.35*

Kuzmanic, A.; Browman, G.R.; Juarez-Jimenez, J.; Michel, J.; Gervasio, F.L., Investigating Cryptic Binding Sites by Molecular Dynamics Simulations. Accounts of Chemical Research 2020, 53 (3), 654-661 *20.82*

Scientific publications (without impact factor)

Ilmjärv, S.; Abdul, F.; Acosta-Gutiérrez, S.; Estarellas, C. Galdadas, I.; Casimir, M.; Alessandrini, M.; Gervasio, F.L.; Krause, K-H., Epidemiologically most successful SARS-CoV-2 variant: concurrent mutations in RNA-dependent RNA polymerase and spike protein. medRxiv 25.08.2020, https://doi.org/10.1101/2020.08.23.20180281

Congresses / conferences and Symposia

- Congresses / conferences organisation : 1 (postponed to 2021)
- Posters presentations : 0
- Oral presentations : 0
- Invited oral presentations : 5

Ph.D. Theses presented in 2020

- MATEDI Giulio (UCL)
  "Investigation of Ligand Selectivity and Activation Dynamics of G Protein-Coupled Receptors Using Enhanced Sampling Simulations"-24.04.2020
  Prof. Francesco Luigi Gervasio

BIOPHARMACY

Professor Gerrit BORCHARD
Doctor Olivier JORDAN

Academic research under pandemic conditions

The COVID-19 pandemic caused a lockdown from March 2020 on, which brought research activities to a temporary hold. Only COVID-19 related activities were permitted, which we exploited to develop formulations for Sars-CoV-2 mRNA and DNA vaccines.

We were contacted by our colleagues at Chulalongkorn University Hospital (Bangkok, Thailand, Prof. Kanitha Patarakul) with a request to enter into the development of mRNA and DNA vaccines against COVID-19. We had collaborated with the Thai group before in a project financed partially by SNF developing formulations of DNA Dengue fever vaccines. Starting in March right after lockdown began, we spent 4 months in the lab developing, characterizing and in vitro testing lipid nanoparticle (LNP) formulations encapsulating mRNA and DNA (pCMVkan-S) for spike proteins S, S1 and S2 of the coronavirus we had obtained from our partners.

We performed formulation work using different lipid composition ratios, characterized loading efficiency and stability, appearance, size, zeta-potential and expression of genetic information using various equipment available within the Section and with the help of the electron microscopy platform (Dr. Christoph Bauer and his team) and the antibody facility (Prof. Pierre Cosson and his team) of the University of Geneva. We also had some support by the company Precision Nanosystems who put at our disposal their microfluidic equipment that resulted in an optimization of our formulations. Sterility of the final formulations prior to being sent to Thailand for preclinical studies was confirmed at HUG pharmacy (Prof. Pascal Bonnabry and his team). The formulations entered preclinical mouse studies on August 7, 2020 and were very successfully concluded in January 2021. We also assured the freedom-to-operate with respect to our formulations by performing a patent search at the Federal Patent Office in Bern, which showed that we would not infringe on pre-existing intellectual property.

Given the positive results, studies in non-human primates and clinical phase 1 studies by our partners at Chula are planned. We are also working on the refinement of our formulations applying the microfluidic equipment we purchased in the meantime. The project thus far has been supported by a grant by the Thai government, and a project proposal for financing of the follow-up studies is currently under revision.

This project is exemplary for the potential of academic research and the benefit of (international) collaboration attempting and succeeding to offer solutions for urgent medical needs.

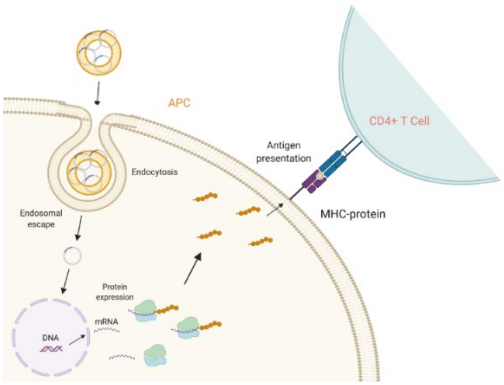

Fig. 1: pCMVkan-S lipoplexes delivery and expression in an Antigen Presenting Cell

2020 at a glance

- Publications with impact factor : 13
- Publications without impact factor : 0
- Patents : 0
- Book and chapters : 1
- Congresses / conferences organisation : 4
- Posters presentations : 1
- Oral presentations : 1
- Invited oral presentations : 12
- Number of projects at FNRS and assimilated (Research funds) : 5
- Service agreements and related activities : 0
- Ph.D. Theses presented in 2020 : 0
- Awards and distinctions: 2
- Public outreach activities : 0

Research funds

FNRS
Novell Micellar Drug Carrier Systems for Gene Therapies
Main applicants: G. Borchard, A. Danani
Total funding of the project: CHF 287'000**.-**
Total duration of the project: 5 years
Allocation 2020: CHF 0.-
Starting date: 01.09.2015

FNRS
Innovative adjuvanted influenza vaccines: "Swiss-Indonesian collaboration towards better pandemic influenza preparedness"
Main applicants: N. Collin, G. Borchard, N. Chairul
Total funding of the project: CHF 172'950.-
Total duration of the project: 3 years
Allocation 2020: CHF 0.-
Starting date: 01.08.2016

FNRS
Tailored Adjuvants for Vaccine Formulations
Main applicant: G. Borchard
Total funding of the project: CHF 319'040.-
Total duration of the project: 4 years
Allocation 2020: CHF 84'020.-
Starting date: 01.07.2019

FNRS
Novel Leptospirosis and Dengue Fever Vaccines for Thailand
Co-Investigators: G. Borchard, N. Collin, M. Cottier
Total funding of the project: CHF 85'000.-
Total duration of the project: 2 years
Allocation 2020: CHF 0.-
Starting date: 01.04.2018

Innogap Fund
Total amount for 2020 CHF 6'596.47

Total amount for all research funds for 2020: CHF 90'616.47

Scientific publications (with impact factor)

Salgado, C.; Morin, H.; Coriolano de Aquino, N.; Neff, L.; Quintino da Rocha, C.; Vilegas, W.; Marcourt, L.; Wolfender, J.-L.; Jordan, O.; Ferreira Queiroz, E.; Allémann E., In vitro anti-inflammatory activity in arthritic synoviocytes of *A. brachypoda* root extracts and its unusual dimeric flavonoids. molecules. 25:5219 (2020) 10.3390/molecules25215219. *3.27*

Salgado, C.; Guénée, L.; Cerny, R.; Allémann, E.; Jordan, O., Nano wet milled celecoxib extended release microparticles for local management of chronic inflammation. Int J Pharm, 589:119783 (2020), doi: 10.1016/j.ijpharm.2020.119783. *4.85*

Patrulea, V; Borchard, G.; Jordan, O., An update on antimicrobial peptides (AMPs) and their delivery strategies for wound infections. Pharmaceutics 12:840 (2020), doi: 10.3390/pharmaceutics12090840. *4.42*

Kawano, Y.; Jordan, O.; Hanawa, T.; Borchard, G.; Patrulea, V., Are antimicrobial peptide dendrimers an escape from ESKAPE? Advances in Wound Care, epub 22 Apri 2020, Jul 2020.378-395, doi: 10.1089/wound.2019.1113. *3.11*

Borchard, G.; Som, C.; Zinn, M.; Ostafe, V.; Borges, O.; Perale, G.; Wick, P., Polymeric nano-biomaterials for medical applications: advancements in developing and implementation considering safety-by-Design concepts. Front. Bioengin. Biotechnol. (2020), doi: 10.3389/fbioe.2020.599950. *3.64*

Patrulea, V.; Borchard, G.; Jordan, O., An update on antimicrobial peptides (AMPs) and their delivery strategies for wound infections, Pharmaceutics 12:840 (2020), doi: 10.3390/pharmaceutics12090840. *4.42*

Schmutz, M.; Borges, O.; Jesus, S.; Borchard, G.; Perale, G.; Zinn, M.; Sips, Ä.A.J.A.M.; Soeteman-Hernandez, L.G.; Wick, P.; Som, C., A methodological safe-by-design approach for the development of nanomedicines, Front. Bioengin. Biotechnol. 8 (2020) 258, doi: 10.3389/fbioe.2020.00258. *3.64*

Jesus, S.; Marques, A.P.; Duarte, A.; Soares, E.; Panão Costa, J.; Colaço, M.; Schmutz, M.; Som, C.; Borchard, G.; Wick, P.; Borges, O., Chitosan nanoparticles: shedding light on immunotoxicity and hemocompatibility, Front. Bioengin. Biotechnol. 8 (2020) 100, doi: 10.3389/fbioe.2020.00100. *3.64*

Béji-Srairi, R.; Younes, I.; Snoussi, M.; Yahyaoui, K.; Borchard, G.; Ksouri, R.; Frachet, V; Ksouri Wided, M., Ethanolic extract of Tunisian propolis: chemical composition, antioxidant, antimicrobial and antiproliferative properties, J. Apicultural Res. (2020), doi: 10.1080/00218839.2020.1732572. *1.87*

Marques, C.; Som, C.; Schmutz, M.; Borges, O; Borchard, G., How the lack of chitosan characterization precludes implementation of the safe-by-design concept, Front. Bioengin. Biotechnol. 8 (2020) 165, doi: 10.3389/fbioe.2020.00165. *3.64*

Di Francesco, T.; Delafontaine, L.; Philipp, E.; Borchard, G., Iron polymaltose complexes: could we spot physicochemical differences in medicines sharing the same active substance? Eur. J. Pharm. Sci. 143 (2020) 105180 doi: 10.1016/j.ejps.2019.105180. *3.62*

Nikravesh, N.; Borchard, G.; Hofmann, H.; Philipp, E.; Flühmann, B.; Wick, P., Factors influencing safety and efficacy of intravenous iron-carbohydrate nanomedicines: from production to clinical practice, Nanomedicine: Nanotechnology, Biology, and Medicine 26 (2020) 102178, doi: 10.1016/j.nano.2020.102178. *5.18*

Lemoine, C.; Thakur, A.; Krajišnik, D.; Guyon, R.; Longet, S.; Razim, A.; Górska, S.; Pantelić, I.; Ilić, T.; Nikolić, I.; Lavelle, EC.; Gamian, A.; Savić, S.; Milicic, A., Technological approaches for improving vaccination compliance and coverage. Vaccines (Basel). 2020 Jun 16;8(2):304, doi: 10.3390/vaccines8020304. *4.09*

Books or books chapters

Schmutz, M.; Borges, O.; Borchard, G.; Wick, P.; Som, C., Guidelines as a starting point to address the needs of small and medium enterprises regarding the Safe-by-Design of polymeric nanobiomaterials for drug delivery In: Rossi, F.; Rainer, A., (Eds.) Nanomaterials for Theranostics and Tissue Engineering: Techniques, Trends and Applications. Elsevier, Amsterdam (2020) 259-271,

Congresses / conferences and Symposia

- Congresses / conferences organisation : 4
- Posters presentations : 1
- Oral presentations : 1
- Invited oral presentations : 12

Awards and distinction

Vinet, L.; Saucy, F.; Delie, F.; Jordan, O., Best Life Science project for “Artemis” anti-restenosis device, Geneus innovation initiator, 14 Dec. 20.

Lemoine, C., ESWI Young Scientist Award, The Netherlands, March 2020.

CLINICAL PHARMACOLOGY AND TOXICOLOGY

Professor Jules DESMEULES

General description of Unit

Our research aims to study the variation of drug responses by evaluating drug transportation and the enzymes involved in the metabolism of xenobiotics such as cytochromes P450 through *in vitro* (microsomes, cells) or *in vivo* models (phenotyping, genotyping, pharmacokinetic, toxicogenetic and pharmacogenetics clinical and epidemiological studies), and studies related to efficacy or the safety usage of drugs. The other field developed by the clinical pharmacology and toxicology is directed to studies related to chronic pain and the usage and misuse of analgesics.

Specific research fields

- Measuring the impact of pharmacogenomics on drug response focusing mainly in opioids, antiplatelet drugs, anti-HIV drugs, oncologic treatments),
- Developing tools to measure the activity of metabolic enzymes, predict therapeutic responses (phenotyping cocktails, PB-PK simulation) and detect drug-drug interactions,
- Evaluating the role of genomics in the assessment of adverse drug reactions,
- Developing neurophysiological evaluation methods for testing the efficacy of peripheral and central analgesics (psychometric and neurophysiological-quantitative sensory testing evaluation), for the treatment and acute and chronic pain syndromes,
- Promote translational research by enhancing synergies between basic sciences and clinical medicine.

Established collaborations with different units from ISPSO, HUG, faculty of medicine of Geneva University and other national and international research groups.

From ISPSO, collaborations are ongoing with different groups:

Prof. Carole Bourquin;

Prof. Patrycja Nowak;

Prof. Jean Luc Veuthey, Prof. Serge Rudaz;

Prof. Jean-Luc Wolfender, Dr Emerson Queiroz.

Other collaborations are ongoing with different groups from HUG and faculty of medicine:

Prof. Jean-Charles Sanchez's group;

Prof. P. Fontana and Prof. J.L. Reny's Geneva Platelet group;

Prof. Christian Lovis's group;

Prof. Marc Ansari's oncopediatric group;

Dr Markus Kosel's psychiatric group;

Dr Petros Tsantoulis;

Prof Sophie Pautex.

National and International collaborations:
Prof. Aurelien Thomas' group (Lausanne University);
Swiss Center for Applied Human Toxicology;
University of Manchester and Certara (Simcyp);
Prof Gisèle Pickering, Clinical pharmacology University of Clermond-Ferrand, France.

2020 at a glance

- Publications with impact factor : 44
- Publications without impact factor : 4
- Patents : 1
- Book and chapters : 0
- Congresses / conferences organisation : 0
- Posters presentations : 3
- Oral presentations : 0
- Invited oral presentations : 3
- Number of projects at FNRS and assimilated (Research funds) : 4 + 6 (private funding) + 2 (institutional funds)
- Service agreements and related activities : 1
- Ph.D. Theses presented in 2020 : 1
- Ph.D. Theses ongoing : 5
- Awards and distinctions: 0
- Public outreach activities : 11

Research funds

Public funds

FNRS 182686
Identification of genetic determinants for central pain sensitization in fibromyalgia patients
Prof. Jules DESMEULES
CHF 387'300.-
3 years: 2019-2022

FNRS 182361
Impact of CYP2D6 Genetic Polymorphisms on the vulnerability to Drug-Drug Interactions with tramadol: a gene-environment interaction study
Prof. Youssef DAALI, Prof. Caroline SAMER
CHF 298'291.-
4 years: 2018-2022

Swiss Personalized Health Network
C3-Study-Citizen Centered Consent: Shared, Transparent and Dynamic
Prof. Christian LOVIS, Prof. Caroline SAMER, Nicolas ROSSAT
CHF 280'000.-
3 years: 2017- 2020

Swiss Innovation Agency 37848.1
NDMC as a new antihyperalgesic
Dr Marie BESSON, CC, PD
CHF 454'971.-

Private Funds

Fondation Handicap Mental et Société (2016-2020)
Développement d'outils d'aide à la prescription chez les patients souffrant de déficience intellectuelle
Dr Marie BESSON, Dr Markus KOSEL, Prof. Jean-Michel AUBRY, Prof. Jules Desmeules
CHF 550'000.-
4 years: 2016-2020

Fondation Leenaards
C3-Study-Citizen Centered Consent: Shared, Transparent and Dynamic
Prof. Caroline SAMER, Prof. Samia HURST, Prof. Christian LOVIS
CHF 160'000.-
2 years: 2018-2020

Fondation Leenaards
Impacts of touch-massage on the experience of patients with chronic pain and on the provider-patient relationship in inpatient settings: a mixed study.
Maria Goreti DA ROCHA RODRIGUES, Prof. Jules DESMEULES, Catherine BOLLONDI PAULY, Prof. Christine CEDRASCHI, Dr François CURTIN.
CHF 128'000.-
2 years: 2019-2021

Fondation Eclosion
A phase I repeated dose pharmacokinetic–pharmacodynamic and drug-drug interaction study of N-desmethylclobazam in healthy volunteers.
Jules DESMEULES
CHF 140'000.-
2020

Fondation privée des HUG projet Priority
DIAPASON Déclaration des effets indésirables par le Patient sur son Traitement
Dr Victoria ROLLASON, PhD, Prof. Caroline SAMER, Prof. Christian LOVIS, Frédéric EHRLER, Dr Damien DIETRICH, Claude GUEGUENIAT
CHF 133'900.-
2 years: 2018-2020

Fondation privée des HUG projet Priority
The MAGIC^2 Study: Major paradigm shift with Alerts of new Generation Individualized to Improve Clinical outcomes and reduce Costs
Prof. Caroline SAMER, Dr Nathalie VERNAZ-HEGI, Prof. Jean-Luc RENY, Prof. Dina ZEKRY, Prof. Didier HANNOUCHE, Dr Angèle GAYET-AGERON, Prof. Arnaud PERRIER, Prof. Jules DESMEULES, Prof. Christian LOVIS
CHF 200'000.-
2 years : 2018-2020

Institutional funds

Projet de Recherche et Développement
Impact de l'IL-6 sur l'activité des CYP450 mesurée par papier buvard
Camille LENOIR, Prof. Caroline SAMER
CHF 50'000.-
2018-ongoing

Projet de Recherche et Développement
Pupillométrie comme méthode de phénotypage du CYP2D6
Dr Frédérique RODIEUX
CHF 50'000.-
2017-ongoing

Total amount for all research funds for 2020: CHF 2'832'462.-

(*) Arithmetic mean calculated over the number of years of each fund is considered for the calculation. In addition, modification in 2020 of the funds calculation rule for J. Desmeules in order to take into account his activity rate (20%) in the Section

Service agreements and related activities

REDs (Center of Research & Expertise in antidoping sciences)
Total amount for 2020: CHF 50'000.-

Total amount (for all service agreements and related activities) for 2020: CHF 50'000.- (**)
(**) Modification in 2020 of the funds calculation rule for J. Desmeules in order to take into account his activity rate (20%) in the Section

Scientific publications (with impact factor)

Lenoir, C.; Daali, Y.; Rollason, V.; Curtin, F.; Gloor, Y.; Bosilkovska, M.; Walder, B.; Gabay, C.; Nissen, MJ.; Desmeules, J.; Hannouche, D.; Samer, C., Impact of Acute Inflammation on Cytochromes P450 Activity Assessed by the Geneva Cocktail. Clin Pharmacol Ther 2020, Dec 20. 6.56

Da Rocha Rodrigues, M. G. ; Bollondi Pauly, C.; Thentz, C.; Boegli, M.; Curtin, F.; Luthy, C.; Cedraschi, C.; Desmeules, J., Impact of Touch massage on the experience of patients with chronic pain: A protocol for a mixed method study. Complement Ther Clin Pract 2020 Nov 28 (3). 1.77

Lonchampt, S.; Gerber, F.; Aubry, JM.; Desmeules, J.; Besson, M.; Kosel, K., TOP-ID: a Delphi technique-guided development of a prescription and deprescription tool for adults with intellectual disabilities. BMJ Open 2020, Nov 4; 10(11). 2.49

Costanza, A.; Chytas, V.; Mazzola, V.; Piguet, V.; Desmeules, J.; Bondolfi, G.; Cedraschi, C., The Role of Demoralization and Meaning in Life (DEMIL) in influencing Suicidal Ideation Among Patients Affected by Chronic Pain: Protocol of a Single-Center, Observational, Case-Control Study. JMIR Res Protoc 2020 Nov 26;9(11) 0.12

Rollason, V.; Lloret-Linares, C.; Ing Lorenzini, K.; Daali, Y.; Gex-Fabry, M.; Piguet, V.; Besson, M.; Samer, C.; Desmeules, J., Evaluation of Phenotypic and Genotypic Variations of Drug Metabolising Enzymes and Transporters in Chronic Pain Patients Facing Adverse Drug Reactions or Non-Response to Analgesics: A retrospective Study. J Pers Med 2020 Oct 27;10(4) 1.34

Dozio, V.; Daali, Y.; Desmeules, J.; Sanchez, J.C., Deep proteomics and phosphoproteomics reveal novel biological pathway perturbed by morphine, morphine-3 glucoronide and morphine-6-glucoronide in human astrocytes. J Neurosci Res 2020 Sep 20 4.69

Rollason, V.; Mouterde, M.; Daali, Y.; Cizkova, M.; Priedhodova, E.; Kulichova, I.; Posova, H.; Posova, H.; Mulugeta, A.; Makonnen, E.; Al-Habsi, A.; Davidson, R.; Al-Balushi, KK.; Al-Thihli, K.; Cerna, M.; Al-Yahyaee, S.; Cerny, V.; Yimer, G.; Poloni, ES.; Desmeules, J., Safety of the Geneva Cocktail, a Cytochrome P450 and P-Glycoprotein Phenotyping Cocktail, in Healthy Volunteers from Three Different Geographic Origins. Drug Saf 2020 Nov;43(11), 1181-1189. 3.44

Kalibala, J.; Péchère-Bertschi, A.; Desmeules, J., Gender Differences in Cardiovascular Pharmacotherapy-the Example of Hypertension: A mini Review. Front Pharmacol 2020 May 6;11: 564. 4.22

Matthey, A.; Daali, Y.; Curtin, F.; Poncet, A.; Desmeules, J.; Besson, M., GABAergic modulation of secondary hyperalgesia: A randomized controlled 4-way crossover trial with the α2-subunit preferring GABA positive allosteric modulator, N-desmethyl-clobazam in healthy volunteers. Eur J Pain 2020 Jul;24(6). 3.49

Lonchampt, S.; Gerber, F.; Aubry, JM.; Desmeules, J.; Kosel, M.; Besson, M., Pain interventions in adults with intellectual disability: A scoping review and pharmacological considerations. Eur J Pain 2020 May;24(5):875-885. 3.49

Lenoir, C.; Boumaïza, S.; Ing Lorenzini, K.; Boulvain, M.; Desmeules, J.; Rollason, V., Outcomes of drug exposition during pregnancy: Analysis from a teratology information service. Eur J Obstet Gynecol Reprod Biol 2020 Apr; 247:42-48. 1.86

Czarnetzki, C. ; Desmeules, J. ; Tessitore, E. ; Faundez, A. ; Chabert, J. ; Daali, Y. ; Fournier, R. ; Dupuis-Lozeron, E. ; Cedraschi, C. ; Tramèr, M., Perioperative intravenous low-dose ketamine for neuropathic pain after major lower back surgery : a randomized, placebo-controlled study. Eur J Pain 2020 Mar;24(3):555-567. 3.49

Magliocco, G. ; Rodieux, F. ; Desmeules, J. ; Samer, C.; Daali, Y., Toward precision medicine in pediatric population using cytochrome P450 phenotyping approaches and physiologically based pharmacokinetic modeling. Pediatr Res 2020 Feb;87(3):441-449 4.92

Dilo, A.; Daali, Y.; Desmeules, J.; Chalandon, Y.; Uppugunduri, CRS.; Ansari, M., Comparing Dried Blood Spots and Plasma Concentrations for Busulfan Therapeutic Drug Monitoring in Children.
Ther Drug Monit 2020 Feb; 42(1):111-117. 2.07

Vernaz, N.; Agoritsas, T.; Calmy, A.; Gayet-Ageron, A.; Gold, G.; Perrier, A.; Picard, F.; Prendki, V.; Reny, JL.; Samer, C.; Stirnemann, J.; Vetter, P.; Zanella, MC.; Zekry, D.; Biaggio, S., Early experimental COVID-19 therapies: associations with length of hospital stay, mortality and related costs. Swiss Med Wkly 2020 Dec 31; 150. 1.82

Schwob, JM.; Samer, C.; Lalive, PH.; Eperon, GA., Live vaccines and immunosuppressive monoclonal antibodies: weighing up the benefit-risk assessment for natalizumab. J Travel Med 2020 Dec 26. 4.88

Samer, C.; Lacombe, K.; Calmy, A., Cyber harassment of femal scientists will not be the new norm. Lancet Infect Dis 2020 Dec 23; S1473-3099 20.21

Fernandez, S.; Lenoir, C.; Samer, C.; Rollason, V., Drug interactions with apixaban: A systematic review of the literature and an analysis of VigiBase, the World Health Organization database of spontaneous safety reports. Pharmacol Res Perspect 2020 Oct, 8(5) 2.05

Barbolini, L.; Terrier, J.; Marti, C.; Samer, C.; Daali, Y.; Fontana, P.; Reny, JL., Mixing Drugs and Genetics: A complex Hemorrhagic Cocktail. Am J Med 2020 Aug 25:S0002-9343 4.52

Vernaz, N.; Simona, A.; Samer, C., The Swiss Cheese Prescribing Model for Precision Medicine. Am J Med 2020 Nov; 133(11):1249-1251 4.52

Rochat, J.; Gaudet-Blavignac, C.; Del Zotto, M.; Ruiz Garretas, V.; Foufi, V.; Issom, D.; Samer, C.; Hurst, S.; Lovis, C., Citizens' Participation in Health and Scientific Research in Switzerland. Stud Health Technol Inform 2020 Jun 16; 270:1098 0.44

Foufi, V.; Ing Lorenzini, K.; Goldman, JP.; Gaudet-Blavignac, C.; Lovis, C.; Samer, C., Automatic Classification of Discharge Letters to Detect Adverse Drug Reactions. Stud Health Technol Inform 2020 Jun 16; 270:48-52. 0.44

Cagno, V.; Magliocco, G.; Tapparel, C.; Daali, Y., The tyrosine kinase inhibitor nilotinib inhibits SARS-CoV-2 In Vitro. Basic Clin Pharmacol Toxicol 2020 Nov 24:10.1111 2.65

Vandenberghe, F.; Gilet, P.; Daali, Y.; Favre, L.; Eap, CB., Bioavailability of Vortioxetine After a Roux-en-Y Gastric Bypass. Obes Surg 2020 Oct 15 3.31

Zoetemelk, M.; Ramzy, GM.; Rausch, M.; Koessler, T.; van Beijnum, JR.; Weiss, A.; Mieville, V.; Piersma, SR.; de Haas, RR.; Delucing-Vivier, C.; Andreas, A.; Toso, C.; Henneman, AA.; Ragusa, S.; Petrova, TV.; Docquier, M.; McKee, TA.; Jimenez, CR.; Daali, Y.; Griffioen, AW.; Rubbia-Brandt, L.; Dietrich, PY.; Nowak-Sliwinska, P., Optimized low-dose combinatorial drug treatment boosts selectivity and efficacy of colorectal carcinoma treatment. Mol Oncol 2020 Oct 5; 14(11):2894-919 6.57

Cloesmeijer, ME.; van Esdonk, MJ.; Lynn, AM.; Smits, A.; Tibboel, D.; Daali, Y.; Olkkola, KT.; Allegaert, K.; Mian, P., Impact of enantiomer-specific changes in pharmacokinetics between infants and adults on the target concentration of racemic ketorolac: A pooled analysis. Br J Clin Pharmacol 2020 Sep 9 1.37

Salamin, O.; Garcia, A.; Gonzalez-Ruiz, V. Rossi, F. Bigard, X.; Déglon, J.; Daali, Y.; Faiss, R.; Saugy, M.; Rudaz, S., Is pain temporary and glory forever ? Detection of tramadol using dried blood spot in cycling competitions. Drug Test Anal 2020 Nov; 12(11-12):1649-1657. 3.1

Magliocco, G.; Daali, Y., Modern approaches for the phenotyping of cytochrome P450 enzymes in children. Expert Rev Clin Pharmacol 2020 Jul; 13(7):671-674 3.48

Fontana, P.; Ibberson, M.; Stevenson, B. Wigger, L.; Daali, Y.; Niknejad, A.; Mach, F.; Docquier, M.; Xenarios, I.; Cuisset, T.; Alessi, MC.; Reny, JL., Contribution of exome sequencing to the identification of genes involved in the response to clopidogrel in cardiovascular patients. J Thromb Haemost 2020 Jun;18(6):1425-1434. 4.36

Wilhelm-Bals, A.; Combescure, C.; Chehade, H.; Daali, Y.; Parvex, P., Variables of interest to predict glomerular filtration rate in preterm newborns in the first days of life. Pediatr Nephrol 2020 Apr; 35(4):703-712. 2.67

Costanza, A., Di Marco, S.; Burroni, M.; Corasaniti, F.; Santinon, P.; Prelati, M.; Chytas, V.; Cedraschi, C.; Ambrosetti, J., Meaning in life and demoralization: a mental-health reading perspective for suicidality in the time of COVID-19. Acta Biomed 2020 Nov 10 ;91 0.77

Cancelliere, C.; Wong, JJ.; Yu, H.; Mior, S.; Brunton, G.; Shearer, HM.; Rudoler, D.; Hestbaek, L.; Papaconstantinou, E.; Cedraschi, C.; Swain, M.; Connell, G.; Verville, L.; Taylor-Vaisey, A.; Côté, P., Rehabilitative management of back pain in children: protocol for a mixed studies systematic review. BMJ Open 2020 Oct 14; 10(10) 2.49

Ferrari, S.; Vanti, C.; Giagio, S.; Anesi, M.; Youssef, S.; Bortolami, A.; Cedraschi, C.; Pillastrini, P., Low back pain and sexual disability from the patient's perspective: a qualitative study. Disabil rehabil 2020 Sep 15:1-9. 2.22

Salmi, LR.; Côté, P.; Cedraschi, C., Covering patient's perspective in case-based critical review articles to improve shared decision making in complex cases. Health Expect 2020 Oct; 23(5):1037-1044. 3.59

Kornmann, G.; Curtin, F., Temelimab, an IgG4 Anti-Human Endogenous Retrovirus Monoclonal Antibody: An Early Development Safety Review. Drug Saf 2020 Dec; 43(12):1287-1296 3.44

Curtin, F.; Champion, B.; Davoren, P.; Duke, S.; Ekinci, EI.; Gilfillan, C.; Morbey, C.; Nathow, T.; O'Moore-Sullivan, T.; O'Neal, D.; Roberts, A.; Stranks, S.; Stuckey, B.; Vora, P.; Malpass, S.; Lloyd, D.; Maëstracci-Beard, N.; Buffet, B.; Kornmann, G.; Bernard, C.; Porchet, H.; Simpson, R., A safety and pharmacodynamics study of temelimab, an antipathogenic human endogenous retrovirus type W envelope monoclonal antibody, in patients with type 1 diabetes. Diabetes Obes Metab 2020 Jul; 22(7):1111-1121 5.9

Bjelogrlic, M.; Robert, A.; Miribel, A.; Namdar, M.; Gencer, B.; Lovis, C.; Girardin, F., Emerging Concepts and Applied Machine Learning Research in Patients with Drug-Induced Repolarization Disorders. Stud Health Technol Inform 2020 June 16; 270:198-202. 0.44

Ing Lorenzini, K.; Girardin, F., Direct-acting antiviral interactions with opioids, alcohol or illicit drugs of abuse in HCV-infected patients. Liver Int 2020 Jan; 40(1):32-44. 5.17

Van Donge, T.; Fuchs, A. ; Leroux, S. ; Pfister, M. ; Rodieux, F. ; Atkinson, A. ; Giannoni, E. ; van den Anker, J. ; Bielicki, J., Amoxicillin Dosing Regimens for the Treatment of Neonatal Sepsis: Balancing Efficacy and Neurotoxicity. Neonatology 2020; 117(5):619-627. 2.65

Coen, M.; Jandus, P.; Rollason, V.; Seebach, J.; Serratrice, J., Cinderella side effect: Intravenous corticosteroid-induced bradycardia. Therapies 2020 Jun 26:S0040-5957(20)30112-8 1.76

Pauliat, E.; Onken, M.; Weber,-Schoendorfer, C. ; Rousson, V. ; Addor, MC. ; Baud, D. ; Théaudin, M.; Diav-Citrin, O.; Cottin, J.; Agusti, A.; Rollason, V.; Kaplan, YC.; Kennedy, D.; Kadioglu, M.; Rothuizen, LE.; Livio, F.; Buclin, T.; Panchaud, A.; Winterfeld, U., Pregnancy outcome following first-trimester exposure to fingolimod: A collaborative ENTIS study. Mult Scler 2020 Jun 15:1352458520929628. 5.41

Cedraschi, C.; Campello, M.; Salmi, LR.; Côté, P. Clinicians' views about the experience of disability due to low back pain. Results from a focus group study. Eur Spine J 2020; 29:1953–58 2.634

Côté, P.; Bussières, A.; Cassidy, JD.; Hartvigsen, J.; Kawchuk, GN.; Leboeuf-Yde, C.; Mior, S.; Schneider, M. and more than 140 signatories # call for an end to pseudoscientific claims on the effect of chiropractic care on immune function. A united statement of the global chiropractic research community against the pseudoscientific claim that chiropractic care boosts immunity. Chiropr Man Therap 2020 28:21. 1.13

Véron, C.; Genevay, S.; Knafou-Bastard, M.; Fleury, A.; Cedraschi, C. Psychomotor therapy as a treatment of chronic spinal pain: a qualitative study. Complement Ther Med 2020 Oct 24 1.587

Scientific publications (without impact factor)

Aubin, PA.; Rigumye, LO.; Kosel, M.; Besson, M.; Favrod-Coune, T., Drug management of behavioral disorders in people with developmental and intellectual disability. Rev Med Suisse 2020 Sep 30;16(708):1786-1789

El Biali, M.; Besson, M., Why using antidepressants in chronic pain? Practical prescription recommendations. Rev Med Suisse 2020 Jul 15;16(700):1350-1353.

De Néris, M.; Costanza, A.; Besson, M.; Greiner, C.; Prada, P.; Ambrosetti, J., Suicidal crisis and suicide prevention: psychopharmacological aspects. Rev Med Suisse 2020 Feb 12 ;16(681) :314-317.

Piguet, V.; Mazouri, S.; Rochat, J.; Ehrler, F.; Cedraschi, C.; Luthy, C., Mobile applications and self-management of chronic-pain. Rev Med Suisse 2020 Jul 15;16(700):1367-1371.

Patents

Besson Marie [CH]; Daali Youssef [CH]; Desmeules Jules [CH]; Matthey Alain [CH]; Ralvenius William T [CH]; Zeilhofer Hans Ulrich [CH], Use of N-Desmethylclobazam in the treatment of chronic pain disorders and related methods, Patent number EP16709145.3

Congresses / conferences and Symposia:

- Congresses / conferences organisation: 0
- Posters presentations : 3
- Oral presentations : 0
- Invited oral presentations : 3

Public outreach activities (radio, television and other media)

Desmeules, J., Ing Lorenzini K., Les opioïdes, TSR, Temps Présent, 2020

Desmeules, J. ; Besson, M., L'usage des opioïdes en Suisse, RTS 1, CQFD, 2020

Desmeules, J., Médication au temps du Covid-19

Samer, C., A la rencontre des médecins de ville qui prescrivent de la chloroquine, Heidi News, avril 2020

Samer, C., Dans les hôpitaux suisses, la valse indécise des traitements, Le Temps, mars 2020

Samer, C., De la chloroquine contre le virus ? Vaud tente déjà, Genève pas encore, 24 Heures Lausanne, mars2020

Samer, C., Pandémie de Covid-19, Swissinfo, mai 2020

Samer, C., Au fait, est-ce qu'on peut de nouveau prendre de l'ibuprofène ? Heidi News, juin 2020

Samer, C., Une analyse juge la chloroquine inefficace, voire dangereuse, Le Temps, août 2020

Samer, C., Comment de jeunes chercheurs ont publié seuls une méta-analyse sur l'hydroxychloroquine, Heidi News, août 2020

Samer, C., Ibuprofène en cas de Covid-19 : où en sommes-nous ?, Le Temps, octobre 2020

CLINICAL PHARMACY SCIENCES

Professor Chantal CSAJKA

General description of the Unit

The mission of the clinical pharmacy science group is to promote post-approval drug optimisation revolving around three main axes. The first research focus is therapeutic individualisation by the comprehension of the demographic, physiopathologic, environmental or genetic determinants influencing therapeutic response or toxicity. The second axe comprises research on security and efficacy of drugs, in particular in vulnerable population (paediatrics, geriatrics, oncology) and the third research focus is the development of tools and guidelines allowing for therapeutic optimisation. The methods used are based on quantitative and qualitative techniques, including modelling and simulations and epidemiological studies. The overall goal of the research is to increase the knowledge on the pharmacokinetics and pharmacokinetic-pharmacodynamic relationships of commercialized drugs at particular risk and to improve safety and efficacy in order to improve their use in clinical practice.

Specific research fields

The following achievements have taken place in 2020.

- **Drug individualisation**. Several projects on the pharmacokinetic characterisation of antiretroviral and psychoactive drugs have been fulfilled, with direct implication for clinical practice. In oncology, a clinical study aiming at better defining therapeutic targets of tyrosine kinase inhibitors and adherence patterns of patients under long-term treatment is ongoing and several population analyses of targeted oncologic drugs have been translated into clinical recommendations. A research program on pharmacogenetic-based drug and dosage individualization has been initialized, aiming at evaluating and implementing novel genetic-based interventions by community and hospital pharmacists.

- **Drug security**. Improvement of adverse drug events detection in a population of geriatric inpatients using data mining has provided first results that will serve to improve risk management in hospitals (SNF project, collaboration between the HUG, CHUV, Baden and Zürich hospital). Several related projects are ongoing for the improvement of the security of use of antithrombotic drugs (collaboration with the HUG). The aging HIV population have been expensively studied in terms of risk of drug-drug interactions and inappropriate prescription in this population, thus establishing new evidence for treatment use in this population. Other projects dedicated to the prediction of ADEs in the geriatric population are ongoing, including the development of a prediction tool of delirium (collaboration with Baden hospital) and medication reconciliation between the community and hospital admission and discharge.

- **Tools for drug optimisation in clinical practice**. The collaborative project with the HEIG-VD aiming at developing a software (www.tucuxi.ch) for Bayesian dosage adjustment is still ongoing. An electronic tool for drug-drug interaction involving antithrombotics is currently being developed.

2020 at a glance

- Publications with impact factor : 22
- Publications without impact factor : 2
- Patents : 0
- Book and chapters : 0
- Congresses / conferences organisation : 0
- Posters presentations : 2
- Oral presentations : 1
- Invited oral presentations : 0
- Number of projects at FNRS and assimilated (Research funds) : 1
- Service agreements and related activities : 2
- Ph.D. Theses presented in 2020 : 1 UNIGE & 1 UNIL
- Awards and distinctions: 2
- Public outreach activities : 0

Research funds

FNRS
Automated detection of adverse drug events from older inpatients' electronic medical records using structured data mining and natural language processing

Main applicant:	Chantal Csajka
Total funding of the project:	CHF 602'560.-
Total duration of the project:	4 years
Allocation 2020:	CHF 51'261.-
Starting date:	01.09.2017

Total amount for all research funds for 2020: CHF 51'261.-

Service agreements and related activities

Debiopharm
Service
Total amount for 2020: CHF 18'005.-

Zürich Suisse Assurance
Total amount for 2020: CHF 20'544.-

Total amount (for all service agreements and related activities) for 2020: CHF 38'549.-

Scientific publications (with impact factor)

Guidi M, Csajka C, Buclin T. Parametric Approaches in Population Pharmacokinetics. J Clin Pharmacol. 2020 Oct 26 *2.812*

Buclin T, Thoma Y, Widmer N, André P, Guidi M, Csajka C, Decosterd LA. The Steps to Therapeutic Drug Monitoring: A Structured Approach Illustrated With Imatinib. Front Pharmacol. 2020 Mar 3; 11:177 *4.225*

Weisskopf E, Guidi M, Fischer CJ, Bickle Graz M, Beaufils E, Nguyen KA, Morisod Harari M, Rouiller S, Rothenburger S, Gaucherand P, Kassai-Koupai B, Borradori Tolsa C, Epiney M, Tolsa JF, Vial Y, Hascoët JM, Claris O, Eap CB, Panchaud A, Csajka C. A population pharmacokinetic model for escitalopram and its major metabolite in depressive patients during the perinatal period: Prediction of infant drug exposure through breast milk. Br J Clin Pharmacol. 2020 Aug;86(8):1642-1653. *2.812*

Courlet P, Decosterd LA, Alves Saldanha S, Cavassini M, Stader F, Stoeckle M, Buclin T, Marzolini C, Csajka C, Guidi M; Swiss HIV Cohort Study. Influence of Drug-Drug Interactions on the Pharmacokinetics of Atorvastatin and Its Major Active Metabolite ortho-OH-Atorvastatin in Aging People Living with HIV. Clin Pharmacokinet. 2020 Aug;59(8):1037-1048. *4.604*

Barceló C, Guidi M, Thorball CW, Hammer C, Chaouch A, Scherrer AU, Hasse B, Cavassini M, Furrer H, Calmy A, Haubitz S, Bernasconi E, Buclin T, Fellay J, Tarr PE, Csajka C; Swiss HIV Cohort Study. Impact of Genetic and Nongenetic Factors on Body Mass Index and Waist-Hip Ratio Change in HIV-Infected Individuals Initiating Antiretroviral Therapy. Open Forum Infect Dis. 2020 Jan 22; 7(1):ofz464. *3.656*

Courlet P, Guidi M, Alves Saldanha S, Stader F, Traytel A, Cavassini M, Stoeckle M, Buclin T, Marzolini C, Decosterd LA, Csajka C; and the Swiss HIV Cohort Study. Pharmacokinetic/Pharmacodynamic Modelling to Describe the Cholesterol Lowering Effect of Rosuvastatin in People Living with HIV. Clin Pharmacokinet. 2020 Oct 29. *4.604*

Evelina Cardoso, Guidi M, Khoudour N, Pascaline Boudou-Rouquette, Fabre E, Tlemsani C, Arrondeau J, François Goldwasser, Vidal M, Schneider MP, Wagner AD, Widmer N, Blanchet B, Csajka C. Population Pharmacokinetics of Erlotinib in Patients With Non-small Cell Lung Cancer: Its Application for Individualized Dosing Regimens in Older Patients. Clin Ther. 2020 Jul; 42(7):1302-1316. *3.119*

Perrine Courlet, Charlotte Barbieux, Delphine Sculier, Gilles Wandeler, Marcel Stoeckle, Enos Bernasconi, Dominique Braun, Pietro Vernazza, Matthias Cavassini, Annalisa Marinosci, Mikaela Smit, Huldrych F. Günthard, Patrick Schmid, Andreas Limacher, Monia Guidi, Susana Alves Saldanha, Laurent Arthur Decosterd, Alexandra Calmy, and the Swiss HIV Cohort Study. Population pharmacokinetic modelling to quantify the magnitude of drug-drug interactions between amlodipine and antiretroviral drugs. Accepted in European Journal of Clinical Pharmacology *2.641*

Dietrich LG, Barceló C, Thorball CW, Ryom L, Burkhalter F, Hasse B, Furrer H, Weisser M, Steffen A, Bernasconi E, Cavassini M, de Seigneux S, Csajka C, Fellay J, Ledergerber B, Tarr PE. Contribution of Genetic Background and Data Collection on Adverse Events of Anti-human Immunodeficiency Virus (HIV) Drugs (D:A:D) Clinical Risk Score to Chronic Kidney Disease in Swiss HIV-infected Persons With Normal Baseline Estimated Glomerular Filtration Rate. Clin Infect Dis. 2020 Feb 14; 70(5):890-897. *8.313*

Decosterd LA, Mercier T, Ternon B, Cruchon S, Guignard N, Lahrichi S, Pesse B, Rochat B, Burger R, Lamoth F, Pagani JL, Eggimann P, Csajka C, Choong E, Buclin T, Widmer N, André P, Marchetti O. Validation and clinical application of a multiplex high performance liquid chromatography - tandem mass spectrometry assay for the monitoring of plasma concentrations of 12 antibiotics in patients with severe bacterial infections. J Chromatogr B Analyt Technol Biomed Life Sci. 2020 Nov 10; 1157:122160. *3.004*

Lisibach A, Benelli V, Ceppi MG, Waldner-Knogler K, Csajka C, Lutters M. Quality of anticholinergic burden scales and their impact on clinical outcomes: a systematic review. Eur J Clin Pharmacol. 2020 Oct 3. *2.641*

C. Bruggmann, S. Fournier, A. Panchaud, O. Muller, F. Sadeghipour, P. Voirol. Beta-blocker use and up-titration after acute ST-segment elevation myocardial infarction: a cohort study. Swiss Med Wkly 2020. eCollection 2020 Aug 10. *1.822*

Pauliat E, Onken M, Weber-Schoendorfer C, Rousson V, Addor MC, Baud D, Théaudin M, Diav-Citrin O, Cottin J, Agusti A, Rollason V, Kaplan YC, Kennedy D, Kadioglu M, Rothuizen LE, Livio F, Buclin T, Panchaud A*, Winterfeld U*. Pregnancy outcome following first-trimester exposure to fingolimod: A collaborative ENTIS study. Mult Scler. 2020 Jun 15:1352458520929628. Online ahead of print. *equally contributed to the work *5.412*

J. Sichitiu, Y. Vial, A. Panchaud, D. Baud, D. Desseauve. Tachysystole and risk of cesarean section after labor induction using misoprostol: A cohort study. Eur J Obstet Gynecol Reprod Biol. 2020 Apr 15; 249:54-58. *1.868*

Lambelet V, Vouga M, Pomar L, Favre G, Gerbier E, Panchaud A, Baud D. SARS-CoV-2 in the context of past coronaviruses epidemics: Consideration for prenatal care. Prenat Diagn. 2020 May 26:10.1002/pd.5759. *2.425*

A. Panchaud, G. Favre, L. Pomar, M. Vouga, K. Aebi-Popp, D. Baud & COVI-Preg group. An international registry for emergent pathogens and pregnancy. Lancet. 2020 May 9; 395(10235):1483-1484. *60.390*

Mathilde G, Rolnik DL, Hoffman MK, Panchaud A, Baud D. Should we stop aspirin prophylaxis in pregnant women diagnosed with COVID-19? Ultrasound Obstet Gynecol. 2020 Apr 29. *5.571*

Dao K, Guidi M, André P, Giannoni E, Basterrechea S, Zhao W, Fuchs A, Pfister M, Buclin T, Csajka C. Optimisation of vancomycin exposure in neonates based on the best level of evidence. Pharmacol Res. 2020 Apr; 154:104278. *5.893*

Dao K, Thoueille P, Decosterd LA, Mercier T, Guidi M, Bardinet C, Lebon S, Choong E, Castang A, Guittet C, Granier LA, Buclin T. Sultiame pharmacokinetic profile in plasma and erythrocytes after single oral doses: A pilot study in healthy volunteers. Pharmacol Res Perspect. 2020 Feb;8(1): e00558. *2.052*

Cardoso E, Guidi M, Blanchet B, Schneider MP, Decosterd LA, Buclin T, Csajka C, Widmer N. Therapeutic Drug Monitoring of Targeted Anticancer Protein Kinase Inhibitors in Routine Clinical Use: A Critical Review. Ther Drug Monit. 2020 Feb; 42(1):33-44. *2.073*

Glatard A, Guidi M, Delacrétaz A, Dubath C, Grosu C, Laaboub N, von Gunten A, Conus P, Csajka C, Eap CB. Amisulpride: Real-World Evidence of Dose Adaptation and Effect on Prolactin Concentrations and Body Weight Gain by Pharmacokinetic/Pharmacodynamic Analyses. Clin Pharmacokinet. 2020 Mar; 59(3):371-382. *4.604*

Courlet P, Stader F, Guidi M, Alves Saldanha S, Stoeckle M, Cavassini M, Battegay M, Buclin T, Decosterd LA, Marzolini C; Swiss HIV Cohort Study. Pharmacokinetic profiles of boosted darunavir, dolutegravir and lamivudine in aging people living with HIV. AIDS. 2020 Jan 1; 34(1):103-108. *4.534*

Scientific publications (without impact factor)

Graz B, Houriet J, Willcox M, Csajka C. Enquête « RTO-COVID-19 » : nos soins, nos actions, leurs effets. Rev Med Suisse. 2020 Aug 26; 16(703):1522-1523. French.

Balakirouchenane D, Guégan S, Csajka C, Jouinot A, Heidelberger V, Puszkiel A, Zehou O, Khoudour N, Courlet P, Kramkimel N, Lheure C, Franck N, Huillard O, Arrondeau J, Vidal M, Goldwasser F, Maubec E, Dupin N, Aractingi S, Guidi M, Blanchet B. Population Pharmacokinetics/Pharmacodynamics of Dabrafenib Plus Trametinib in Patients with BRAF-Mutated Metastatic Melanoma. Cancers (Basel). 2020 Apr 9; 12(4):931

Congresses / conferences and Symposia

- Congresses / conferences organisation : 0
- Posters presentations : 2
- Oral presentations : 1
- Invited oral presentations : 0

Ph.D. Theses presented in 2020

- Akram Farhat “Treatment safety and therapeutic optimisation in hospitalized patients”
  Prof. Chantal Csajka

- Perrin Courlet “Model-based simulations of drug-drug interactions in the Swiss HIV Cohort Study”.
  Prof. Chantal Csajka and Laurent Decosterd

Awards and distinction

Gaspar, F., A step towards Ticagrelor individualization based on pharmacokinetic approaches, Virtual Congress GSASA, 2020, best poster, 3rd prize.

Lisibach, A., A high anticholinergic burden at admission is associated with in-hospital mortality in older patients: A comparison of 19 different anticholinergic burden scales, Virtual Congress GSASA, 2020, best oral presentation, 1st prize.

COMMUNITY PHARMACY PRACTICE

Professor Olivier BUGNON *(†13.05.2020)*
Doctor Jérôme BERGER

General description of Unit

The Community Pharmacy of Unisanté offers specific opportunities for the clinical pharmaceutical sciences in Western Switzerland and for the Faculty of Medicine in Lausanne.

Unisanté is the university centre dedicated to primary care and public health in Lausanne, which corresponds to the modern vision of health systems giving priority to interprofessional collaboration, optimisation of resources and partnering with patients considered in all their individuality. The team of the Community Pharmacy is fully involved in Unisanté's missions (www.unisante.ch).

The Community pharmacy practice research unit is currently affiliated to:

- Centre for Primary Care and Public Health (Unisanté), University of Lausanne
- Institute of Pharmaceutical Sciences of Western Switzerland (ISPSO), University of Geneva, University of Lausanne)
- School of Pharmaceutical Sciences, University of Geneva
- Centre for Research and Innovation in Clinical Pharmaceutical Sciences, University of Lausanne

The Community Pharmacy is a key sector of the Department of Ambulatory Care in Unisanté. Our expertise is recognised at the regional, national and international levels for its clinical, research/development and educational activities. Our work focus on understanding the determinants, development, implementation and clinical, humanistic, economic evaluation of pharmacy services around the topic "smarter medication in primary care and public health".

Specific research fields

Smarter medication in primary care and public health

The main research and teaching activities of the research unit are focused on development, implementation and evaluation of person-centred and integrated community pharmacy services for "smarter medication in primary care and public health":

- chronic care management programs,
- optimization of drug therapy,
- interprofessional care models
- technological innovations (e-Health)
- professional developments, methodological expertise and developments.

2020 at a glance

- Publications with impact factor : 10
- Publications without impact factor : 22
- Patents : 0
- Book and chapters : 0

- Congresses / conferences organisation : 0
- Posters presentations : 2
- Oral presentations : 3
- Invited oral presentations : 0
- Number of projects at FNRS and assimilated (Research funds) : 4
- Service agreements and related activities : 8
- Ph.D. Theses presented in 2020 : 2
- Awards and distinctions: 2
- Public outreach activities : 0

Research funds

FNRS (NPR 74)
How to improve care integration, coordination and continuity? Designing policy from population needs and preferences
Main applicant: J. Marti
Co-applicants: C. Perraudin, O. Bugnon, I. Peytremann Bridevaux and J. Wagner
Total funding of the project: CHF 337'060
Total duration of the project: 3 years
Allocation 2020: CHF112'353
Starting date: 01.02.2020

CANTONAL OFFICE OF PUBLIC HEALTH – VAUD
Développement, implémentation et évaluation scientifique du programme interprofessionnel vaudois de cercles de qualité médecins-pharmaciens-soignants des établissements médico-sociaux pour personnes âgées (EMS)
Main applicants: O. Bugnon and A. Niquille Charrière
Total funding of the project: CHF 180'000
Total duration of the project: 1 year
Allocation 2020: CHF 180'000
Starting date: 01.01.2020

CANTONAL OFFICE OF PUBLIC HEALTH – VAUD
Organisation and animation of a Quality Circle Physicians-Pharmacists-Nurses in the nursing homes of the « Fondation Asile des Aveugles (FAA) and Nursing Home Béthanie»
Main applicants: O. Bugnon and J. Berger
Total funding of the project: CHF 35'842
Allocation 2020: CHF 35'842
Starting date: 01.01.2020

CANTONAL OFFICE OF PUBLIC HEALTH – VAUD AND
SOCIETE VAUDOISE DE PHARMACIE
Médicaments à jour? - MAJ
Feasibility study of a pharmacist-led medication reconciliation service ("brown bag" type) for patients with polypharmacy
Main applicants: O. Bugnon and J. Berger
Total funding of the project: CHF 111'190
Allocation 2020: CHF 0.00 (pending COVID-19)
Starting date: 01.01.2020

Total amount for all research funds for 2020: CHF 328'195.-

Service agreements and related activities

FEDERAL OFFICE OF PUBLIC HEALTH (FOPH)
Service agreement (Examen fédéral en Pharmacie 2020)
Main applicant: O. Bugnon and J. Berger for the Institute of pharmaceutical sciences of Western Switzerland (ISPSO), University of Geneva, University of Lausanne.
Total amount 2020: CHF 375'000

CP3
Service agreement
Total amount 2020: CHF 8'850

7OP
Service agreement
Total amount 2020: CHF 1'440

PHA11
Service agreement
Total amount 2020: CHF 7'100

SV3
Service agreement
Total amount 2020: CHF 12'700

RC15S
Service agreement
Total amount 2020: CHF 43'500

AF13
Service agreement
Total amount 2020: CHF 90'000

U3
Service agreement
Total amount 2020: CHF 36'530

Total amount (for all service agreements and related activities) for 2020: CHF 575'120.-

Scientific publications (with impact factor)

Pluss-Suard, C.; Niquille, A.; Hequet, D.; Krahenbuhl, S.; Pichon, R.; Zanetti, G.; Bugnon, O.; Petignat, C., Decrease in Antibacterial Use and Facility-Level Variability After the Introduction of Guidelines and Implementation of Physician-Pharmacist-Nurse Quality Circles in Swiss Long-term Care Facilities.
Journal of the American Medical Directors Association 2020, 21 (1), 78-83. 4.367

Kamal, S.; Glass, T. R.; Doco-Lecompte, T.; Locher, S.; Bugnon, O.; Parienti, J. J.; Cavassini, M.; Schneider, M. P., An Adherence-Enhancing Program Increases Retention in Care in the Swiss HIV Cohort.
Open forum infectious diseases 2020, 7 (9), ofaa323. 3.656

Cateau, D.; Ballabeni, P.; Mena, S.; Bugnon, O.; Niquille, A., Deprescribing in nursing homes: Protocol for nested, randomised controlled hybrid trials of deprescribing interventions.
Research in social & administrative pharmacy: RSAP 2020. 2.844

Cateau, D. ; Bugnon, O. ; Niquille, A., 2.844
Evolution of potentially inappropriate medication use in nursing homes: Retrospective analysis of drug consumption data.
Research in social & administrative pharmacy: RSAP 2020.

Garcia-Cardenas, V.; Rossing, C. V.; Fernandez-Llimos, F.; Schulz, M.; 2.844
M.; Tsuyuki, R.; Bugnon, O.; Stumpf Tonin, F.; Benrimoj, S. I., Pharmacy practice research – A call to action.
Research in Social and Administrative Pharmacy 2020, 16 (11), 1602-1608.

Roux, B.; Sirois, C.; Niquille, A.; Spinewine, A.; Ouellet, N.; Pétein, C.; Sibille, F.-X.; 2.844
Csajka, C.; Reeve, E.; Villeneuve, C.; Laroche, M.-L., Cross-cultural adaptation and psychometric validation of the revised Patients' Attitudes Towards Deprescribing (rPATD) questionnaire in French.
Research in Social and Administrative Pharmacy 2020.

Perraudin, C.; Bourdin, A.; Vicino, A.; Kuntzer, T.; Bugnon, O.; Berger, J., 2.740
Home-based subcutaneous immunoglobulin for chronic inflammatory demyelinating polyneuropathy patients: A Swiss cost-minimization analysis.
PLoS One 2020, 15 (11), e0242630.

Schütz Leuthold, M.; Schwarz, J.; Marti, J.; Perraudin, C.; Hudon, C.; Peytremann-Bridevaux, I.; Senn, N.; Cohidon, C., Protocol for an implementation and realist evaluation of a new organizational model for primary care practices in the Canton of Vaud, Switzerland. 2.496
BMJ Open 2020, Accepted.

Bourdin, A.; Dubois, J.; Foley, R. A.; Schluep, M.; Bugnon, O.; Berger, J., 1.987
Satisfaction and experiences of patients taking fingolimod and involved in a pharmacy-based patient support program in Switzerland - a qualitative study.
BMC health services research 2020, 20 (1), 425.

Kamal, S.; Urata, J.; Cavassini, M.; Liu, H.; Kouyos, R.; Bugnon, O.; Wang, W.; 1.894
Schneider, M. P., Random forest machine learning algorithm predicts virologic outcomes among HIV infected adults in Lausanne, Switzerland using electronically monitored combined antiretroviral treatment adherence.
AIDS Care 2020, 1-7.

Scientific publications (without impact factor)

Peer-reviewed publications

Bawab, N.; Moullin, J. C.; Perraudin, C.; Bugnon, O., Implementation and Effectiveness of an Interprofessional Support Program for Patients with Type 2 Diabetes in Swiss Primary Care: A Study Protocol. Pharmacy (Basel, Switzerland) 2020, 8 (2).

Cateau, D.; Foley, R. A.; Niquille, A., [Deprescribing in nursing homes: comparative views of residents, their relatives, and healthcare professionals]. Revue medicale suisse 2020, 16 (714), 2169-2171.

Foley, R. A.; Hurard, L. L.; Cateau, D.; Koutaissoff, D.; Bugnon, O.; Niquille, A., Physicians', Nurses' and Pharmacists' Perceptions of Determinants to Deprescribing in Nursing Homes Considering Three Levels of Action: A Qualitative Study. Pharmacy (Basel, Switzerland) 2020, 8 (1).

Lechevalier Hurard, L.; Cateau, D.; Bugnon, O.; Niquille Charrière, A.; Foley, R.-A., Points de vue d'usagers sur la déprescription de médicaments en maison de retraite. Gérontologie et société 2020, 42 / 161 (1), 171-189.

Schnegg, D.; Senn, N.; Bugnon, O.; Schwarz, J.; Mueller, Y., Drug Prescription in Older Swiss Men and Women Followed in Family Medicine. Drugs - real world outcomes 2020, 7 (1), 87-95.

Schneider, M.; Bandiera, C.; Dotta-Celio, J.; Zanchi, A., [Medication adherence and physician-pharmacist collaboration. Focus on the patient with diabetic nephropathy]. Revue medicale suisse 2020, 16 (697), 1210-1213.

Stämpfli, D.; la Torre, A. M.; Du Pasquier, S.; Stegmann, D.; Brügger, A.; Burden, A. M., Community pharmacist-administered seasonal influenza vaccination: a national customer survey. Journal of pharmaceutical policy and practice 2020, 13, 57.

Publications in professional press

Carrel, S.; Carli, D.; Berger, J., Behandlung von Heuschnupfen / Les traitements du rhume des foins. Pharmajournal 2020, 3, P. 14-16.

T. Orlandi, D. C., J. Berger, Hauptmerkmale von Phosphodiesterase-5-Inhibitoren / Principales caractéristiques des inhibiteurs de la phosphodiestérase V. Pharmajournal 2020, 8, P. 4-5.

Pittet, N.; Carli, D.; Berger, J., Beratung bei Kopflausbefall / Prise en charge des poux de tête à l'officine. Pharmajournal 2020, 8, P. 12-13.

Carrel, S.; Pittet, N.; Carli, D.; Berger, J., Unerwünschte Wirkungen auf die Fahrfähigkeit – Verantwortung der Akteure / Effets indésirables pouvant influencer la conduite et responsabilités engagées de chaque acteur. Pharmajournal 2020, 12, P. 1-3.

Clinical practice guidelines published on the Unisanté's intranet

Frossard, T.; Barbalat, M-J.; Carli, D.; Berger, J., Traitement de la gale. Ipharm 2020, 1.

Pittet, N.; Du Pasquier, S.; Carli, D.; Berger, J., Interactions entre le tabac et les médicaments pour la désaccoutumance tabagique. Ipharm 2020, 2.

Frossard, T.; Carli, D.; Berger, J., Traitements et préventions des cystites aigues non-compliquées. Ipharm 2020, 3.

Frossard, T.; Carli, D.; Berger, J., Traitements des cystites compliquées. Ipharm 2020, 4.

Oualidi, S.; Carli, D.; Berger, J., Gluten et lactose. Ipharm 2020, 5.

Carrel, S.; Carli, D.; Berger, J., Prescription de médicaments biosimilaires. Ipharm 2020, 6.

Pittet, N.; Carli, D.; Berger, J., Bonnes pratiques de prescription de la morphine. Ipharm 2020, 7.

Carli, D. ; Berger, J., Tocilizumab (Actemra®) : Limitation de l'utilisation de stylo pré-rempli par mesure de sécurité. Imed janvier 2020

Carli, D. ; Berger, J., Anti-hypertenseur pris une fois par jour : à prendre le soir ? Imed février 2020

Carli, D. ; Berger, J., Enoxaparine : premier biosimilaire et nouveaux dosages. Imed novembre 2020

Carli, D. ; Berger, J., Pharmacovigilance : Hydroxychloroquine (Plaquenil®) : Risque d'évènements cardiovasculaires graves, prudence lors de prescription en off label dans le traitement de la Covid 19. Imed 2020

Congresses / conferences and Symposia

- Congresses / conferences organisation : 0
- Posters presentations : 2
- Oral presentations : 3
- Invited oral presentations : 0

Ph.D. Theses presented in 2020

- Bawab N. Implementation and Effectiveness Study of an Interprofessional Support Programme for Patients with Type 2 Diabetes in Swiss Primary Care. September 11th 2020. Director: Schneider M., Bugnon O.; supervisor: Perraudin C.

- Cateau D. Could we also stop this one? Deprescribing Inappropriate Medications in Western Switzerland's Nursing Homes. December 11th 2020. Director: Csajka C., Bugnon O.; supervisor: Niquille A.

Awards and distinction

Bawab, N., Poster prize award in Intervention-Implementation category Eurodurg 2020 Conference, March 2020, Szeged (Hungary)

Maritz C., 1st prize, best master thesis, Ofac Pharmacy Awards, December 2020

HOSPITAL PHARMACY (HUG)

Professor Pascal BONNABRY

General description of Unit

HUG hospital pharmacy group (http://pharmacie.hug.ch) develops research and education activities in hospital and clinical pharmacy. The undergraduate education is mainly focused on hospital pharmacy modules in BUSP2 and BUSP3. A post-graduate education (MAS) in hospital pharmacy is also proposed since 1999. This three years program is a complete specialization in hospital pharmacy, associating theoretical and practical teachings, as well as a research project. Hospital pharmacy also propose positions for PhD students. The unit is also involved in global pharmacy, mainly with the project Pharm-Ed (www.Pharm-Ed.net) and in emergency and disaster pharmacy, by hosting the Swiss specialized center of competence (SEDIP, www.disaster-pharmacy.ch).

Specific research fields

To optimize the safety, the efficiency and the traceability of drug use in hospitals:

- Processes
  - Risk analysis
  - Information technologies
  - Human factors, ergonomics and process efficiency
  - Continuity of care
  - Organization in humanitarian, emergency and disaster situations
- Persons
  - Inter-professionality
  - Pedagogic approaches for knowledge transmission
  - Decision support
- Products
  - Optimisation of clinical and economic use
  - Development of hospital preparations
  - Stability studies
  - Analysis of hazardous drugs

2020 at a glance

- Publications with impact factor : 11
- Publications without impact factor : 3
- Patents : 0
- Book and chapters : 0
- Congresses / conferences organisation : 1
- Posters presentations : 13
- Oral presentations : 10
- Invited oral presentations : 6
- Number of projects at FNRS and assimilated (Research funds) : 3
- Service agreements and related activities : 1
- Ph.D. Theses presented in 2020 : 1
- Awards and distinctions: 2
- Public outreach activities : 11

Research funds

B/Braun, Sanofi, Vifor, Roche
Impact des technologies de l'information sur la sécurité, l'efficience et la traçabilité du circuit du médicament à l'hôpital
Main applicant: Pr Pascal Bonnabry
Total funding of the project: to be discussed year after year with the companies
Total duration of the project: 4 years
Allocation 2020: CHF 60'000
Starting date: 01.01.2020

Debiopharm, Octapharma
Pharm-Ed: développement de la pharmacie hospitalière dans les pays à faible revenus
Main applicant: Pr Pascal Bonnabry
Total funding of the project: around CHF 900'000 since the beginning
Total duration of the project: beginning in 2014, project will continue
Allocation 2020: CHF 8'000
Starting date: 01.01.2014

BD Switzerland
Impact of automated dispensing cabinets on dispensing errors, interruptions and pillbox preparation time
Main applicant: Pr Pascal Bonnabry
Total funding of the project: CHF 21'000
Total duration of the project: 2020
Allocation 2020: CHF 21'000
Starting date: 01.01.2020

Total amount for all research funds for 2020: CHF 89'000.-

Service agreements and related activities

Helvétique, Département fédéral de la Défense, de la Protection de la Population et des Sports (DPPS)
Service – Development – Research : Centre de pharmacie d'urgence et de catastrophe
Total amount for 2020: CHF 100'000

Total amount (for all service agreements and related activities) for 2020: CHF 100'000.-

Scientific publications (with impact factor)

Simon, N.; Odou, P.; Décaudin, B.; Bonnabry, P.; Fleury-Souverain, S., Chemical Decontamination of Hazardous Drugs: A Comparison of Solution Performances. Annals of Work Exposures and Health Performance 2020, 64, 114-124. *1.2*

Berthod, F.; Bouchoud, L.; Grossrieder, F.; Falaschi, L.; Senhaji, S.; Bonnabry, P., Learning good manufacturing practices in an escape room: Validation of a new pedagogical tool. Journal of Oncology Pharmacy Practice 2020, 26, 853-860. *1.8*

Petit, L.-M.; Le Pape, P.; Delestras, S.; Nguyen, C.; Marchand, V.; Belli, D.; Bonnabry, P.; Bajwa, N.; Fonzo-Christe, C., E-Learning Training to Improve Pediatric Parenteral Nutrition Practice: A Pilot Study in Two University Hospitals. Journal of Parenteral and Enteral Nutrition 2020, 44, 1089-1095. *4.1*

Bonnabry, P.; François, O., Return on investment: a practical calculation tool to convince your institution. European Journal of Hospital Pharmacy 2020, 27, 111-113. *0.9*

Batson, S.; Herranz, A.; Rohrbach, N.; Canobbio, M.; Mitchell, S. A.; Bonnabry, P., Automation of in-hospital pharmacy dispensing: a systematic review. European Journal of Hospital Pharmacy 2020; doi: 10.1136/ejhpharm-2019-002081 *0.9*

Sommer, I.; Schwebel, H.; Adamo, V.; Bonnabry, P.; Bouchoud, L.; Sadeghipour, F., Stability of *N*-Acetylcysteine (NAC) in Standardized Pediatric Parenteral Nutrition and Evaluation of *N*, *N*-Diacetylcystine (DAC) Formation. Nutrients 2020, 12, 1849 doi: 10.3390/nu12061849. *4.1*

Simon, N.; Guichard, N.; Odou, P.; Decaudin, B.; Bonnabry, P.; Fleury-Souverain, S., Efficiency of four solutions in removing conventional antineoplastic drugs from contaminated surfaces. PLoS One 2020, 15(6): e0235131. *2.8*

Von Grünigen, S.; Geissbühler, A.; Bonnabry, P., Cyto-STAT: A self-assessment tool for the safe handling of cytotoxic drugs adapted for use in low-and middle-income countries. Journal of Oncology Pharmacy Practice 2020, doi: 10.1177/1078155220956687. *1.8*

Sommer, I.; Bouchoud, L.; Berger-Gryllaki, M.; Bonnabry, P.; Sadeghipour, F., Quality and Safety of parenteral nutrition for newborn and preterm infants as an on-ward preparation. European Journal of Hospital Pharmacy 2020, 27, 292-296. *0.9*

Simon, N.; Odou, P.; Décaudin, B.; Bonnabry, P.; Fleury-Souverain, S., Occupational exposure to conventional antineoplastic drugs: can it be further limited? European Journal of Hospital Pharmacy 2020, 27, 251-252. *0.9*

Guichard, N.; Tobolkina, E.; El Morabit, L.; Bonnabry, P.; Vernaz, N.; Rudaz, S., Determination of antiretroviral drugs for buyers' club in Switzerland using capillary electrophoresis methods. Electrophoresis 2020; doi: 10.1002/elps.202000216. *3.1*

Scientific publications (without impact factor)

Dossim, S.; Koffi Mawusse, G.; Chick, A.; Tanga, A.; Kolou, M.; Kponvi, V.; Amavi, T.; Gbadoe, A. D.; Segbena, A. Y. ; Bonnabry, P.; Dagnra, A. Y., Prevalence of Hepatitis B Surface Antigen and Hepatitis C Antibodies in Sickle Cell Disease Children under Sixteen in Two University Hospitals of Lome. Microbiology Research Journal International 2020, 30, 56-61.

Fonzo-Christe, C.; Bochaton, N.; Kiener, A.; Rimensberger, P. C.; Bonnabry, P., Incidence and Cause of Infusion Alarms In a Neonatal and Pediatric Intensive Care Unit: A Prospective Pilot Study. Journal of Pediatric Pharmacology and Therapeutics 2020, 25, 500-506.

Schumacher, L.; Blatrie, C.; Krähenbühl, S.; Pasteur, C.; Blanc, A.-L.; Pellaton, C.; Bonnabry, P.; Rouiller, F.; Widmer, N., Management of the COVID-19 pandemic in Switzerland: Roles and challenges of an interhospital Pharmacy. Médecine de catastrophe - Urgences collectives 2020, 4, 223-232.

Congresses / conferences and Symposia

- Congresses / conferences organisation : 1
- Posters presentations : 13
- Oral presentations : 10
- Invited oral presentations : 6

Ph.D. Theses presented in 2020

- Isabelle Sommer
  Le développement d'une nutrition parentérale pédiatrique standardisée et industrialisée pour les premiers jours de vie des nouveau-nés à terme et prématurés et sa mise en œuvre en tant que « standard of care »
  Pr Farshid Sadeghipour, Pr Pascal Bonnabry

Awards and distinction

Bonnabry, P., GSASA-award 2020.
(https://www.gsasa.ch/fr/la-gsasa/distinctions/gsasa-award/?oid=10128&lang=fr)

Schumacher, L.; Senhaji, S.; Gartner, B. A.; Carrez, L.; Dupuis, A.; Bonnabry, P.; Widmer, N., Multicenter full-scale simulations in hospital pharmacies to improve disaster preparedness. **Congrès GSASA**, Virtuel, 2020 (**best oral communication, 2nd prize**).

Public outreach activities (radio, television and other media, community service)

P. Bonnabry. Le coronavirus pourrait aggraver la pénurie de médicaments en Suisse. RTS, 19:30, February 14th, 2020.

P. Bonnabry. Pénurie de médicaments : faut-il s'en inquiéter ? RTS, On en parle, February 25th, 2020.

L. Bouchoud. Aux HUG, la course à la potion magique. Le Temps, March 23rd, 2020.

P. Bonnabry. Nerf de la guerre, les anesthésiants se font rares dans les hôpitaux. RTS, 19:30, March 28th, 2020.

P. Bonnabry. L'hôpital est confronté au spectre de la pénurie d'anesthésiants. Tribune de Genève, March 30th, 2020

P. Bonnabry, D. Kraus. N'attendons pas la fin de la crise pour assurer l'approvisionnement pharma ! Heidi.news, April 2nd, 2020

D. Pittet, P. Bonnabry. L'inventeur du gel hydro-alcoolique : c'est lui ! TF1, 20 heures, May 5th, 2020.

P. Bonnabry. La formule genevoise du gel hydro-alcoolique explose sur Youtube. Heidi.news, May 6th, 2020.

P. Bonnabry. Les hôpitaux suisses prennent les devants et font des stocks de dexamethasone. RTS, Le journal radio, June 24th, 2020.

P. Bonnabry. Gels désinfectants : comment faire le bon choix ? Le Matin dimanche, July 12nd, 2020.

P. Bonnabry, Le monde complexe des désinfectants. Bon à savoir, November 9th, 2020.

HOSPITAL PHARMACY (CHUV)

Professor Farshid SADEGHIPOUR

General description of Unit

CHUV hospital pharmacy group (https://www.chuv.ch/fr/pharmacie/pha-home) develops research and education activities in hospital and clinical pharmacy. The undergraduate education is mainly focused on hospital pharmacy modules in BUSP2 and BUSP3. A post-graduate education (MAS) in hospital pharmacy is also proposed since 1999. This three years program is a complete specialization in hospital pharmacy, associating theoretical and practical teachings, as well as a research project. Hospital pharmacy also propose positions for PhD students. The unit is also involved in research in radiopharmaceuticals and autologous skin grafts in the therapy of patients with burn injuries.

Specific research fields

Optimization of clinical use of drugs
- Securing the drug use process in high risk care units
- Detection, prevention, management and evaluation of drug incompatibilities
- Therapeutic education with new technologies

Development of hospital pharmaceutical forms
- Development of ready-to-use pharmaceutical forms
- Formulation of pediatric parenteral nutrition

Pharmaceutical analysis
- Development and validation of generic separation methods for the dosage of active ingredients contained in hospital pharmaceutical formulations.
- Study of content and containers interactions in leachable and extractable events of different pharmaceutical packagings

Pharmacoeconomics and pharmacoepidemiology
- Economic evaluation of changes in therapeutic strategies in hospital

2020 at a glance

- Publications with impact factor : 8
- Publications without impact factor : 3
- Patents : 0
- Book and chapters : 0
- Congresses / conferences organisation : 3
- Posters presentations : 12
- Oral presentations : 3
- Invited oral presentations : 2
- Number of projects at FNRS and assimilated (Research funds) : 0
- Service agreements and related activities : 2
- Ph.D. Theses presented in 2020 : 2

Awards and distinctions: 1Public outreach activities: 3Scientific publications (with impact factor)

Sommer, I.; Schwebel, H.; Adamo, V.; Bonnabry P.; Bouchoud, L.; Sadeghipour F.;
Stability of N-Acetylcysteine (NAC) in Standardized Pediatric Parenteral Nutrition and Evaluation of N, N-Diacetylcystine (DAC) Formation
Nutrients. 2020 Jun; 12(6): 1849; doi: 10.3390/nu12061849 *4.55*

Bruggmann, C.; Astaneh, M.; Lu, H.; Tozzi, P.; Ltaief, Z.; Voirol, P.; Sadeghipour, F.;
Management of Atrial Fibrillation Following Cardiac Surgery: Observational Study and Development of a Standardized Protocol.
Ann Pharmacother. 2020 Nov 13:1060028020973998. doi: 10.1177/1060028020973998. 2.41

Franchitti, M.; Piubellini, J.; Sadeghipour, F.; Eckert, P.; Voirol, P*.; Schneider, A.-G.*;
Adequacy of stress ulcer prophylaxis prescription in the intensive care unit: an observational study,
Swiss Med Wkly 2020 150:w20322. doi: 10.4414/smw.2020.20322 *equal contribution 1.82

Bruggmann, C. ; Fournier, S. ; Panchaud, A. ; Muller, O. ; Sadeghipour, F. ; Voirol, P.;
Beta-blocker use and up-titration after acute ST-segment elevation myocardial infarction: a cohort study,
Swiss Med Wkly 2020 Aug 18; 150:w20321. doi: 10.4414/smw.2020.20321 1.82

Bruggmann, C.; Iglesias, J.F.; Gex-Fabry, M.; Fesselet R.; Vogt, P.; Sadeghipour, F.; Voirol, P.;
Long-term quality of prescription for ST-segment elevation myocardial infarction (STEMI) patients: a real world one-year follow-up study. American Journal of Cardiovascular Drugs
Am J Cardiovasc Drugs. 2020 Feb;20(1):105-115. doi: 10.1007/s40256-019-00361-5. 2.67

Delage, J.A.; Faivre-Chauvet, A.; Fierle, J.K ; Gnesin, S.; Schaefer, N. ; Coukos, G.; Dunn, S.M.;, Viertl, D.; Prior, J.O.;
177 Lu radiolabeling and preclinical theranostic study of 1C1m-Fc: an anti-TEM-1 scFv-Fc fusion protein in soft tissue sarcoma.
EJNMMI Res. 2020 Aug 17;10(1):98. 2.64

Ruman-Colombier, M.; Rochat-Guignard, I; Di Paolo, E.R.; Gehri, M.; Pauchard, J.Y.;
Prevalence and risk factors of lactic acidosis in children with acute moderate and severe asthma, a prospective observational study.
Eur J Pediatr 2020; DOI 10.1007/s00431-020-03834-x. 2.31

Schwotzer, N.; Paganetti, G.; Barchi, M.; Perrottet, N.; Aubert, V.; Sadallah, S.; Rotman, S.; Venetz, J.P.; Matter, M.; Golshayan, D.; Pascual, M.;
Upfront use of eculizumab to treat early acute antibody-mediated rejection after kidney allotransplantation and relevance for xenotransplantation.
Xenotransplantation. 2020 Jul; 27(4):e12630 3.48

Scientific publications (without impact factor)

Crauste-Manciet, S.; Krämer, I.; Lagarce, F.; Sautou V.; Beaney, A.; Smith, J.; Fenton-May,V.; Hecq, J.-D.; Sadeghipour, F.; Le Brun P.;
GERPAC Consensus Conference–Guidanceon the Assignment of Microbiological Shelf-lifefor Hospital Pharmacy Aseptic Preparations
Pharm Technol Hosp Pharm 2020; 20200001; https://doi.org/10.1515/pthp-2020-0001

Pauchet, A.; Schwotzer, N.; Lamine, F.; Perrottet, N.; Zanchi, A.; Golshayan, D.; Wojtusciszyn, A.;
Diabète post-transplantation rénale: le point de vue du diabétologue. / [Post-transplantation diabetes in kidney transplant: from the diabetologist point of view].
Rev Med Suisse. 2020 Jun 10;16(697):1200-1205.

Nachar, C. ; Perrottet, N.; Garnier A.;
Le bon moment pour un médicament: comment faire passer la pilule ?
Rev Med Suisse 2020 Nov 25; 16(716): 2254-2258.

Congresses / conferences and Symposia

- Congresses / conferences organisation : 3
- Posters presentations : 12
- Oral presentations : 3
- Invited oral presentations : 2

Awards and distinction

Sommer, I.; Schwebel, H.; D. Palmero, D.; Fischer Fumeaux, C.: Beauport, L.; Adamo, V.; Bonnabry P.;, Bouchoud, L.; Sadeghipour F.;
Development of a Standardized Pediatric Parenteral Nutrition for the First Days of Life of a Term or Preterm Newborn
Prix Junior (Swiss YPG) Poster, Virtual Congress GSASA, 2020

Public outreach activities (radio, television and other media, community service)

F. Sadeghipour. Dans les hôpitaux suisses, les stocks d'anesthésiants diminuent. Un manque qui pourrait notamment peser aux soins intensifs. ;
RTS, TJ 19H30 ; 28.03.2020

F. Sadeghipour. Les hôpitaux romands s'organisent à la deuxième vague de Covid-19. ;
RTS, TJ 19H30 ; 21.10.2020

P. Voirol. Témoignages spécial Coronavirus, PharmaJournal, 5/2020

IMMUNOPHARMACOLOGY OF CANCER

Professor Carole BOURQUIN

General description of Unit

Our overall aim is to develop novel treatments to enhance the body's immune defences against cancer.

We aim to uncover new mechanisms leading to immune activation in cancer. Our goal is to identify novel targets to stimulate anticancer immunity and to demonstrate the impact of their pharmacological modulation. In this context, we have three main research axes focusing on innate immunity, immunometabolism and drug delivery.

One focus of our research is the role of players involved in the innate immune recognition of nucleic acids, such as endosomal Toll-like receptors, HMGB1 and STING. We study the effect of the pharmacological modulation of these receptors and immune mediators. We address the following questions:

- What is the impact of these pathways on different aspects of anticancer immunity?
- Can we enhance migration of immune cells into the tumor with pharmacological modulators of these pathways?
- Can we decrease cancer-associated immunosuppression by targeting these pathways?

A second focus of our research is the impact of lipid metabolism on the anti-tumor immune response at different levels. At the systemic level, we study how a high-fat diet, obesity and steroid signalling may modify anticancer immunity and the response to immunotherapy. At the cellular level, we address the role of intratumoral lipid biosynthesis and steroid metabolism on the anti-tumor immune response. We address the following questions:

- Can the lipid synthesis pathway in cancer cells modulate the immune response?
- What is the impact of obesity on steroid-mediated immune modulation?
- Can we target steroid metabolism to enhance the anti-tumor immune response?

The third focus of our research is the implementation of drug delivery systems, such as nanoparticles, to improve the therapeutic efficacy of immune modulators in cancer. We address the following questions:

- Can we use nanoparticles as a delivery system to focus the action of Toll-like receptor 7 agonists and prevent unwanted side effects?
- What are the optimal characteristics of nanocarriers to deliver drugs that target anticancer immunity?

We address these scientific questions using translational approaches, starting with clinically relevant data to generate our hypotheses, which we then validate in preclinical models of gastrointestinal, skin, liver and renal cancer. Our research was awarded the Egon Naef Foundation for In Vitro Research prize for alternative methods to animal experimentation.

2020 at a glance

- Publications with impact factor : 2
- Publications without impact factor : 0
- Patents : 1
- Book and chapters : 0
- Congresses / conferences organisation : 1
- Posters presentations : 4
- Oral presentations : 6
- Invited oral presentations : 3
- Number of projects at FNRS and assimilated (Research funds) : 8
- Service agreements and related activities : 0
- Ph.D. Theses presented in 2020 : 1
- Awards and distinctions: 4
- Public outreach activities : 2

Research funds

Swiss National Science Foundation
“HMGB1 and Gasdermin D: intratumoral targets to improve the response to cancer immunotherapy” (310030_182317/1)
Main applicant: Carole Bourquin
Total funding: CHF 700’000
Duration: 4 years
Allocation 2020: CHF 175'374
Starting date: 01.01.2019

Swiss Cancer Research Foundation
“Impact of obesity on anti-tumor response to immunotherapy.” (KFS-4535-08-2018-R)
Main applicants : Carole Bourquin and Aurélien Pommier
Total funding: CHF 368’850
Duration: 3 years
Allocation 2020: CHF 123'000
Starting date: 01.03.2019

Fondation Ernest Boninchi
“Le métabolisme des glococorticoïdes dans l’immunité anti-tumorale”
Main applicants : Carole Bourquin and Aurélien Pommier
Total funding: CHF 80’000
Duration: 2 years
Allocation 2019-2020: CHF 80’000
Starting date: 01.05.2019

Cell Migration
Doctoral Program SwissUniversities
Main applicant: Carole Bourquin
Total funding: CHF 24'000
Duration: 3 years
Allocation 2019-2020: CHF 12'000
Starting date: 01.07.2018

Novartis Foundation
"Exploring the tumorigenic role of stomach microbiota in a spontaneous mouse model of gastric cancer"
Main applicants: Carole Bourquin and Viola Puddinu
Total funding: CHF 60'000
Duration: 1 ½ year
Allocation 2020: CHF 60'000
Starting date: 01.08.2020

Innosuisse
"First-in-class treatment for renal cancer"
Main applicants: Carole Bourquin and Aurélien Pommier
Total funding: CHF 307'281.30
Duration: 1 ½ year
Allocation 2020: CHF 153'640.50
Starting date: 01.08.2020

Doctoral Program Cell Migration
Doctoral Program SwissUniversities
Main applicant: Carole Bourquin
Total funding: CHF 8'000
Duration: annual
Allocation 2020: CHF 8'000
Starting date: 01.11.2020

Fondation Egon Naef pour la Recherche in Vitro (FENRIV)
Prize attributed to Carole Bourquin
Total funding : CHF 8'000
Allocation 2020 : CHF 8'000

Total amount for all research funds for 2020: CHF 620'014.50

Scientific publications (with impact factor)

Hérault, N.*; Wagner, J.*; Abram, SL.; Widmer, J.; Horvath, L.; Vanhecke, D.; Bourquin, C.*; Fromm, M.* (*shared first and senior authorship), Silver-containing titanium oxide nanocapsules for combating multidrug-resistant bacteria. International Journal of Nanomedicine 2020, 15:1267-1281. *4.5*

Bourquin, C.; Pommier, A.; Hotz, C. Harnessing the immune system to fight cancer with Toll-like receptor and RIG-I-like receptor agonists. Pharmacological Research, 2020; 154:104192 *5.6*

Patents

Bourquin, C.; Pommier, A., HSD11B1 inhibitors for use in immunotherapy and uses thereof, 2020, Patent application EP20161715.6

Congresses / conferences and Symposia

- Congresses / conferences organisation : 1
- Posters presentations : 4
- Oral presentations : 6
- Invited oral presentations : 3

Ph.D. Theses presented in 2020

Sandra Hocevar
Understanding the interactions of gold nanoparticles with B lymphocytes in vitro and in vivo
Prof. Carole Bourquin

Awards and distinction

Wagner, J., Combination of a TLR agonist with a STING ligand induces T cell death. Free Registration Grant. World Immune Regulation Meeting (WIRM) XIV, October 2020, Davos (Switzerland) (online meeting).

Wagner, J., Combination of a TLR agonist with a STING ligand induces T cell death. Best Poster Presentation Award. World Immune Regulation Meeting (WIRM) XIV, October 2020, Davos (Switzerland) (online meeting).

Taskoparan, B., Cancer-cell-derived HMGB1 suppresses the immune response against cancer. Free Registration Grant. World Immune Regulation Meeting (WIRM) XIV, October 2020, Davos (Switzerland) (online meeting).

Taskoparan, B., Tumor-cell-intrinsic HMGB1 expression dampens antitumor immunity. Best Poster First Prize & Best Poster Layout Prize. 16th Spring School of Immunology organized by the German Society of Immunology, October 2020, Ettal (Germany).

Public outreach activities (radio, television and other media, community service)

E. Dupuychaffray. Interview by 7 students of the Moser School of Geneva, accompanied by their teacher, on cancer immunotherapy, 03 February 2020, Geneva (Switzerland).

C. Bourquin. Scientific discussion and demonstration, class of 6P from the Ecole des Eaux-Vives, Geneva, "International Day of Women and Girls in Science", organized by CERN, 07 February 2020, Geneva (Switzerland).

MOLECULAR PHARMACOLOGY

Professor Patrycja NOWAK-SLIWINSKA

General description of Unit

Paradoxically, the growing arsenal of therapeutics, yielded by biomedical research and development, does not bring the degree of effectiveness that is necessary for the treatment of cancer. It is generally expected that the combination of drugs will bring the needed improvement of cancer therapy. Although promising personalized cancer treatment approaches are starting to find clinical utility, personalized design of optimized drug combinations (ODCs) is still in its infancy.

The overall aim of the *Molecular Pharmacology Group's* **research is the discovery of ODCs for the treatment of complex diseases, mainly cancer, and at the fundamental level discovery of mechanism of action leading to design of new treatment strategies.** Optimally combining drugs that are already clinically used holds the potential for rapid translation into the clinic, especially when used at low doses. We use a phenotypic statistics-based technology combined with data modelling to identify ODCs with a minimal *in vitro* experimental effort. The results are subsequently translated and validated in appropriate *in vivo* models.

The major clinical relevance of this strategy can be highlighted as follows: (i) the approach is personalized, resulting in patient-tailored individualized treatment, (ii) ODC treatment may be applicable to patients that failed conventional treatment, (iii) ODC treatment can be quickly adapted during the course of treatment addressing temporal tumor heterogeneity, when tumors get more aggressive or develop resistance. Moreover, our strategy uses fundamental research to reveal the ODC action mechanisms. The latter, in turn, may identify novel signalling pathways, unexpected mechanisms of resistance and may lead to new drug discovery alleys.

Specific research subfields

- Phenotypic multidrug combinations optimization for cancer treatment
- Cell fate and acquired resistance mechanism
- Heterotypic 3D co-cultures and patient-derived organoids to test drug combinations

2020 at a glance

- Publications with impact factor: 9
- Publications without impact factor: 0
- Patents : 0
- Book and chapters: 0
- Congresses / conferences organisation: 5
- Posters presentations: 2
- Oral presentations: 3
- Invited oral presentations: 3 (conferences postponed due to the COVID)
- Number of projects at FNRS and assimilated (Research funds): 4
- Service agreements and related activities: 0
- Ph.D. Theses presented in 2020: 2
- Awards and distinctions: 4
- Public outreach activities: 8

Research funds

Swiss Innovation Agency – InnoSwiss S19365+S19366
Tumor vasculature normalizers to improve radiotherapy and chemotherapy efficiency for treatment of chemo and radioresistant tumors
Main applicant: Prof. Patrycja Nowak-Sliwinska
Total funding of the project: CHF 361'000
Total duration of the project: 18 months
Allocation 2020: CHF 97'000
Starting date: 01.1.2018

Foundation or the cancer fight and for the medico-biological research
Title of the research project: Personalized drug combination optimization for effective treatment of colorectal cancer
Main applicant: Prof. Patrycja Nowak-Sliwinska
Total funding of the project: CHF 150'000
Total duration of the project: 3 years
Allocation 2020: CHF 50'000
Starting date: 01.11.2018

ERC Starting Grant (ERC-2015-StG -LS7-680209) S198881 + S19882
Title of the research project: Optimized drug combinations for effective cancer treatment: a personalized approach
Main applicant: Prof. Patrycja Nowak-Sliwinska
Total funding of the project: EURO 1'200'000
Total duration of the project: 4 years
Allocation 2020: CHF 199'000
Starting date: 01.05.2016

DIP Mentorat
Title of the research project: Poste de mentore / Programmes égalité UNIGE
Main applicant: Prof. Patrycja Nowak-Sliwinska
Total funding of the project: CHF 65'000
Total duration of the project: 2 years
Allocation 2020: CHF 25'000
Starting date: 15.05.2020

Total amount for all research funds for 2020: CHF 371'000.-.

Scientific publications (with impact factor)

Nowak-Sliwinska, P., Optimization for multidrug combinations: Challenges and perspectives in complex disorders. *Pharmacol Res*. 2020, 154, 104165. *5.893*

Nowak-Sliwinska P.; Griffioen AW., Programmed death, cells on the last train to glory, Apoptosis 2020, 25, 151-153. *4.543*

Rausch M.; Weiss A.; Akchanian J.; Rotari A.; Nowak-Sliwinska P., Identification of low-dose multidrug combinations for sunitinib naïve and pre-treated renal cell carcinoma, *Br J Cancer 2020,* 123 (4), 556-567. *5.791*

Ramzy G.M.; Koessler T.; Ducrey E.; McKee T.; Ris F.; Buchs N, Rubbia-Brandt L.; Dietrich P.Y.; Nowak-Sliwinska P., Patient-derived in vitro models for drug discovery in colorectal carcinoma, Cancers 2020, 2 (6), 1423. *6.126*

Zoetemelk M.; Ramzy G.M.; Rausch M.; Nowak-Sliwinska P., Drug-drug interactions of irinotecan, 5-fluorouracil, folinic acid and oxaliplatin in colorectal carcinoma treatment, Molecules, 25 (11), 2614. *3.267*

Zoetemelk M.; Ramzy G.M.; Rausch M.; Koessler T.; van Beijnum J.R.; Weiss A.; Mieville V.; Piersma S.R.; de Haas R.R.; Delucinge-Vivier C.; Andres A.; Toso C.; Henneman A.A.; Ragusa S.; Petrova T.V.; Docquier M.; McKee T.A.; Jimenez C.R.; Daali Y.; Griffioen A.W.; Rubbia-Brandt L.; Dietrich P.Y.; Nowak-Sliwinska P.; Optimized high-order low-dose drug mixtures boost selectivity and efficacy of colorectal carcinoma treatment, Mol Oncol. 2020, 14 (11), 2894-2919. *6.574*

van Beijnum J.R.; Weiss A.; Berndsen R.H.; Wong T.J.; Reckman L.C.; Piersma S.R.; Zoetemelk M.; de Haas R.R.; Dormond O.; Bex A.; Henneman A.A.; Jimenez C.R.; Griffioen A.W.; Nowak-Sliwinska P., Integrating phenotypic search and phosphoproteomic profiling of active kinases for optimization of drug mixtures for RCC treatment, Cancers 2020, 12 (9), 2697. *6.126*

Rausch M.; Weiss A.; Zoetemelk M.; Piersma S.R.; Jimenez C.R.; van Beijnum J.R.; Nowak-Sliwinska P., Optimized combination of HDACI and TKI efficiently inhibits metabolic activity in renal cell carcinoma and overcomes sunitinib-resistance, Cancers 2020, 12 (11), E3172. *6.126*

de Boer R.A.; Hulot J.-S.; Tocchetti C.G; Aboumsallem J.P.; Ameri P.; Anker S.D.; Bauersachs J.; Bertero E.; Coats A.A.J.; Čelutkienė J.; Chioncel O.; Dodion P., Eschenhagen T., Farmakis D.; Bayes-Genis A.; Jäger D.; Jankowska E.A.; Kitsis R.N.; Konety S.H.; Larkin J.; Lehmann L.; Lenihan D.J.; Maack C.; Moslehi J.; Müller O.J.; Nowak-Sliwinska P.; Piepoli M.F.; Ponikowski P.; Pudil R.; Rainer P.P.; Ruschitzka F.; Sawyer D.; Seferovic P.M.; Suter T.; Thum T.; van der Meer P.; Van Laake L.W.; Von Haehling S.; Heymans S.; Lyon A.R.; Backs J., Common Mechanistic Pathways in Cancer and Heart Failure. A scientific roadmap on behalf of the Translational Research Committee of the Heart Failure Association (HFA) of the European Society of Cardiology (ESC), Eur J Heart Fail. 2020, 22, 2272–2289. *11.627*

Congresses / conferences and Symposia

- Congresses / conferences organisation: 5
- Posters presentations: 2
- Oral presentations: 3
- Invited oral presentations: 3 (conferences postponed due to the COVID)

Ph.D. Theses presented in 2020

- Marloes Zoetemelk
  Challenges and Considerations in Designing Multidrug Combinations for Cancer Treatment
  Patrycja Nowak-Sliwinska (UNIGE)

Awards and distinction

Nowak-Sliwinska, P., Prix 3R de l'UNIGE 2020. Université de Genève, Geneva (Switzerland).

Rausch, M., Finalist, PhD *Booster Edition 2020.* Université de Genève, 24 September 2020, Geneva (Switzerland).

Nowak-Sliwinska, P., Member of the Faculty of Science Egality and Diversity Commission, Université de Genève, Geneva (Switzerland).

Nowak-Sliwinska, P., Pitch Finalist of the HUG Innovation day, Université de Genève, 29 October 2020, Geneva (Switzerland).

Public outreach activities (radio, television and other media, community service)

P. Nowak-Sliwinska and P. Meraldi. Une nouvelle stratégie contre les cellules cancéreuses. Radio RTS, Emission CQFD, March 10th, 2020, Geneva (Switzerland).

M. Rausch, A. Weiss, J. Achkhanian, A. Rotari, P. Nowak-Sliwinska, Beyond the abstract release: Identification of low-dose multidrug combinations for sunitinib-naive and pre-treated renal cell carcinoma. UroToday, May 28th, 2020, www.urotoday.com.

P. Nowak-Sliwinska and E. Allémann. Cellules d'élevage et placenta pour réduire les tests sur l'animal. 24 heures, May 23rd, 2020, Lausanne (Switzerland).

P. Nowak-Sliwinska. Colorectal cancer treatment: the winning combinations. UNIGE Press Release, October 6th, 2020, Geneva (Switzerland).

P. Nowak-Sliwinska. Avancée majeure dans le traitement d'un cancer. TV Léman Bleu, October 7th, 2020, Geneva (Switzerland).

P. Nowak-Sliwinska. Chimiothérapies: la fin des effets secondaires? Le Journal de l'UNIGE, October 8th, 2020, Geneva (Switzerland).

J. R. van Beijnum, A. Weiss, R. H. Berndsen, T. J Wong, L. C. Reckman, S. R. Piersma, M. Zoetemelk, R. de Haas, O. Dormond, A. Bex, A. A. Henneman, C. R. Jimenez, A. W. Griffioen, P. Nowak-Sliwinska. Beyond the abstract release: Integrating Phenotypic Search and Phosphoproteomic Profiling of Active Kinases for Optimization of Drug Mixtures for RCC Treatment. UroToday, October 5th, 2020, www.urotoday.com.

P. Nowak-Sliwinska. Découverte majeure dans le traitement d'un cancer. Tribune de Genève. October 10th, 2020, Geneva (Switzerland).

PHARMACEUTICAL BIOCHEMISTRY

Professor Yogeshvar KALIA
Professor Leonardo SCAPOZZA
Doctor Emmanuel VARESIO

General description of Unit

The Pharmaceutical Biochemistry group (Drug Discovery and Delivery group) includes two distinct fields of research linked to molecular therapeutics discovery and delivery.

The first is the Pharmaceutical Biochemistry/Chemistry field in which the research is focused on understanding ligand-macromolecule interactions to develop new therapeutic strategies including new chemical entities, new targets using an interdisciplinary approach based on the combination of Biochemistry/Biophysics and Chemistry with Computational Chemistry/Molecular Modelling. Additionally an in vivo activity in the field of rare disease has been added in order to be able to do preclinical Proof of Concept.

The second is in the field of drug delivery and focuses on developing and investigating methods to increase molecular transport across biological barriers using chemical, formulation and technology based enhancement techniques. Areas of interest include (i) topical and transdermal delivery of therapeutic agents by investigating the effect of molecular properties on both passive and active transport processes, (ii) use of formulation and technology-based methods to improve drug delivery to the eye, and (iii) development of an ex vivo model for drug absorption in the gastrointestinal tract.

Specific research fields

The research in the field of pharmaceutical biochemistry/chemistry covers three main topics, namely Cancer, Neglected Diseases, Rare Diseases and Antibiotics Research.

- In Cancer Research we have two main objectives, namely the development of a thymidine kinase based safety and monitoring tool for stem cells therapy and the development of inhibitors of the tyrosine kinase domain of oncogenic fusion proteins involved in signalling pathways.

- Within the research area of Neglected Diseases and Rare Diseases we aim at elucidating and validating new potential drug targets for developing therapeutic strategies against orphan diseases e.g. dystrophy/SMA and the major parasitic diseases of the Third World e.g. Malaria, Tripanosomiasis and Leishmaniosis as well as finding potential lead compounds against such diseases.

- Within the area of Antibiotic Research the objective is to find compounds inhibiting bacterial virulence with novel mechanisms of action.

The research in the field of drug delivery includes:

- Development of new formulations and physical enhancement techniques to increase topical and transdermal delivery of low and high molecular weight therapeutics.
- Development and optimization of methods to understand the spatio-temporal biodistribution of drugs in the skin and other tissues.
- Investigation into the use of formulation and technology-based methods to improve drug delivery to both the anterior and posterior segments of the eye.
- Optimization of passive and iontophoretic drug delivery to the oral cavity for targeted local therapy.
- Developing a physiological ex vivo model for drug absorption in the gastrointestinal tract.

Further minor activities based on molecular recognition-based approaches for improving formulation and delivery are on-going.

2020 at a glance

- Publications with impact factor : 27
- Publications without impact factor : 0
- Patents : 1
- Book and chapters : 0
- Congresses / conferences organisation : 3
- Posters presentations : 9
- Oral presentations : 0
- Invited oral presentations : 5
- Number of projects at FNRS and assimilated (Research funds) : 22
- Service agreements and related activities : 2
- Ph.D. Theses presented in 2020 : 2
- Awards and distinctions: 0
- Public outreach activities 2

Research funds

CTI-19086.1 PFLS-LS" - S18925
"Spironolactone-Apidsol formulation for delayed healing of minor wounds in glucocorticoid treated patients
Main applicant: Y. Kalia
Total funding of the project: CHF 105'033
Total duration of the project: 2 years
Allocation 2020: CHF 21'006
Starting date: 01.07.2016

Fondation Suisse de recherché sur les maladies musculaires - S19034 – FSRMM DMD Nox
NADPH oxidases in the pathogenesis of Duchenne muscular dystrophy: role and therapeutic potential.
Main applicants: L. Scapozza and H. Hamed
Total funding of the project: CHF 127'450
Total duration of the project: 2 years
Allocation 2020: CHF 0
Starting date: 01.04.2017

Fondation AFM-Telethon - S19106 – AFM TAM 2017
Pre-clinical evaluation of tamoxifen in mouse models of X-linked myotubular myopathy and other severe muscular diseases
Main applicants: L. Scapozza and O. Dorchies
Total funding of the project: CHF 85'271
Total duration of the project: 2 years
Allocation 2020: CHF 21'461
Starting date: 01.06.2017

Eurostars Project E!11391 - S 19202 - SERI-ONCOFITIN
Oncofitin Drug conjugates: first in class vectors targeting cytotoxic drugs into solid tumors
Main applicant: L.Scapozza
Total funding of the project: CHF 217'120 (Total: 434'240)
Total duration of the project: 30 months
Allocation 2020: CHF 49'210
Starting date: 01.11.2017

CTI-27862.1 PFLS-LS - S19236
"Development of novel orally available anti-inflammatory therapeutics"
Main applicant: L.Scapozza
Total funding of the project: CHF 213'028
Total duration of the project: 18 months
Allocation 2020: CHF 42'605
Starting date: 01.03.2018

TAMYOCAL-H2020-MSCA-IF-2017 - S19251
Tamoxifen mediated protection on X-linked centronuclear myopathy: a mechanistic and pre-clinical study
Main applicant: M. Sierra (Marie Sklodowska-Curie fellowship) and L. Scapozza
Total funding of the project: CHF 206'995
Total duration of the project: 24 months
Allocation 2020: CHF 65'805
Starting date: 01.05.2018

Fondation Duchenne UK - S19263
Combination therapy for Duchenne muscular dystrophy: Evaluation of tamoxifen with L-citrulline, metformin and steroids
Main applicant: L. Scapozza and O. Dorchies
Total funding of the project: CHF 260'492.
Total duration of the project: 2 years
Allocation 2020: CHF 48'728
Starting date: 01.03.2018

Fondation SMA Europe - S19309 – SMA Europe ETHZ
Seeking small molecules that stabilize protein-RNA interactions to cure Spinal Muscular Atrophy.
Main applicant: L. Scapozza
Total funding of the project: Euro 50'000 - CHF 56964
Total duration of the project: 2 years
Allocation 2020: CHF 0
Starting date: 01.03.2018

SNF CRSII5_183536 Sinergia - S19485
"From medicinal plant to mechanism: Target deconvolution of phytochemicals for Trypanosoma cruzi"
Applicant: L. Scapozza and R. Perozzo
Main applicant: P. Maeser (STPI)
Total funding of the project: CHF 293'632 (from CHF 2'279'020)
Total duration of the project: 3.5 years
Allocation 2020: CHF 81'139
Starting date: 01.02.2019

Fondation GELU - S19549
"Exploring the role of KIAA1199/CEMIP axis in Alport syndrome, a paediatric rare disease condition resulting in end stage renal disease"
Main applicants: L. Scapozza and M. Prunotto
Total funding of the project: CHF 480'000 out 750'000.- (750'000.- received in 2019)
Total duration of the project: 3 years
Allocation 2020: CHF 160'000.- (money of the total that is budgeted for 2020, not counted in the sum for 2020)
Starting date: 01.05.2019

SNF CRSII5_186405 Sinergi - S19590 - CRSII5 -186405 SIN UB
“Deciphering and Targeting the Cancer Ubiquitylome”
Applicant: L. Scapozza
Main applicant: J-P. Theurillat (IOR),
Total funding of the project: CHF 733’641 (from CHF 2'528'452)
Total duration of the project: 4 years
Allocation 2020: CHF 182’334
Starting date: 01.06.2019

INNOSUISSE 34335.1IP - S19615
“A diagnostic kit for personalised dietary recommendations based on the gut microbiota”
Main applicant: T. Gurry
Total funding of the project: CHF 254’030
Total duration of the project: 18 months
Allocation 2020: CHF 103’911
Starting date: 01.09.2019

Fondation Duchenne UK - S19651 - Duchenne UK 2
“Repurposing drugs to combat fibrosis in Duchenne patients: Pharmacotherapy studies in a murine model with enchanced fibrosis”
Main applicant: L. Scapozza and O. Dorchies
Total funding of the project: CHF 243’763
Total duration of the project: 16 months
Allocation 2020: CHF 0
Starting date: 01.10.2019

SKYHAWK THERAPEUTICS- S19757
“Molecular modelling and virtual screening on an RNA structure involved in MAPT exon 10 spicing”
Main applicant: L. Scapozza
Total funding of the project: CHF 29.325,31
Total duration of the project: 1 year
Allocation 2020: CHF 29’325
Starting date: 01.03.2020

HIPPIE - S19810
“High-resolution Investigation of Personalised Post-prandial inflammation biomarkErs”
Main applicant: L. Scapozza and T. Gurry
Total funding of the project: CHF 135’000 (+10’000 en 2021)
Total duration of the project: 1 year
Allocation 2020: CHF 70’000
Starting date: 01.06.2020

DPP NL 18 consortia S19811
“Preclinical evaluation of branched chain amino acids to support protein metabolism in the early phase of muscular dystrophy: a consortium approach”
Main applicant: L. Scapozza and O. Dorchies
Total funding of the project: CHF 71.888,40
Total duration of the project: 2 years
Allocation 2020: CHF 33’967
Starting date: 01.02.2019

INNO-44531.1 IP-LS - S19821
“Novel self-structuring gels for dermal filler applications”
Main applicant: Y. Kalia
Total funding of the project: CHF 177’068
Total duration of the project: 2 years
Allocation 2020: CHF 88’534
Starting date: 01.06.2020

INNO-44531.1 KYLYS - S19871
“Novel self-structuring gels for dermal filler applications”
Main applicant: Y. Kalia
Total funding of the project: CHF 25’000
Total duration of the project: 2 years
Allocation 2020: CHF 0
Starting date: 01.06.2020

SWISS E!114171 G2B - S19876
“G2B Gut-To-Blood: a platform for oral systemic delivery of targeted therapies”
Main applicant: L. Scapozza
Total funding of the project: CHF 263’616
Total duration of the project: 3 years
Allocation 2020: CHF 195’735
Starting date: 01.10.2020

INNO-46357.1 IP-LS - S19892
A2AR negative allosteric modulators for cancer immunotherapy: validation of lead candidate”
Main applicant: L. Scapozza
Total funding of the project: CHF 881’156
Total duration of the project: 18 months
Allocation 2020: CHF 440’578
Starting date: 01.12.2020

AFM #23127 - S19893
“Duchenne muscular dystrophy: phenotyping and validation of better murine models for improving preclinical research and clinical translation”
Main applicant: L. Scapozza and O. Dorchies
Total funding of the project: CHF 96’238
Total duration of the project: 3 years
Allocation 2020: CHF 0 (50’149 CHF en 2021)
Starting date: 01.10.2020

INNOGAP AD2020 - S19925
“Solvent free approach for preparing nanosystems”
Main applicant: Y. Kalia
Total funding of the project: CHF 30’000
Total duration of the project: 1 year
Allocation 2020: CHF 0
Starting date: 01.12.2020

Total amount for all research funds for 2020: CHF 1’474’338.-

<u>Service agreements and related activities</u>

L’Oréal - S 17721 (Development)
“Topical delivery of excipients into skin”
Main applicant: Y. Kalia
Total amount for 2020: CHF 7950

ACCANIS F&E GmbH & Co KG - S19344 - ACCAN
"Investigation into and development of formulations for tropical targeted delivery of mRNA "
Main applicant: Y. Kalia
Total funding of the project: CHF 160’000
Total duration of the project: 18 months
Allocation 2020: CHF 40’000
Starting date: 01.07.2018

Total amount (for all service agreements and related activities) for 2020: CHF 47’950

Scientific publications (with impact factor)

Arnold, Y. E.; Kalia, Y. N., Using Ex Vivo Porcine Jejunum to Identify Membrane Transporter Substrates:A Screening Tool for Early-Stage Drug Development. *Biomedicines* **2020** *4.71*

Balaphas, A.; Meyer, J.; Perozzo, R.; Zeisser-Labouebe, M.; Berndt, S.; Turzi, A.; Fontana, P.; Scapozza, L.; Gonelle-Gispert, C.; Buhler, L. H., Platelet Transforming Growth Factor-beta1 Induces Liver Sinusoidal Endothelial Cells to Secrete Interleukin-6. Cells 2020, 9 (5). *4.366*

Bruschi, M.; Moroni, G.; Sinico, R. A.; Franceschini, F.; Fredi, M.; Vaglio, A.; Cavagna, L.; Petretto, A.; Pratesi, F.; Migliorini, P.; Locatelli, F.; Pazzola, G.; Pesce, G.; Bagnasco, M.; Manfredi, A.; Ramirez, G. A.; Esposito, P.; Murdaca, G.; Negrini, S.; Cipriani, L.; Trezzi, B.; Emmi, G.; Cavazzana, I.; Binda, V.; d'Alessandro, M.; Fenaroli, P.; Pisani, I.; Garibotto, G.; Montecucco, C.; Santoro, D.; Scolari, F.; Volpi, S.; Mosca, M.; Tincani, A.; Candiano, G.; Prunotto, M.; Verrina, E.; Angeletti, A.; Ravelli, A.; Ghiggeri, G. M., Serum IgG2 antibody multi-composition in systemic lupus erythematosus and in lupus nephritis (Part 2): prospective study. Rheumatology (Oxford) 2020. 2020 Dec 22:keaa793 *5.606*

Bruschi, M.; Moroni, G.; Sinico, R. A.; Franceschini, F.; Fredi, M.; Vaglio, A.; Cavagna, L.; Petretto, A.; Pratesi, F.; Migliorini, P.; Locatelli, F.; Pazzola, G.; Pesce, G.; Bagnasco, M.; Manfredi, A.; Ramirez, G. A.; Esposito, P.; Murdaca, G.; Negrini, S.; Cipriani, L.; Trezzi, B.; Emmi, G.; Cavazzana, I.; Binda, V.; Fenaroli, P.; Pisani, I.; Garibotto, G.; Montecucco, C.; Santoro, D.; Scolari, F.; Mosca, M.; Tincani, A.; Candiano, G.; Prunotto, M.; Volpi, S.; Verrina, E.; Angeletti, A.; Ravelli, A.; Ghiggeri, G. M., Serum IgG2 antibody multicomposition in systemic lupus erythematosus and lupus nephritis (Part 1): cross-sectional analysis. Rheumatology (Oxford) 2020. 2020 Dec 29:keaa767 *5.606*

Cai, Y.; Zhou, Y.; Zhang, P.; Kalia, Y. N.; Gratieri, T.; Chen, Y., Tissue Levels of Flurbiprofen in the Rat Plantar Heel after Short-Duration Topical Iontophoresis are Sufficient to Induce Pharmacodynamic Responses to Local Pain Stimuli. Pharmaceutics 2020, 12 (7). *4.845*

Cecchini, C.; Tardy, S.; Ceserani, V.; Theurillat, J. P.; Scapozza, L., Exploring the Ubiquitin-Proteasome System (UPS) through PROTAC Technology. Chimia (Aarau) 2020, 74 (4), 274-277. *1.478*

Dahmana, N.; Kowalczuk, L.; Gabriel, D.; Behar-Cohen, F.; Gurny, R.; Kalia, Y. N., Ocular Biodistribution of Spironolactone after a Single Intravitreal Injection of a Biodegradable Sustained-Release Polymer in Rats. Mol Pharm 2020, 17 (1), 59-69. *4.321*

Darwish, M.; Shatz, W.; Leonard, B.; Loyet, K.; Barrett, K.; Wong, J. L.; Li, H.; Abraham, R.; Lin, M.; Franke, Y.; Tam, C.; Mortara, K.; Zilberleyb, I.; Blanchette, C., Nanolipoprotein Particles as a Delivery Platform for Fab Based Therapeutics. Bioconjug Chem 2020, 31 (8), 1995-2007. *4.031*

Del Rio-Sancho, S.; Lapteva, M.; Sonaje, K.; Bohler, C.; Ling, V.; Boehncke, W. H.; Kalia, Y. N., Targeted cutaneous delivery of etanercept using Er:YAG fractional laser ablation. Int J Pharm 2020, 580, 119234. *4.845*

Dubey, S.; Perozzo, R.; Scapozza, L.; Kalia, Y. N., Specific protein-protein interactions limit the cutaneous iontophoretic transport of interferon beta-1b and a poly-Arg interferon beta-1b analogue. Int J Pharm 2020, 589, 119913. *4.845*

Ghiggeri, G. M.; Seitz-Polski, B.; Justino, J.; Zaghrini, C.; Payre, C.; Brglez, V.; Dolla, G.; Sinico, A.; Scolari, F.; Vaglio, A.; Prunotto, M.; Candiano, G.; Radice, A.; Bruschi, M.; Lambeau, G.; Italian Study Group for Membranous, N., Multi-Autoantibody Signature and Clinical Outcome in Membranous Nephropathy. Clin J Am Soc Nephrol 2020, 15 (12), 1762-1776. *6.628*

Gurry, T.; Scapozza, L., Exploiting the gut microbiota's fermentation capabilities towards disease prevention. J Pharm Biomed Anal 2020, 189, 113469. *3.209*

Hanna, N.; Kicka, S.; Chiriano, G.; Harrison, C.; Sakouhi, H. O.; Trofimov, V.; Kranjc, A.; Nitschke, J.; Pagni, M.; Cosson, P.; Hilbi, H.; Scapozza, L.; Soldati, T., Identification of Anti-Mycobacterium and Anti-Legionella Compounds With Potential Distinctive Structural Scaffolds From an HD-PBL Using Phenotypic Screens in Amoebae Host Models. Front Microbiol 2020, 11, 266. *4.235*

Ibrahim, W. W.; Ismail, H. M.; Khattab, M. M.; Abdelkader, N. F., Cognitive enhancing effect of diapocynin in D-galactose-ovariectomy-induced Alzheimer's-like disease in rats: Role of ERK, GSK-3beta, and JNK signaling. Toxicol Appl Pharmacol 2020, 398, 115028. *3.347*

Lapteva, M.; Sallam, M. A.; Goyon, A.; Guillarme, D.; Veuthey, J. L.; Kalia, Y. N., Non-invasive targeted iontophoretic delivery of cetuximab to skin. Expert Opin Drug Deliv 2020, 17 (4), 589-602. *4.838*

Marizzoni, M.; Gurry, T.; Provasi, S.; Greub, G.; Lopizzo, N.; Ribaldi, F.; Festari, C.; Mazzelli, M.; Mombelli, E.; Salvatore, M.; Mirabelli, P.; Franzese, M.; Soricelli, A.; Frisoni, G. B.; Cattaneo, A., Comparison of Bioinformatics Pipelines and Operating Systems for the Analyses of 16S rRNA Gene Amplicon Sequences in Human Fecal Samples. Front Microbiol 2020, 11, 1262. *4.235*

Owczarczyk, K.; Cascino, M. D.; Holweg, C.; Tew, G. W.; Ortmann, W.; Behrens, T.; Schindler, T.; Langford, C. A.; St Clair, E. W.; Merkel, P. A.; Spiera, R.; Seo, P.; Kallenberg, C. G.; Specks, U.; Lim, N.; Stone, J.; Brunetta, P.; Prunotto, M.; Group, R.-I. R., Fc receptor-like 5 and anti-CD20 treatment response in granulomatosis with polyangiitis and microscopic polyangiitis. JCI Insight 2020, 5 (18). *6.205*

Pejoski, D.; de Rham, C.; Martinez-Murillo, P.; Santoro, F.; Auderset, F.; Medaglini, D.; Pozzi, G.; Vono, M.; Lambert, P. H.; Huttner, A.; Haks, M. C.; Ottenhoff, T. H. M.; Villard, J.; Siegrist, C. A.; Consortium, V.; Consortium, V.-E.; Consortium, V.-E., Rapid dose-dependent Natural Killer (NK) cell modulation and cytokine responses following human rVSV-ZEBOV Ebolavirus vaccination. NPJ Vaccines 2020, 5, 32. *5.433*

Ravani, P.; Lugani, F.; Pisani, I.; Bodria, M.; Piaggio, G.; Bartolomeo, D.; Prunotto, M.; Ghiggeri, G. M., Rituximab for very low dose steroid-dependent nephrotic syndrome in children: a randomized controlled study. Pediatr Nephrol 2020, 35 (8), 1437-1444. *2.300*

Reger de Moura, C.; Prunotto, M.; Sohail, A.; Battistella, M.; Jouenne, F.; Marbach, D.; Lebbe, C.; Fridman, R.; Mourah, S., Discoidin Domain Receptors in Melanoma: Potential Therapeutic Targets to Overcome MAPK Inhibitor Resistance. Front Oncol 2020, 10, 1748. *4.416*

Rouaud, F.; Tessaro, F.; Aimaretti, L.; Scapozza, L.; Citi, S., Cooperative binding of the tandem WW domains of PLEKHA7 to PDZD11 promotes conformation-dependent interaction with tetraspanin 33. J Biol Chem 2020, 295 (28), 9299-9312. *4.238*

Salgado, C.; Morin, H.; Coriolano de Aquino, N.; Neff, L.; Quintino da Rocha, C.; Vilegas, W.; Marcourt, L.; Wolfender, J. L.; Jordan, O.; Ferreira Queiroz, E.; Allemann, E., In Vitro Anti-Inflammatory Activity in Arthritic Synoviocytes of A. brachypoda Root Extracts and Its Unusual Dimeric Flavonoids. Molecules 2020, 25 (21). *3.309*

Tambuyzer, E.; Vandendriessche, B.; Austin, C. P.; Brooks, P. J.; Larsson, K.; Miller Needleman, K. I.; Valentine, J.; Davies, K.; Groft, S. C.; Preti, R.; Oprea, T. I.; Prunotto, M., Therapies for rare diseases: therapeutic modalities, progress and challenges ahead. Nat Rev Drug Discov 2020, 19 (2), 93-111. *64.797*

Tessaro, F.; Scapozza, L., How 'Protein-Docking' Translates into the New Emerging Field of Docking Small Molecules to Nucleic Acids? Molecules 2020, 25 (12). *3.309*

Wasinski, B.; Sohail, A.; Bonfil, R. D.; Kim, S.; Saliganan, A.; Polin, L.; Bouhamdan, M.; Kim, H. C.; Prunotto, M.; Fridman, R., Discoidin Domain Receptors, DDR1b and DDR2, Promote Tumour Growth within Collagen but DDR1b Suppresses Experimental Lung Metastasis in HT1080 Xenografts. Sci Rep 2020, 10 (1), 2309. *3.998*

Weinstock, B. A.; Feldman, D. L.; Fornoni, A.; Gross, O.; Kashtan, C. E.; Lagas, S.; Lennon, R.; Miner, J. H.; Rheault, M. N.; Prunotto, M.; Simon, J. F.; Workshop, P., Clinical trial recommendations for potential Alport syndrome therapies. Kidney Int 2020, 97 (6), 1109-1116. *8.945*

Yu, X.; Gurry, T.; Nguyen, L. T. T.; Richardson, H. S.; Alm, E. J., Prebiotics and Community Composition Influence Gas Production of the Human Gut Microbiota. mBio 2020, 11 (5). *6.784*

Patents

Kalia, Y. N.; Darade A, Method for preparing nanosystems, 2020, Patent application number 20210470.9-1112.

Congresses / conferences and Symposia

- Congresses / conferences organisation : 3
- Posters presentations : 9
- Oral presentations : 0
- Invited oral presentations : 5

Ph.D. Theses presented in 2020

- GOU Si
  « Microarticle, Nanocarrier and Fractional Laser Ablation: Formulation and Physical Enhancement Strategies to Increase Cutaneous and Ungual drug Bioavailability» - 08.05.20
  Prof. Yogeshvar Kalia

- TESSARO
  «Multi-scale Applications Of Structure-based Methods In Drug Discovery» - 23.04.20
  Prof. Leonardo Scapozza

Public outreach activities (radio, television and other media, community service)

22.01.2020 Presentation of the project Accelerare in the frame of the World Economic Forum in Davos 2020: “ACCELERARE: AN EMPOWERING PUBLIC PRIVATE PATIENT PARTNERSHIP TO ADVANCE THERAPIES FOR RARE DISEASES “Morosani Post Hotel, Promenade 42, 7270 Davos Platz

18.03.2020 Intervention radio RSI Rete Uno a Modem de Leonardo Scapozza, sujet: Un servizio sul modo in cui il mondo della ricerca, il settore della farmaceutica reagisce di fronte ad una crisi come quella del coronavirus.

PHARMACEUTICAL TECHNOLOGY

Professor Eric ALLEMANN
Professor Norbert LANGE
Doctor Florence DELIE-SALMON

General description of Unit

Research at the unit of Pharmaceutical Technology is focusing on the delivery of therapeutic agents for cancer, rheumatic, vascular applications and contrast agents for medical imaging at the right site at the right time. Eric Allémann has activities in nanomedicine, micro particles, and targeted contrast agents for medical imaging. Norbert Lange leads research in photodetection, photodynamic therapy and enzymatically activated prodrugs. Florence Delie leads research in nanomedicine and drug targeting. In 2020, various collaborations were continued with the University Hospital of Geneva, the University Hospital of Lausanne, and the Faculty of Medicine in Geneva. Collaboration projects with established companies continued.

Specific research fields

Modified nanoparticles for active targeting
Perivascular formulation for the prevention of restenosis
Development of drug formulations for intra articular delivery
Enzymatically activated prodrugs and supramolecular constructs
Development of new contrast agent for MRI
Formulation of microbiota
Polymer photosensitizers projects
Cancer targeted drug delivery systems

2020 at a glance

- Publications with impact factor : 8
- Publications without impact factor : 1
- Patents : 5
- Book and chapters : 0
- Congresses / conferences organisation : 0
- Posters presentations : 0
- Oral presentations : 0
- Invited oral presentations : 1
- Number of projects at FNRS and assimilated (Research funds) : 5
- Service agreements and related activities : 1
- Ph.D. Theses presented in 2020 : 1
- Awards and distinctions: 0
- Public outreach activities : 2

Research funds

HUG-CONFIRM
Molecular markers of intracranial aneurysms wall integrity and stability
Main applicant: Kwak Brenda, Bijlenga Philippe, Allémann Eric
Total funding of the project: CHF 600'000.-
Total duration of the project: 3 years
Allocation 2020: CHF 200'000
Starting date: 01.11.2019

FNRS – 205321-173027/ALA
Novel-Self Assembling 5-ALA Derivatives for Controlled Drug Delivery
Main applicant: Lange Norbert
Total funding of the project: 500'000.-
Total duration of the project: 4 years
Allocation 2020: CHF 193'293.-
Starting date: 01.02.2018

FNRS – 205321 - 192350
Synthesis of biopolymers and their application for glucose carriers for osteoarthritis stem cells therapy
Main applicant: Allémann Eric
Total funding of the project: 493'114.-
Total duration of the project: 4 years
Allocation 2020: CHF 73'553.-
Starting date: 01.09.2020

INNOGAP Round 21
5-ALA derivatives and use thereof
Main applicant: Lange Norbert
Total funding of the project: 30'000.-
Total duration of the project: 1 year
Allocation 2020: CHF 30'000.-
Starting date: 01.01.2020

GALAPAGOS NV
Main applicant: Allémann Eric
Total funding of the project: 435'000.-
Total duration of the project: 2 years
Allocation 2020: CHF 217'500.-
Starting date: 01.11.2020

Total amount for all research funds for 2020: CHF 714'346.-

Service agreements and related activities

OM Pharma
Service
Total amount for 2020: CHF 5'338.-

Total amount (for all service agreements and related activities) for 2020: CHF 5'338.-

Scientific publications (with impact factor)

Herceg V, Bouilloux J, Janikowska K, Allémann E, Lange N., Cathepsin B-Cleavable Cyclopeptidic Chemotherapeutic Prodrugs., Molecules, 2020, 25(18), 4285 3.27

De Las Heras E, Boix-Garriga E, Bryden F, Agut M, Mora M, Sagristá ML, Boyle RW, Lange N, Nonell S., c(RGDfK)- and ZnTriMPyP-Bound Polymeric Nanocarriers for Tumor-Targeted Photodynamic Therapy, Photochem Photobiol. 2020;96(3):570-580 2.72

Salgado C., Morin H., Coriolano de Aquino N., Ferreira Queiroz E., Allémann E., In Vitro Anti-Inflammatory activity in arthritic synoviocytes of A. brachypoda root extracts and its unusual dimeric flavonoids, Molecules, 2020, 25(21) 3.27

Fouotsa, H.; Dzoyem, J. P.; Lannang, A. M.; Stammler, H. G.; Mbazoa, C. D.; Luhmer, M.; Nkengfack, A. E.; Allemann, E.; Delie, F.; Meyer, F.; Sewald, N., Antiproliferative activity of a new xanthone derivative from leaves of Garcinia nobilis Engl. Nat Prod Res 2020, 13, 1-8. 2.16

Fraguas-Sanchez, A. I.; Fernandez-Carballido, A.; Delie, F.; Cohen, M.; Martin-Sabroso, C.; Mezzanzanica, D.; Figini, M.; Satta, A.; Torres-Suarez, A. I., Enhancing ovarian cancer conventional chemotherapy through the combination with cannabidiol loaded microparticles. Eur J Pharm Biopharm 2020, 154, 246-258. 4.60

Fraguas-Sanchez, A. I.; Torres-Suarez, A. I.; Cohen, M.; Delie, F.; Bastida-Ruiz, D.; Yart, L.; Martin-Sabroso, C.; Fernandez-Carballido, A., PLGA Nanoparticles for the Intraperitoneal Administration of CBD in the Treatment of Ovarian Cancer: In Vitro and In Ovo Assessment. Pharmaceutics 2020, 12 (5), 431 4.42

Leutcha, B. P.; Sema, D. K.; Dzoyem, J. P.; Ayimele, G. A.; Nyongbela, K. D.; Delie, F.; Alleman, E.; Sewald, N.; Meli Lannang, A., Cytotoxicity of a new tirucallane derivative isolated from Stereospermum acuminatissimum K. Schum stem bark. Nat Prod Res 2020, 1-6. 2.16

Salgado C., Guénée L., Cerny R., Allémann E., Jordan O., Nano wet milled celecoxib extended release microparticles for local management of chronic inflammation, International Journal of Pharmaceutics, 2020, 589, 119783 4,84

Scientific publications (without impact factor)

Bouzid M, Schelling C, Furrer P. Formulation de gélules de méthadone en officine. PharmaJournal, 6/7: 1-4, 2020.

Patents

Allemann E., Maudens P., Jordan O., Hyaluronic acid conjugates and uses thereof, US Patent number 10767037, September 2020

Allemann E., Schneider M., Bussat P., Guillot C., Freeze-dried product and gas-filled microvesicles suspension, US Patent application 20200360289 November 2020

Babič, A., Lange N., 5-ALA Derivatives and use thereof. U.S. Patent No. 10874740 December 2020

Babič, A., Lange N., 5-ALA Derivatives and use thereof. Europe – Patent No. 3297675, June 2020

Babič, A., Lange N., 5-ALA Derivatives and use thereof. U.S. Patent No. 10258690, April 2020

Congresses / conferences and Symposia

- Congresses / conferences organisation : 0
- Posters presentations : 0
- Oral presentations : 0
- Invited oral presentations : 1

Public outreach activities (radio, television and other media, community service)

E. Allémann, La galénique et la forme des médicaments, CQFD, RTS Avis d'experts, December 9, 2020

E. Allémann, L'arthrose : quelles thérapies pour éviter ou retarder la chirurgie? UNI 3, December 1, 2020

PHARMACOGNOSY

Professor Muriel CUENDET
Doctor Philippe Christen (until 31.10.2020)

General description of Unit

The pharmacognosy research unit is focused on the study of bioactive natural products. Compounds with anticancer and antiparasitic activity are of particular interest. In these areas, the development of new and better drugs remains a principal need. As established by ample precedent, nature provides broad chemical diversity. Prevention is well developed in the field of cardiovascular disease, but similar drugs that could prevent cancer on this scale are still a long way off. A panel of in vitro bioassays indicative of inhibiting major stages of carcinogenesis (initiation, promotion and progression) is used. Mechanistic studies are then pursued with the most promising compounds. Also, most antiparasitic drugs available on the market (when available) have a limited efficacy and strong side effects. Some plant extracts having shown good in vitro and in vivo activity are currently being investigated to uncover the compounds responsible for the activity and their mechanism of action. The absorption and the metabolism of pure compounds and phytopreparations are also being evaluated in vitro and in vivo.

Specific research fields

- Cancer chemopreventive screening of natural products: quinone reductase induction, epigenetic modulation, anti-inflammatory and anti-angiogenic activities
- Antiparasitic activity
- Activity-guided fractionation
- Absorption and metabolization studies of phytopreparations and pure natural products using Caco-2 cells and in vivo models
- In depth studies to uncover the mechanism of action of pure natural products and phytopreparations
- Natural products against multiple myeloma resistance

2020 at a glance

- Publications with impact factor: 6
- Publications without impact factor: 0
- Patents: 0
- Book and chapters: 1
- Congresses / conferences organisation: 0
- Posters presentations: 0
- Oral presentations: 0
- Invited oral presentations: 2
- Number of projects at FNRS and assimilated (Research funds): 4
- Service agreements and related activities: 0
- Ph.D. Theses presented in 2020: 1
- Awards and distinctions: 0
- Public outreach activities: 0

Research funds

FNS
Grant No CRSII5_183536: From medicinal plant to mechanism: Target deconvolution of phytochemicals for *Trypanosoma cruzi*
Main applicant within the research unit: Muriel Cuendet
Total funding of the project: CHF 945'554.00
Total duration of the project: 42 months
Allocation 2020: CHF 266'392.00
Starting date: 01.02.2019

INNOSUISSE – Innovation Project
Grant No 33410.1 IP-LS: Development of waltherione F-based chemical entities for Chagas disease
Main applicant within the research unit: Muriel Cuendet
Total funding of the project: CHF 243'844.00
Total duration of the project: 30 months
Allocation 2020: CHF 100'509.40
Starting date: 01.06.2019

FNS
Grant No 310030_184790: HDAC6 ZnF-UBP domain inhibition in multiple myeloma
Main applicant within the research unit: Muriel Cuendet
Total funding of the project: CHF 530'880.00
Total duration of the project: 48 months
Allocation 2020: CHF 236'163.00
Starting date: 01.01.2020

Leading House for the Latin American Region - University of St. Gallen, Centro Latino Americano-Suizo (CLS HSG)
Grant No SMG I 906: Extracts, natural products and nanoparticles from *Musa sp*. and *Virola oleifera* as potential HDAC inhibitors in a multiple myeloma model
Main applicant within the research unit: Muriel Cuendet
Total funding of the project: CHF 10'050.00
Total duration of the project: 19 months
Allocation 2020: CHF 8'040.00
Starting date: 01.02.2020

Total amount for all research funds for 2020: CHF 611'104.40

Scientific publications (with impact factor)

Carpentier, G.; Berndt, S.; Ferratge, S.; Rasband, W.; Cuendet, M.; Uzan, G.; Albanese, P., Angiogenesis Analyzer for ImageJ – A comparative morphometric analysis of "Endothelial Tube Formation Assay" and "Fibrin Beads Assay". Sci. Rep. 2020, 10(1), 11568. 3.99

Cretton, S.; Kaiser, M.; Karimou, S.; Ebrahimi, S.N.; Maeser, P.; Cuendet, M.; Christen, P., Pyridine-4(1*H*)-one alkaloids from *Waltheria indica* as antitrypanosomatid agents. J. Nat. Prod. 2020, 83: 3363-3371. 3.78

Christen, P.; Cretton, S.; Humam, M.; Bieri, S.; Muñoz, O.; Joseph-Nathan, P., Chemistry and biological activity of alkaloids from the genus *Schizanthus*. Phytochem. Rev. 2020, 19: 615-641. 4.29

Do, T.K.T.; Clark, K.; Christen, P.; Reich, E., Quality assessment of *Sclerocarya birrea* leaves and leaves products from Burkina Faso based on fingerprinting using HPTLC. J. Planar Chromat. 2020, 33: 439-448. 0.81

Klein-Júnior, L.C.; Cretton, S.; Vander Heyden, Y.; Gasper, A.L.; Ebrahimi, S.N.; Christen, P.; Henriques, A.T., Bioactive azepine-indole alkaloids from *Psychotria nemorosa*. J. Nat. Prod. 2020, 83: 852-863. 3.78

Lacombe, J.; Cretignier, T.; Meli, L.; Wijeratne, K.; Veuthey, J.-L.; Cuendet, M.; Gunatilaka, A.A.L.; Zenhausern, F., Withanolide D enhances radiosensitivity of human cancer cells by inhibiting DNA damage non-homologous end joining repair pathway. Front. Oncol. 2020, 9, 1468. 4.84

Books and chapters

Monteillier, A., Cuendet, M., The Use of Anti-inflammatory Agents for Cancer Chemoprevention. In *Natural products for cancer chemoprevention: single compounds and combinations.* Pezzuto, J.M, Vang, O., eds. Springer Nature Switzerland, 2020, pp. 561-575.

Congresses / conferences and symposia

- Congress / conference organisation: 0
- Posters presentations: 0
- Oral presentations: 0
- Invited oral presentations: 2

Ph.D. Theses presented in 2020

- Noémie Saraux
  Phytochemical investigation of plants from Niger used in traditional medicine and their antiproliferative activity against multiple myeloma
  Director: Prof. Muriel Cuendet
  Co-Director: Dr Philippe Christen

PHYTOCHEMISTRY AND BIOACTIVE NATURAL PRODUCTS

Professor Jean-Luc WOLFENDER
Doctor Emerson FERREIRA-QUEIROZ

General description of Unit

The main research activities of the unit are related to the development of methodologies for the rapid isolation identification and bioactivity characterisation of natural products (NPs) at the microgram scale. State-of-the-art LC-MS and LC-MS/MS as well as microNMR techniques are used for dereplication purposes or de novo identification of NPs in crude extracts from different origins (plants, fungi, and microorganisms). Microfractionation methods in 96 well plates allow bioassays to be performed on LC peak in crude extracts, quantitative estimation of the well content and further structural determination by sensitive NMR. Rational large scale isolation strategies are developed for the rapid obtention of pure NPs in the mg scale for further testing bioactivies and mode of action. The range of biological activities studied in house or in collaboration covers mainly antifungal, antiprotozoal, anti-inflammatory and antiepileptic activities. The interest of the group is also focused on plant metabolomics, in this respect the focus is on the investigation of bioactive NPs dynamically induced in various stress situations (fungi confrontation, biotic and abiotic stresses, metabolite elicitation...). With the idea to generate original sources of bioactive NPs, other strategies including biotransformation or chemical derivatisation of crude extracts from common sources are also investigated. Finally, the analytical and metabolomics methods are also used for studying the metabolisation of crude extracts in view of a better understanding of the mode of action (synergy, prodrugs) and the potential toxicity of phytopharmaceuticals or nutraceuticals.

Specific research fields

- Search for new lead compounds from natural sources
- On-line identification of natural products by LC-UV-NMR-MS (dereplication)
- Rapid microfractionation of crude extracts for chemical and bioactivity profiling
- Plant metabolomics
- Search for original bioactive stress-induced natural products of various origin
- Study of antifungal compounds from pathogen fungi in co-culture Qualitative quantitative analysis of phytotherapeuticals
- Study of the metabolisation of phytopreparation by metabolomics in relation with their mode of action
- Investigation of natural products involved in diseases associated with problems of ageing
- Search for new lead compounds for use against tropical parasitic diseases
- Investigation of methods for isolation of natural products using preparative chromatographic techniques
- Exploitation of microbial biotransformation for the search of new lead compounds

2020 at a glance

- Publications with impact factor : 26
- Publications without impact factor : 2
- Patent : 1
- Book and chapters : 0
- Congresses / conferences organisation : 0
- Posters presentations : 0
- Oral presentations : 2

- Invited oral presentations : 7
- Number of projects at FNRS and assimilated (Research funds) : 4
- Service agreements and related activities : 4
- Ph.D. Theses presented in 2020 : 3
- Awards and distinctions: 0
- Public outreach activities : 0

Research funds

FNS
Grant No 310030E-164289: Study of leaf endophytic fungi: Exploration and valorization of biosourCed Innovative antibacterial metaboLites
Main applicant within the research unit: Jean-Luc Wolfender
Total funding of the project: CHF 455'044
Total duration of the project: 52 months
Allocation 2020: CHF 0
Starting date: 01.06.2016

FNS
Grant No 31003A-163424/1: Localisation and dynamics of free and bound 12-oxo-phytodienoic acid (OPDA) pools in Arabidopsis
Main applicant within the research unit: Jean-Luc Wolfender
Total funding of the project: CHF 451'030
Total duration of the project: 54 months
Allocation 2020: CHF 0
Starting date: 01.07.2016

FNS
Grant No 205321_182438: Improving natural products chemical biodiversity for drug discovery by fungal secretome assisted biotransformation
Main applicant within the research unit: Emerson Ferreira Queiroz
Total funding of the project: CHF 319'161
Total duration of the project: 48 months
Allocation 2020: CHF 85'704
Starting date: 01.04.2019

FNS
Grant No CRSII5-189921/1: An in silico and chemo-biological approach to identify anti-infective and pro-metabolic natural products
Main applicant within the research unit: Jean-Luc Wolfender
Total funding of the project: CHF 3'198'673
Total duration of the project: 48 months
Allocation 2020: CHF 884'205 (pour tout le consortium mais reçu à l'UNIGE)
Starting date: 01.04.2020

Total amount for all research funds for 2020: CHF 969'909

Service agreements and related activities

Industry Partner, Geneva (NITM)
Total amount for 2020: CHF 0

Industry Partner, Geneva (ALICE)
Total amount for 2020: CHF 40'882

Industry Partner, Lausanne (NIHS)
Total amount for 2020: CHF 47'056

Industry Partner, Wenling, China (Bench Fees Hao)
Total amount for 2020: CHF 0

Total amount (for all service agreements and related activities) for 2020: CHF 87'938

Scientific publications (with impact factor)

Agostini, M.; Hininger-Favier, I.; Marcourt, L.; Boucherle, B.; Gao, B.F.; Hybertson, B.M.; Bose, S.K.; McCord, J.M.; Millery, A.; Rome, M.; Queiroz, E.F.; Wolfender, J.-L.; Gallet, C.; Boumendjel, A., Phytochemical and biological investigation of *Helianthemum nummularium*, a high-altitude growing alpine plant overrepresented in ungulates diets. Planta Med. 2020, 86: 1185 1190. *2.68*

Allard, S.; Le Daré, B.; Allard, P.-M.; Morel, I.; Gicquel, T., Comparative molecular networking analysis of a Rauwolfia plant powder and biological matrices in a fatal ingestion case. Forensic Toxicol. 2020, 38 (2), 447–454. *2.94*

Azuama, O.C.; Ortiz, S.; Quiros-Guerrero, L.; Bouffartigues, E.; Tortuel, D.; Maillot, O.; Feuilloley, M.; Cornelis, P.; Lesouhaitier, O.; Grougnet, R.; Boutefnouchet, S,.; Wolfender, J.-L.; Chevalier, S.; Tahrioui, A., Tackling *Pseudomonas aeruginosa* virulence by mulinane-like diterpenoids from *Azorella atacamensis*. Biomolecules 2020, 10. *3.26*

Barthelemy, M.; Guerineau, V.; Genta-Jouve, G.; Roy, M.; Chave, J.; Guillot, R.; Pellissier, L.; Wolfender, J.-L.; Stien, D.; Eparvier, V.; Touboul, D., Identification and dereplication of endophytic *Colletotrichum* strains by MALDI TOF mass spectrometry and molecular networking. Scientific Reports 2020,10. *3.99*

Benchadi. W.; Haba, H.; Queiroz, E.F.; Marcourt, L.; Wolfender, J.-L.; Bensouici, C.; Benkhaled, M., Chemical composition, antioxidant, and anti-inflammatory activities of whole parts of *Onobrychis* crista-galli (L.) Lam. Natural Products Journal 2020, 10: 642-654. *3.78*

Besbas, S.; Mouffouk, S.; Haba, H.; Marcourt, L.; Wolfender, J.-L.; Benkhaled, M., Chemical composition, antioxidant, antihemolytic and anti-inflammatory activities of *Ononis mitissima L*. Phytochemistry Letters 2020, 37: 63-69. *1.45*

Brel, O. ; Toure, S.; Levasseur, M.; Lechat, C.; Pellissier, L.; Wolfender, J.-L.; Van-Elslande, E.; Litaudon, M.; Dusfour, I.; Stien, D.; Eparvier, V., Paecilosetin derivatives as potent antimicrobial agents from *Isaria farinosa*. J. Nat. Prod. 2020, 83: 2915-2922. *3.78*

Brillatz, T.; Jacmin, M.; Queiroz, E.F.; Marcourt, L.; Slacanin, I.; Petit, C.; Carrupt, P.-A.; Bum, E.N.; Herrling, P.; Crawford, A.D.; Wolfender, J.-L., Zebrafish bioassay-guided isolation of antiseizure compounds from the Cameroonian medicinal plant *Cyperus articulatus L*. Phytomedicine 2020, 70. *4.26*

Brillatz, T.; Jacmin, M.; Vougogiannopoulou, K.; Petrakis, E.A.; Kalpoutzakis, E.; Houriet, J.; Pellissier, L.; Rutz, A.; Marcourt, L.; Queiroz, E.F.; Crawford, A.D.; Skaltsounis, A.-L.; Wolfender, J.-L., Antiseizure potential of the ancient Greek medicinal plant *Helleborus odorus subsp. cyclophyllus* and identification of its main active principles. J. Ethnopharmacol. 2020, 259: 112954. *3.69*

Brillatz, T.; Kubo, M.; Takahashi, S.; Jozukuri, N.; Takechi, K.; Queiroz, E.F.; Marcourt, L.; Allard, P.-M.; Fish, R-; Harada, K.; Ishizawa, K.; Crawford, A.D.; Fukuyama, Y.; Wolfender, J.-L., Metabolite profiling of javanese ginger *Zingiber purpureum* and identification of antiseizure metabolites via a low-cost open-source Zebrafish bioassay-guided Isolation. J. Agric. Food Chem. 2020, 68: 7904-7915. *4.19*

Descombes, P.; Pitteloud, C.; Glauser, G.; Defossez, E. ; Kergunteuil, A. ; Allard, P.-M. ; Rasmann, S.; Pellissier, L., Novel trophic interactions under climate change promote alpine plant coexistence. Science 2020, 370: 1469-1473. *41.84*

Dienes-Nagy, A.; Marti, G.; Breant, L.; Lorenzini, F.; Fuchsmann, P.; Baumgartner, D.; Zufferey, V.; Spring, J.L.; Gindro, K.; Viret, O.; Wolfender, J.-L.; Rosti, J., Identification of putative chemical markers in white wine (Chasselas) related to nitrogen deficiencies in vineyards. Oeno One 2020, 54: 583-599. *2.83*

Farmer, E. E.; Gao, Y.Q.; Lenzoni, G.; Wolfender, J.-L.; Wu, Q., Wound-and mechanostimulated electrical signals control hormone responses. New Phytol. 2020, 227: 1037-1050. *8,51*

Gdaniec, B.G.; Allard, P.-M.; Queiroz, E. F.; Wolfender, J.-L.; van Delden, C.; Kohler, T., Surface sensing triggers a broad-spectrum antimicrobial response in *Pseudomonas aeruginosa*. Environmental Microbiology 2020, 22: 3572-3587. *4.93*

Houriet, J.; Allard, P.-M.; Queiroz, E. F.; Marcourt, L.; Gaudry, A.; Vallin, L.; Li, S.; Lin, Y.; Wang, R.; Kuchta, K.; Wolfender, J.-L., A Mass Spectrometry based metabolite profiling workflow for selecting abundant specific markers and their structurally related multi-component signatures in Traditional Chinese Medicine multi-herb formulae. Frontiers in Pharmacology 2020, 11. *4.22*

Koziol, E.; Luca, S. V.; Agalar, H.G.; Saglik, B. N.; Demirci, F.; Marcourt, L.; Wolfender, J.-L.; Jozwiak, K.; Skalicka-Wozniak, K., Rutamarin: efficient liquid-iquid chromatographic isolation from *Ruta graveolens L.* and evaluation of its In Vitro and In Silico MAO-B inhibitory activity. Molecules 2020, 25. *3.26*

Le Daré, B.; Ferron, P.-J.; Allard, P.-M.; Clément, B.; Morel, I.; Gicquel, T., New insights into quetiapine metabolism using molecular networking. Sci. Rep. 2020, 10 (1), 1–10. *3.99*

Mannochio Russo, H.; Ferreira Queiroz, E. F.; Marcourt, L.; Rutz, A.; Allard, P.-M.; de Almeida, R. F.; Marques Carvalho, N.; Wolfender, J.-L.; da Silva Bolzani, V., Phytochemical analysis of the methanolic leaves extract of *Niedenzuella multiglandulosa* (Malpighiaceae), a plant species toxic to cattle in Brazil. Phytochemistry Letters 2020, 37: 10-16. *1.45*

Massana-Codina, J.; Schnee, S.; Allard, P.-M.; Rutz, A.; Boccard, J.; Michellod, E.; Cléroux, M.; Schürch, S.; Gindro, K.; Wolfender, J.-L., Insights on the structural and metabolic resistance of potato (*Solanum tuberosum*) cultivars to tuber black dot (*Colletotrichum coccodes*). Frontiers in Plant Science 2020, 11. *4.40*

Neuenschwander, A.; Rocha, V.P.C.; Bastos, T. M.; Marcourt, L.; Morin, H.; da Rocha, C.Q.; Grimaldi, G. B.; de Sousa, K.A.F.; Borges, J. N.; Rivara-Minten, E.; Wolfender, J.-L.; Soares, M.B.P.; Queiroz, E.F., Production of highly active antiparasitic compounds from the controlled halogenation of the *Arrabidaea brachypoda* crude plant extract. J. Nat. Prod. 2020, 83: 2631-2640. *3.78*

Nothias, L.F.; Petras, D.; Schmid, R.; Dührkop, K.; Rainer, J.; Sarvepalli, A.; Protsyuk, I.; Ernst, M.; Tsugawa, H.; Fleischauer, M.; Aicheler, F.; Aksenov, A.A.; Alka, O.; Allard, P.-M.; Barsch, A.; Cachet, X.; Caraballo-Rodriguez, A.M.; Da Silva, R.R.; Dang, T.; Garg, N.; Gauglitz, J.M.; Gurevich, A.; Isaac, G.; Jarmusch, A.K.; Kameník, Z.; Kang, K.B.; Kessler, N.; Koester, I.; Korf, A.; Le Gouellec, A.; Ludwig, M.; Martin, H.C.; McCall, L.I.; McSayles, J.; Meyer, S.W.; Mohimani, H.; Morsy, M.; Moyne, O.; Neumann, S.; Neuweger, H.; Nguyen, N.H.; Nothias-Esposito, M.; Paolini, J.; Phelan, V.V.; Pluskal, T.; Quinn, R.A.; Rogers, S.; Shrestha, B.; Tripathi, A.; van der Hooft, J.J.J.; Vargas, F.; Weldon, K.C.; Witting, M.; Yang, H.; Zhang, Z.; Zubeil, F.; Kohlbacher, O.; Böcker, S.,; Alexandrov, T.; Bandeira, N.; Wang, M.; Dorrestein, P.C., Feature-based molecular networking in the GNPS analysis environment. Nat Methods 2020, 17: 905-908. *30.82*

Righi, D.; Huber, R.; Koval, A.; Marcourt, L.; Schnee, S.; Le Floch, A.; Ducret, V.; Perozzo, R.; de Ruvo, C. C.; Lecoultre, N.; Michellod, E.; Ebrahimi, S. N.; Rivara-Minten, E.; Katanaev, VL.; Perron, K.; Wolfender, J.-L.; Gindro, K.; Queiroz, E.F., Generation of stilbene antimicrobials against multiresistant strains of *Staphylococcus aureus* through biotransformation by the enzymatic secretome of *Botrytis cinerea*. J. Nat. Prod. 2020, 83: 2347-2356. *3.78*

Saldanha, L.L.; Allard, P.-M.; Afzan, A.; de Melo F.P.d S.R.; Marcourt, L.; Queiroz, E.F.; Vilegas. W.; Furlan, C. M.; Dokkedal, A. L.; Wolfender, J.-L., Metabolomics of *Myrcia bella* populations in brazilian savanna reveals strong influence of environmental factors on its specialized metabolism. Molecules 2020, 25: 2954. *3.26*

Salgado, C.; Morin, H.; de Aquino, N.C.; Neff, L.; Rocha, C.Q.; Vilegas, W.; Marcourt, L.; Wolfender, J.-L.; Jordan, O.; Queiroz, E.F.; Allemann, E., In Vitro anti-inflammatory activity in arthritic synoviocytes of *A. brachypoda* root extracts and its unusual dimeric flavonoids. Molecules 2020, 25. *3.26*

Stahl, E.; Brillatz, T.; Ferreira Queiroz, E.; Marcourt, L.; Schmiesing, A.; Hilfiker, O.; Riezman, I.; Riezman, H.; Wolfender, J.-L.; Reymond, P., Phosphatidylcholines from *Pieris brassicae* eggs activate an immune response in Arabidopsis. Elife 2020, 9: e60293. *7.08*

Trifan, A.; Skalicka-Wozniak, K.; Granica, S.; Czerwinska, M. E.; Kruk, A.; Marcourt, L.; Wolfender, J.-L.; Wolfram, E.; Esslinger, N.; Grubelnik, A.; Luca, S.V., *Syrnphytum officinale L.*: liquid-liquid chromatography isolation of caffeic acid oligomers and evaluation of their influence on pro-inflammatory cytokine release in LPS-stimulated neutrophils. J. Ethnopharmacol. 2020, 262. *3.69*

Scientific publications (without impact factor)

Puma-Zamora, W.; Jimenez, F.; Alvarado-Huayhuaz, J. A.; Cordova-Serrano, G.; Allard, P.-M.; Prado Acosta, M.; Olivos-Ramirez, G. E.; Condori-Alagón, H.; Camps, I., In Silico studies of the biomolecular interactions between natural products and SARS-CoV-2 main protease. ChemRxiv 2020.

Wolfender, J.-L.; Queiroz, E.F.; Allard, P.-M., Massive metabolite profiling of natural extracts for a rational prioritization of bioactive natural products: A paradigm shift in pharmacognosy. Food Frontiers 2020, n/a.

Patents

Queiroz, E.F.; Righi, D.; Huber, R.; Marcourt, L.; Schnee, S.; Ducret, V.; Lecoultre, N.; Voinesco, F.; Michellod, E.; Perron, K.; Perozzo, R.; Wolfender, J.-L.; Gindro, K.; Soldati, T.; Hanna, N., Anti-bacterial and anti-viral compounds 2020, Patent number EP20172403.6.

Congresses / conferences and symposia

- Congresses / conferences organisation : 0
- Posters presentations : 0
- Oral presentations: 2
- Invited oral presentations : 7
- Workshops : 2

Ph.D. Theses presented in 2020

- Adlin Afzan
  "Comprehensive chemical profiling for plant chemotaxonomy and quality control of herbal medicines – An MS-based metabolomics and molecular network perspective"
  Director: Prof. Jean-Luc Wolfender Co-director: Prof. Nor Hadiani

- Marianne Dor
  "Proteomics investigation of human tear fluid: from healthy subjects to Thyroid-Associated Orbitopathy and Multiple Sclerosis patients."
  Director: Prof. Jean-Luc Wolfender Co-directors: Prof. Patrice Lalive, Prof. Aurélien Thomas

- Théo Brillatz
  "Medicinal Plants to Treat Epilepsy: Discovery of Antiseizure Compounds by *In Vivo* Zebrafish Bioactivity Guided Isolation"
  Director: Prof. Jean-Luc Wolfender

MEDICATION ADHERENCE AND INTERPROFESSIONALITY

Professor Marie-Paule SCHNEIDER VOIROL

General description of Unit

The adjunct professorship (0.5 FTP) in medication adherence and interprofessionality, and its research and teaching unit was launched in August 2018. Medication adherence is the core research area of the unit. Medication adherence is a key determinant of the ambulatory care system of the 21st century. It is defined as the process by which patients take their medications as prescribed. It is characterized by three components: treatment initiation, implementation and discontinuation (Vrijens et al. 2012). As described by the World Health Organization (WHO) in 2003, around 50% of chronic patients are nonadherent to their treatment worldwide. This creates an endemic, medical and economic threat on the healthcare systems, which needs to be addressed. Research is needed to better document the issue and its contributing factors as well as assess cost-effective, interprofessional adherence-enhancing programs to implement in clinical practice and envision new models of care. Therefore, the research plan of the unit aims at achieving a comprehensive understanding of patient adherence and self-management across several chronic disease models, where adherence is a complex and still underinvestigated behaviour, with the modelling of long-term patient behaviour, and the development of screening and preventive approaches to nonadherence. This research is at the interface between pharmaceutical and medical sciences.

In tandem with this unit, the professor is director of pharma24 (0.4 FTE), a new outpatient pharmacy located in the Geneva University Hospitals (HUG). Twelve EFT pharmacists, among whom two have a PhD degree, and 12 EFT technicians in pharmacy form the professional team. Pharma24 is an academic outpatient pharmacy, where research on medication adherence and interprofessionality has been launched in 2019. Pharma24 as research partner will support a steady collection of routine-based adherence and patient data. In 2020, pharma24 was central in launching the SAS-CoV-2 rapid testing activity for community pharmacists in the Canton de Geneva. It ensured the education of all engaged community pharmacists and their teams, in collaboration with the HUG, and ensured a testing activity 7 days a week for the population. Since the outbreak of SAS-CoV-2, community pharmacists and physicians confirmed that they are instrumental front-line healthcare providers for our society.

The unit is in charge of the interprofessional teaching curriculum of the school of pharmacy in close collaboration with the Interprofessional Simulation Center (CIS) of the University of Geneva, especially with Dr Th. Fassier, head of the center, and P. Picchiottino, deputy head. The students of the school of pharmacy have joined the interprofessional curriculum in 2019-2020.

Since September 2018, the medication adherence unit is participating in the reform of the teaching curriculum of the school of pharmacy (Bachelor and Master levels), with a focus in harnessing the teaching of communication in health and in reinforcing the posture of the clinical, community pharmacist to ensure efficient, safe and economic drug use.

Specific research fields

- To evaluate medication adherence support programs in chronic diseases, such as HIV, oral oncology, diabetes and renal failure.
- To develop robust medication adherence measurement and data analysis, in particular electronic monitoring in routine care.

- To analyse the epidemiology of contradictory information on prescribed medications as perceived by chronic patients, and its impact on patient medication self-management.

- To investigate how interprofessional collaborations could support a more efficient and secure medication use, especially at the interface between the hospital and the community.

2020 at a glance

- Publications with impact factor : 5
- Publications without impact factor : 1
- Patents : 0
- Book and chapters : 0
- Congresses / conferences organisation : 1
- Posters presentations : 5
- Oral presentations : 0
- Invited oral presentations : 2
- Number of projects at FNRS and assimilated (Research funds) : 3
- Service agreements and related activities : 0
- Ph.D. Theses presented in 2020 : 1
- Awards and distinctions: 2
- Public outreach activities : 4

Research funds

Swiss Cancer Research Foundation
Optimizing targeted anti-cancer therapies: from better medication adherence to individualized treatments.
Main applicant : Maire Paule Schneider Voirol
Total funding of the project: CHF 248'200
Total duration of the project 4 years
Allocation 2020: CHF 49'600
Starting date : 01.10.2018

Qualité et Recherche Santésuisse Curafutura et Pharmasuisse
Medication adherence and renal failure
Main applicant : Maire Paule Schneider Voirol
Total funding of the project: CHF 110'000
Total duration of the project: 5 years
Allocation 2020: CHF 0
Starting date : 01.07.2017

OFSP
Enquête sur les contradictions perçues par les patients dans leur prise en charge médicamenteuse et pistes d'amélioration
Main applicant : Maire Paule Schneider Voirol
Total funding of the project: CHF124'993
Total duration of the project: 2,5 years
Allocation 2020: CHF 44'993
Starting date: 01.10.2018

Total amount for all research funds for 2020: CHF 94'593

Scientific publications (with impact factor):

Kamal, S. Glass, T. R. Doco-Lecompte, T. Locher, S. Bugnon, O. Parienti, J. J. Cavassini, M. Schneider, M. P., An Adherence-Enhancing Program Increases Retention in Care in the Swiss HIV Cohort. Open Forum Infectious Deseas 2020, 7 (9), ofaa323. *3.66*

Cardoso, E Guidi, M. Khoudour, N. Boudou-Rouquette, P Fabre, E. Tlemsani, C. Arrondeau, J. Goldwasser, F Vidal, M. Schneider, M. P. Wagner, A. D. Widmer, N. Blanchet, B. Csajka, C., Population Pharmacokinetics of Erlotinib in Patients With Non-small Cell Lung Cancer: Its Application for Individualized Dosing Regimens in Older Patients.
Clinical therapeutics 2020, 42 (7), 1302-1316 *3.12*

Kamal, S. Urata, J. Cavassini, M. Liu, H. Kuoyos, R. Bugnon, O. Wang, W. Schneider, M. P., Random forest machine learning algorithm predicts virologic outcomes among HIV infected adults in Lausanne, Switzerland using electronically monitored combined antiretroviral treatment adherence. AIDS Care 2020-04-08,1-7 *1.89*

Haag, M. Lehmann, A. Hersberger, K. E. Schneider, M. P. Gauchet, A. Vrijens, B. Arnet, I. Allenet, B.,
The ABC taxonomy for medication adherence translated into French and German.
British Journal of Clinical Pharmacology 2020, 86, (4), 734-744 *3.74*

Cardoso, E. Guidi, M. Blanchet, B. Schneider, M. P. Decosterd, L. A. Buclin, T. Csajka, C. Widmer, N.,
Therapeutic Drug Monitoring of Targeted Anticancer Protein Kinase Inhibitors in Routine Clinical Use: A Critical Review.
Therapeutic Drug Monitoring 2020, 42, 33-44 *2.07*

Scientific publications (without impact factor)

Schneider M.P, Bandiera C, Dotta-Celio J, Zanchi A. Medication adherence and physician-pharmacist collaboration. Focus on the patient with diabetic nephropathy. Rev Med Suisse 2020; 16 (697):1210-1213

Congresses / conferences and Symposia

- Congresses / conferences organisation : 1
- Posters presentations : 5
- Oral presentations : 0
- Invited oral presentations : 2

Ph.D. Theses presented in 2020:
Resumption of thesis supervision following the death of Prof. Olivier Bugnon:

- Bawab Noura
  “Implementation and Effectiveness Study of an Interprofessional Support Program for Patients with Type 2 Diabetes in Swiss Primary Care”
  Prof. O. Bugnon and Prof. M.P. Schneider (dès juillet 2020)

Awards and distinction

Schneider M., "Who is Marie Schneider" https://www.espacomp.eu/2020/12/19/talking-about-medication-non-adherence-with-marie-schneider/ **winner of the John Urquhart Memorial Lecture**, International Society for Patient Adherence, Compliance and Persistence (ESPACOMP), Novembre 2020, Seraing (Belgium)

Solh Dost S., Dispensing of HIV self-tests in the pharmacies in Geneva: what is the situation a year after their marketing authorization? **winner of the 1st Ofac Pharmacy Awards 2020 prize** (ex-aequo with another candidate) excellence of Master Thesis, 29 Octobre 2020 Genève (Suisse)

Public outreach activities (radio, television and other media)

M. Schneider, Quand le patient connaît les effets secondaires, il anticipe les symptômes indésirables, Migros Magazine 27.01.2020 (p.24-25)

M. Schneider, Un patient sur deux ne suit pas son traitement. Magazine Ma santé, publication de Bon à savoir 2020 (5) (p.10-11)

M. Schneider, Covid, tous testés RTS, Emission T.T.C November 30th 2020 Geneva (Switzerland) https://www.rts.ch/play/tv/emission/t-t-c--toutes-taxes-comprises?id=14235 ;https://rts-vod-dd.akamaized.net/ww/11790520/141e98ee-45d5-3914-9b9d-55cce26d4a43.mp4

M. Schneider, Si soigner mon enfant était plus simple… Le Cercle pharmaSee, UniGe, September 24th, 2020, Geneva (Switzerland)

DATA ANALYTICS LAB

Professor Stéphane GUERRIER

General description

The Data Analytics Lab aims at contributing to the development of new methodologies for data analysis and decision-making that allow to respond to the ever-increasing data size and model complexity while achieving desirable statistical properties and performance. These fundamental developments make use of the latest advances in (applied) computer sciences, in particular machine learning. We also aim at making these developments broadly available through open-source statistical packages (e.g. the R platform) and scientific publications and/or reports in applied statistics. To ensure added-value and tangible impact of our work, we aim at confirming and expanding our interdisciplinary approach to research. Therefore, our work includes not only collaborations with established researchers in computer and mathematical sciences but also in areas such as experimental and behavioural sciences for whom data analysis has become an important and very demanding challenge, as is also the case for disciplines such as life sciences (medical and pharmaceutical), population health, engineering (signal processing, navigation), economics, management and others. We also aim at collaborating with (semi-)private institutions that face the challenges of analysing the data they collect in order to improve their products and/or services as well as their strategic decision-making.

Specific research fields

- Computational statistics and simulation methods
- Life sciences analytics
- Signal processing and time series analysis
- Machine learning
- Data analytics in engineering
- Applied statistics

2020 at a glance

- Publications with impact factor: 6
- Publications without impact factor: 1
- Patents: 0
- Book and chapters: 1
- Congresses / conferences organisation: 0
- Posters presentations: 0
- Oral presentations: 3
- Invited oral presentations: 1
- Number of projects at FNRS and assimilated (Research funds): 2
- Service agreements and related activities: 0
- Ph.D. Theses presented in 2020: 0
- Awards and distinctions: 0
- Public outreach activities: 2

Research funds

SNSF Professorships
New Challenges for Statistical Methods in Large and Complex Data Settings: Analysis of Dependent Data and Model Selection
Main applicant: Stéphane Guerrier
Main discipline: Mathematics
Total funding of the project: CHF 1'633'470
Total duration of the project: 4 years
Allocation 2020: CHF 402'893
Starting date: 01.01.2019
Link: http://p3.snf.ch/project-176843#

InnoSuisse
Title: Stochastic Modelling of Inertial Sensors for Precise GNSS-based Positioning
Main applicants: Stéphane Guerrier, Jan Skaloud (EPFL) and Markus Wenk (Hexagon)
Main discipline: Engineering
Total funding of the project: CHF 917'280 (CHF 246'355 allocated to the University of Geneva)
Total duration of the project: 2 years
Allocation 2020: CHF 112'320
Starting date: 01.01.2020

Total amount for all research funds for 2020: CHF 515'213

Scientific publications (with impact factor)

Khamma, T.; Zhang, Y.; Guerrier, S.; Boubekri, M., Generalized Additive Models: An Efficient Method for Short-Term Energy Prediction in Office Buildings. Energy 2020, 213, 118834. 6.082

Guerrier, S.; Jurado, J.; Khaghani, M.; Bakalli, G.; Karemera, M.; Molinari, R.; Orso, S.; Raquet, J.; Schubert Kabban, C.; Skaloud, J.; Xu, H.; Zhang, Y., Wavelet-Based Moment-Matching Techniques for Inertial Sensor Calibration. IEEE Transactions on Instrumentation & Measurement 2020, 69(10), 7542–7551. 3.658

LaChance, J.; Radhakrishnn, S.; Madiwale, G.; Guerrier, S.; Vanamala, J., Targeting Hallmarks of Cancer with a Food System-based Approach. Nutrition 2020, 69(110563),1-23. 3.639

Wang, Y.; Gardoni, P.; Murphy, C.; Guerrier, S., Empirical Predictive Modeling Approach to Quantifying Social Vulnerability to Natural Hazards. Annals of the American Association of Geographers, 2020, 1-25, in press. 3.302

Wang, Y.; Gardoni, P.; Murphy, C.; Guerrier, S., Worldwide Predictions of Earthquake Casualty Rates with Seismic Intensity Measure and Socioeconomic Data: A Fragility-Based Formulation. Natural Hazards Review 2020, 21(2), 1-40. 1.667

Jammalamadaka, S.R.; Guerrier, S.; Mangalam, V., Exact Distributions and Performance of some Two-sample Nonparametric Tests for Circular Data. Sankhya B, 1-27, in press. 0.425

Scientific publications (without impact factor)

a. Conference proceedings

Voirol, L.; Guerrier, S.; Zhang, Y.; Karemera, M.; Radi, A., Optimally Weighted Wavelet Variance-based Estimation for Inertial Sensor Stochastic Calibration, 12th International Conference on Electrical Engineering 2020, Cairo, Egypt, 482-486.

b. Books or books chapters

Beckman, M.; Guerrier, S.; Lee, J.; Molinari, R.; Orso, S.; Rudnytskyi, J., An Introduction to Statistical Programming Methods with R. E-book, updated in 2020. http://r.smac-group.com

c. Selected submitted manuscript in methodological statistics

Guerrier, S.; Karemera, M.; Orso, S.; Victoria-Feser, M.-P.; Zhang, Y., A General Approach for Simulation-based Bias Correction in High Dimensional Settings.
https://arxiv.org/abs/2010.13687

Molinari, R.; Bakalli, G.; Guerrier, S.; Miglioli, C.; Oros, S.; Scaillet, O., SWAG: A Wrapper Method for Sparse Learning. https://arxiv.org/abs/2006.12837

Guerrier, S.; Kuzmics, C.; Victoria-Feser, M.-P., Prevalence Estimation from Random Samples and Census Data with Participation Bias. https://arxiv.org/abs/2012.10745

d. Selected statistical software (R packages)

Maintainer and author for the R package “simts”, which provides easy-to-use tools for time series analysis. Source code: https://github.com/SMAC-Group/simts
Website: https://smac-group.github.io/simts/index.html. Downloads: 8000 per year.

Maintainer and author for the R package “wv”, which provides various tools to perform standard and robust wavelet variance analysis for time series.
Source code: https://github.com/SMAC-Group/wv
Website: https://smac-group.github.io/wv/. Downloads: 6000 per year.

Maintainer and author for the R package “avar”, which provides a computationally efficient implementation of the Allan variance and of other related quantities.
Source code: https://github.com/SMAC-Group/avar
Website: https://smac-group.github.io/avar/. Downloads: 6000 per year.

Congresses / conferences and Symposia

- Congresses / conferences organisation: 0
- Posters presentations: 0
- Oral presentations: 3
- Invited oral presentations: 1

Public outreach activities:

Participation to “*Comprendre le Numérique*”, Fall 2020, Bachelor level course (open to all bachelors students of the University of Geneva, cours transversal), responsible for the module on statistical literacy.

Participation to “Inference for Large-Scale Time Series with Application to Sensor Fusion”, Winter 2020, PhD-level course (with Dr. Jan Skaloud) on signal processing with application in navigation (for PhD students in Robotics & PhD in Civil Engineering). More information: https://gmwm.netlify.com/

PhD PROGRAM

Professor Yogeshvar KALIA, Director
Doctor Béatrice KAUFMANN, Coordinator
Ms Florence VON OW, Secretary

Introduction – general description

The PhD Program in Pharmaceutical Sciences promotes a solid theoretical and practical training in all aspects of the Pharmaceutical Sciences, fosters interdisciplinary research and provides opportunities for scientific exchange via lectures, symposia and networking activities. The PhD Program also aims to increase career opportunities for graduates from the School of Pharmaceutical Sciences.

One of the main objectives of this year has been to consolidate the integration of our doctoral program into the new inter-faculty doctoral school in life sciences created by the Faculty of Science and the Faculty of Medicine in June 2018 (PSLS) and of which the Section of Pharmaceutical Sciences is a founding member. This doctoral school brings together approximately 275 doctoral students, 155 of whom are from the Faculty of Science. The 78 doctoral students in pharmaceutical sciences who are enrolled in this school therefore represent 25% of the PSLS doctoral students (and 50% of the PSLS doctoral students from the Faculty of Science). The vast majority of doctoral students in pharmaceutical sciences have joined this doctoral school (78 as of 16.11.2020), but some of them (either at the end of their thesis, or doing a thesis in practical pharmacy or hospital pharmacy, 17 as of 16.11.2020) have preferred to remain under the "old regime" of the doctoral school in pharmaceutical sciences. The other goal has been to maintain our course offerings despite the difficult conditions in 2020 (see below).

This doctoral program, a pioneer since 2004, is in fact a special case. Indeed, there is only one pharmaceutical sciences program in French-speaking Switzerland. Theses are generally done in Geneva or Lausanne, with a few exceptions for extramural theses. For any doctoral student doing a thesis with a specialization in "pharmaceutical sciences", registration and participation in the doctoral program is mandatory in order to be able to defend the thesis and a minimum number of ECTS credits is required. These measures are clearly detailed in the regulations for the doctoral program in pharmaceutical sciences.

The program covers all aspects of pharmaceutical sciences, from basic molecular research to the patient. Five types of activities make up the program: courses, specialized conferences, symposia, networking activities and extramural seminars.

The activities of our doctoral program are primarily organized for our doctoral students, but we accept registrations from doctoral students from other life science fields, or from other CUSO doctoral programs, as long as there is space available.

Registration to our program is mandatory for PhD Students in pharmaceutical sciences, and all of the doctoral students enrolled in the PhD program of the School of Pharmaceutical Sciences are subject to the regulation that stipulates the acquisition of at least 30 credits before the thesis defense can take place. The Program's Direction tries to promote participation of PhD Students in the activities proposed either by the program or by the CUSO, but also recognizes some external activities, which are also granted credits. This is useful for "extramural" PhD students who are sometimes far from Geneva and cannot participate in the "local" courses and events.

The credits granted vary but as a general rule 1 credit is awarded for 6 hours of activity (internal activities) or 1 credit for 10 hours of attendance (external activities). It should be noted that most of the PhD students acquire more than the 30 credits indicating their active participation in the PhD program.
Despite the fact the Unige does not allow the award of credits twice for different formations, completion of a CAS or MAS is recognized with the award of 3 credits (in the “course” part of the credits table). The minimum number of credits to be obtained by attending courses is now 20 (previously 18), in order to align with the other PSLS cursus.

The introduction of the TAC, which takes place 12-15 months after the start of the doctorate, by the PhD Program commission, enables an evaluation of the progress of the PhD thesis. This is organized with the objective of harmonizing levels of excellence of the PhD candidates from the different component disciplines in the School of Pharmaceutical Sciences. This is done with respect to: (i) efficient time-planning and organization of the thesis project, (ii) enthusiasm and ability to perform interesting projects and (iii) optimization of thesis project progression. The TAC system is valid for all PhD candidates beginning their thesis as of 15 September 2015. 18 TACS were conducted in 2020 (1 under the old regulation and 17 via PSLS), with very good feedback and comments from the PhD students evaluated, as well as from their supervisors. This procedure allowed also to confirm the vocation of the PhD students, since only 2 failures were registered since the TAC procedure was introduced.

Courses and symposia

From March 16, after a few days of adaptation, we were able to reorganize the rest of the year's courses in a remote virtual form. This was made possible by the great responsiveness, availability and dynamism of our external teachers, whom we cannot thank enough. However, some courses had to be postponed, especially those that involved a great deal of interactivity. In 2020, 51 activities were initially proposed to the registered PhD students (57, if considering each "Conférence sur sujet specialisé" separately) of these 26 had to be postponed or cancelled due to the COVID-19 sanitary situation. A total of 474 hours could however be maintained within the 2020 PhD program (including all activities; see Tables 1-3 below for detailed information).

Our annual extramural seminar in Zermatt had to be postponed, due to the cancellation of our reservation by the hotel, which could not commit to respecting the distance norms in force at this time of year. It also turns out that the hotel has changed ownership in the meantime, and we are trying to find an alternative venue for this seminar, as the conditions proposed by the new management are no longer compatible with our budget. However, it seems very difficult to organize such an event in 2021, given the uncertainties that still exist.

The PhD day had also to be postponed to 2021, as was the PSLS annual symposium (initially scheduled in November 2020).

One course could only be partially reorganized due to a change of speaker, linked to the departure of the usual contact person from the company concerned on March 31.

Almost all other courses could be held online (Zoom, Microsoft Teams, ppt + MP4...), except for one course, which required too much interactivity, and whose speaker was overloaded due to his professional involvement in the health situation.

Since the information session on the Doctoral programme in pharmaceutical sciences held in 2019 was very successful and found very useful, a new session was organized on November 17th 2020 (held by Zoom). The goal was to inform all PhD students about the practical issues generated by the coexistence of two PhD cursus: PhD in Sciences, mention Pharmaceutical Sciences or PhD in Life Sciences, mention Pharmaceutical Sciences. This lecture was mandatory for all PhD students having started a PhD as from 16.11.2019, and 19 PhD students attended the session. The General Secretary of the CUSO honored us with his participation, as well as the coordinator of PSLS for the Faculty of sciences.

The CILS was held in 2020, despite an initial selection of 26 applications, only 11 people actually started the course, and 10 completed it - obviously the conditions were very particular.

The rule of a minimum of 6 doctoral students enrolled for a CUSO-funded course to take place (valid as from 01.01.2020) was communicated to all our external speakers, and all of them were willing to postpone their course if necessary in order to reach this quota.

The Doctoral Program Commission held a meeting on December 9th, with a new composition, requested by the new Présidence de la section, and also due to the sudden death of one of our colleagues who passed away in May 2020.

The PhD students also attended the specialized seminars ("conférences spécialisées") proposed within the PhD program; 7 seminars were given remotely by international researchers from academia and industry, for a total of 14 teaching hours. A total of 23 participants attended these lectures including 10 PhD students.

Table 1
List of courses organized within the PhD Program in Pharmaceutical Sciences 2020 and number of participants

Name of course 2020	Course No.	Course Organizer	Total no. of hours	Credits	No. of PhD students (total no. of attendees)
Pharmacie hospitalière et communautaire 1	19H003	P. Bonnabry	18	3	9 (26)
Pharmacie hospitalière et communautaire 2	19H012	F. Sadeghipour	18	3	4 (24)
Pharmacie hospitalière et communautaire 3	19H015	J. Beney	18	3	5 (total?)
Design drugs with a computer	19H053	A. Daina, V. Zoete	16	2	POSTPONED TO 2021
Introduction to pharmaceutical industry: History, structures and Challenges	19H017	B. Baumeister	30	5	6 (+ 9 CILS students)
Formulation of protein biopharmaceuticals and drug delivery	19H013	T. Arvinte	20	5	8
Drug discovery: an industrial perspective	19H063	M. Prunotto	18	3	10 (+ 9 CILS students)
Biostatistics in drug development and clinical trials design	19H055	D. Warne, F. Curtin	24	4	3 (+ 9 CILS students)
Use of fluorescence spectroscopy in the study of drugs, protein and membrane	19H032	T. Arvinte	16	3	7 (31)
Therapeutic Drug Monitoring and its Application in Diagnostics and Clinical Research	19H045	L. Decosterd	6	1	Postponed to 2021
Initiation aux méthodes d'analyse multivariées en sciences pharmaceutiques	19H046	S. Rudaz, J. Boccard	12	3	CANCELLED
Techniques de chromatographie préparative : isolement de produits naturels et de composés synthétiques	19H037	E. Ferreira-Queiroz	20	3	CANCELLED
Caractérisation structurale de produits naturels	19H006	J.-L. Wolfender	12	2	CANCELLED
Microscopy and imaging course	14B063P	C. Bauer	32	3	1

Library PhD Camp: from Research to Publication	19H064	A. Bellier, V. Huber	8	1	3
Therapeutic Drug Monitoring and its Application in Diagnostics and Clinical Research	19H045	L. Decosterd	6	1	POSTPONED TO 2021
Drug development: regulatory aspects and clinical trials	19H009	S. Latour, A. Mc Allister, A. Naik	24	4	8 (+ 9 CILS students) + 8 MSc students
Ethics in research	19H092	D. Sprumont	24	2.5	7 (+ 9 CILS students)
Biotechnology development	19H070	Various speakers from NovImmune	20	3	6 (+ 9 CILS students)
Personal genomics & predictive genetics	19H069	D. Kraus, G. Tanackovic; T. Abbas-Terki	10	1.5	7 (+ 9 CILS students)
Aperçu de la pharmacovigilance pré et post-marketing	19H068	V. Rollason	16	1.5	POSTPONED TO 2021
Suivi thérapeutique des médicaments en pratique clinique	19H059	N. Widmer	8	1.5	11
Les agents anticancéreux : manipulation et aspects analytiques	19H061	S. Fleury-Souverain, D. Guillarme	10	1.5	CANCELLED
Pharmaceutical regulatory affairs : an introduction	19H088	G. Sbihi-Bouvier, P. Humbert-Droz	20	3	7
Spectrométrie de masse + exercices	1506BCR + 1506BEX	G. Hopfgartner	20	4	0
Electrophorèse capillaire	19H016	S. Rudaz	12	2	CANCELLED
Biobusiness	19H085	P. Nowak-Sliwinska	12	2	CANCELLED
Hot topics in immunology and immunopharmacology	19H077	C. Bourquin, O. Hartley	28	1 for every 6 hrs	6
Immunology from A to Z Part 1: basic immunology	19H083	C. Bourquin, V. Puddinu	26	4	CANCELLED
Immunology from A to Z Part 2: advanced immunology	19H084	C. Bourquin, V. Puddinu	18	3	CANCELLED

Combination therapies for cancer and personalized medicine	19H080	P. Nowak-Sliwinska	6	1	Postponed to 2021, due to sanitary situation
Theory into practice: creating a successful business in Life Sciences	19H072	J. Camblong	10	1.5	CANCELLED, due to sanitary situation
Quality By Design (QBD) to ensure product quality and operational excellence (Lean 6 Sigma)	19H065	F.-X. Abellan, J. Boccadoro	20	3	5 (+ 9 CILS students), partially cancelled
Pharmaceutical project and portfolio management	19H075	A. Poulet	6	1	5 (+ 9 CILS students)
Pre-clinical in vivo models	19H073	F. Chadaud-Barandun	20	4	0 (+ 11 CILS students)
Assurance Qualité en sciences pharmaceutiques (AQ) : comment implanter les bonnes pratiques industrielles dans un milieu hospitalier?	19H004	S. Campione	8	2	CANCELLED
Patenting procedures in life sciences and intellectual property	19H018	K. Houchangpour, D. Kraus, L. Miéville, P. Weibel	24	4	8 (+ 9 CILS students)
Challenges in clinical oncology	19H094	C. Bourquin, P. Nowak-Sliwinska, I. Labidi-Galy	12	2	15
Validation de méthodes analytiques	19H034	S. Rudaz	28	4	CANCELLED
Métabolisme des médicaments et interactions médicamenteuses : extrapolation in vitro-in vivo	19H060	Y. Daali	12	1.5	CANCELLED
Pratique des plans d'expérience	19H022	S. Rudaz	16	3	CANCELLED
Structural bioinformatics	19H028	L. Scapozza	30	5	CANCELLED
Production stérile: méthodes et environnement	19H044	F. Sadeghipour	9	1.5	CANCELLED
TOTAL	44		723		141 PhD 168 others

Table 2
List of symposia organized within the PhD Program in Pharmaceutical Sciences 2020 and number of participants.

Name of course 2020	# Course no.	Course organizer	Total no. of hours	Credits	# No. of participants
PhD Day	19H020	Y. Kalia	8	1 or 2	Postponed to 2021, due to sanitary situation
Conférences sur sujets spécialisés		Y. Kalia	4 days (14 hrs)	1,5 for 5 conf.	10 PhD students (23 total)
33rd « extra-muros » meeting, (“New paradigms in natural product drug discovery: Bedside to bench to bedside”)	19H025	M. Cuendet, J.-L. Wolfender, E. Ferreira-Queiroz, P. Christen	4 days (24 hrs)	1 or 2	Postponed to 2021, due to sanitary situation

Table 3
List of networking activities organized within the PhD Program in Pharmaceutical Sciences 2020 and number of participants.

Name of course 2020	Course no.	Course organizer	Total no. of hours	Credits	No. of PhD students
Boost your career! How to network at a scientific meeting	19H078	C. Bourquin	4	0.5	Postponed to 2021, due to sanitary situation
Votre programme doctoral se présente : general information session on the PhD in pharmaceutical sciences	19H093	Y. Kalia, B. Kaufmann	2	N/A	19
2nd Forum the PhD School of Life Sciences		PSLS			Postponed to 2021, due to sanitary situation
L’industrie pharmaceutique se présente *	19H050	Y. Kalia	6	1	Postponed to 2021, due to sanitary situation
Career day **	19H007	Y. Kalia	7	1	Postponed to 2021, due to sanitary situation

*to be reorganized next year

**the career day of the Faculté des Sciences was proposed to the PhD students, but the University of Geneva cancelled it, due to sanitary situation.

Public research funds (CUSO)

Conférence Universitaire de Suisse Occidentale (CUSO)

The CUSO announced a 2020 budget similar to the 2019 budget. The program and the budget for 2020 were submitted to the CUSO in Sep 2019 and they were duly accepted. The total budget in 2020 for the five activities (Seminar Extra-Muros, Conférences spécialisées, Cours, Symposia as well as Networking activities) was CHF 65'500. One activity was rescheduled in 2020, along with its budget (CHF 80). Therefore, the total amount of money virtually offered by the CUSO was CHF 65'580.

In 2020, we took advantage of the financing of activities common with the CILS by the Faculty of Sciences (although the final number of CILS students did not so largely exceed the PhD students attending those courses, as could have been expected from previous years).

The COVID-19 sanitary situation did not allow us to hold all scheduled activities, and some of them, involving networking interactions had to be postponed to 2021, along with their budgets (for a total amount of CHF 24'170).

At the end, the effective costs for 2020 for all the activities were CHF 29'559.60.

We would like to thank all our external lecturers for their flexibility and their willingness to find solutions to keep almost all the essential courses given remotely, and hope that this sanitary emergency will give place to more normal days.

We also take the opportunity in this report to thank the CUSO for the past and future financial support allowing us to offer an outstanding program to the PhD students in Pharmaceutical Sciences.