ANNUAL REPORT 2019

SCHOOL OF PHARMACEUTICAL SCIENCES

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DIRECTION AND ADMINISTRATION

BOARD MEMBERS

Prof Eric Allémann, president
Prof Chantal Csajka, vice president
Prof Yogeshvar Kalia, vice president

ADMINISTRATION

Mrs Annick de Morsier, administrator (until 31.12.2019), 100%
Mrs Françoise Védy, administrator (as of 01.11.2019), 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, 80%, 90% since 01.10.19
Mrs Elisa Masson, secretary, 80%
Mrs Miroslava Rebetez, secretary, 50%

IT STAFF

Mr Loris Franco, system administrator, 100%
Mr Yann Manet, system administrator, 100%
Mr Xavier Melich, helpdesk support, 25%

DOCTORAL PROGRAM

Dr Beatrice Kaufmann, coordinator, 15%
Mrs Florence Von Ow, secretary, 20%

ABBREVIATIONS

PO	*Full Professor*
PAS	*Associate Professor*
PAST	*Assistant Professor*
PT	*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

BIOPHARMACEUTICS

Prof Gerrit BORCHARD, PO
Dr Olivier JORDAN, MER

IMMUNOPHARMACOLOGY OF CANCER

Prof Carole BOURQUIN, PO

ANALYTICAL SCIENCES

Prof Jean-Luc VEUTHEY, PO
Prof Serge RUDAZ, PAS
Dr Davy GUILLARME, CC
Dr Julien BOCCARD, CE

PHARMACEUTICAL BIOCHEMISTRY

Prof Leonardo SCAPOZZA, PO
Prof Yogeshvar KALIA, PAS
Dr Remo PEROZZO, MER *(until 08.08.2019)*

PHARMACEUTICAL TECHNOLOGY

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

PHARMACOGNOSY

Prof Muriel CUENDET, PAS
Dr Philippe CHRISTEN, MER

PHYTOCHEMISTRY & BIOACTIVE NATURAL PRODUCTS

Prof Jean-Luc WOLFENDER, PO
Dr Emerson F.-QUEIROZ, MER
Dr Elisabeth RIVARA-MINTEN, CE

COMMUNITY PHARMACY

Prof Olivier BUGNON, PAS
Dr Jérôme BERGER, CE

CLINICAL PHARMACY SCIENCES

Prof Chantal CSAJKA, PAS
Dr Alice PANCHAUD, CS

CLINICAL PHARMACOLOGY

Prof Jules DESMEULES, PO

HOSPITAL PHARMACY

Prof Pascal BONNABRY, PAS
Prof Farshid SADEGHIPOUR, PT

MOLECULAR PHARMACOLOGY

Prof Patrycja NOWAK-SLIWINSKA, PAST

MEDICATION ADHERENCE AND INTERPROFESSIONALITY

Prof Marie-Paule SCHNEIDER, PT

DATA ANAYTICS LAB

Prof Stéphane GUERRIER, PAST

SCHOOL OF PHARMACEUTICAL SCIENCES COMMITTEE SITUATION ON JANUARY 1st, 2019

TEACHING COMMITTEE – President: Prof Jean-Luc Veuthey

REGULATIONS AND EQUIVALENCE COMMITTEE – President: Prof Muriel Cuendet

GRADES, EXAMINATIONS AND DEROGATIONS COMMITTEE – President: Prof Eric Allémann

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

IT COMMITTEE – President: Prof Norbert Lange

SECURITY AND PREMISES COMMITTEE – President: Prof Eric Allémann

2028 HORIZON COMMITTEE – President: Prof Chantal Csajka

GLOBAL PHARMACY COMMITTEE – President: Prof Pascal Bonnabry

MASS SPECTROMETRY COMMITTEE – President: Prof Yogeshvar Kalia

PRACTICAL WORK COMMITTEE – President: Florence Delie

STAFF

PROFESSORS

Eric ALLÉMANN, 100%
Tudor ARVINTE, 10%
Pascal BONNABRY, 15% (+HUG)
Gerrit BORCHARD, 100%
Carole BOURQUIN, 80% (+20% APSIC)
Olivier BUGNON, 50% (+Unisanté)
Chantal CSAJKA, 50% (+UNIL)
Muriel CUENDET, 100%
Jules DESMEULES (payed by Faculty of Medicine)
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%

SENIOR LECTURERS

Philippe CHRISTEN, 100%
Florence DELIE-SALMON, 100%
Chin Bin EAP, 10% (+ Associate Professor at UNIL)
Emerson FERREIRA QUEIROZ, 100%
Davy GUILLARME, 100%
Olivier JORDAN, 100%
Philippe LAURENT, 100%
Alain MERKLI, 10%
Remo PEROZZO, 100% (until 08.08.19)
Emmanuel VARESIO, 50% (+50% Faculty of Sciences)

INVITED RESEARCHERS

Jean-Paul DZOYEM (until 28.02.2019)
Thomas GURRY (until 31.08.2019)
Yayoi KAWANO (26.03.19 to 31.07.19)
Damien OLIVIER (01.03.19 to 31.08.19)
Lia TSIKLAURI (01.08.19 to 31.01.20)

LECTURERS

Jérôme BERGER, 20% (+Unisanté)
Martin BERNHARDT, 10%
Julien BOCCARD, 20% (+80% Senior research associates)
Pascal FURRER, 100%
Karl PERRON, 40% (+ 60% BIVEG)
Christian KOLLER, 10%
Elisabeth RIVARA-MINTEN, 40%

PRIVAT DOCENTS

Johnny BENEY
Youssef DAALI (+ 20% Faculty of Medicine)
Sandrine FLEURY SOUVERAIN
Remo PEROZZO (until 08.08.19)
Marco PRUNOTTO (since 01.04.19)
Pierre VOIROL
Nicolas WIDMER

SENIOR RESEARCH ASSOCIATES

Yvonne ARNOLD, 80%
Julien BOCCARD, 80%
Livia BRUNNER, 50% (since 01.08.19)
Sylvian CRETTON, 100%
Olivier DORCHIES, 100%
Szabolcs FEKETE, 100%
Amparo GARCIA LOPEZ, 15%
Victor GONZALEZ RUIZ, 100%
Thomas GURRY, 100 % (since 01.09.2019)
Beatrice KAUFMANN, 55 % (+15% Faculty)
Laurence NEFF, 80%
Alice PANCHAUD-MONNAT, 50%
Domitille SCHVARTZ, 20%
Magali ZEISSER-LABOUEBE, 80%

SENIOR RESEARCH AND TEACHING ASSISTANTS

Pierre-Marie ALLARD, 100%
Andrej BABIC, 100% (until 31.10.19)
Hesham HAMED, 100%
Aurélien POMMIER, 100%
Sebastien TARDY, 100%
Elena TOBOLKINA, 100%
Narasimha UDA, 100%

POSTDOCTORAL SCHOLARS

Antonio AZZOLLINI, 85% (until 31.01.2019)
Ali BAKIRI, 100%, 90% since May
Ester BOIX GARRIGA, 90% (until 31.03.2029)
Jordan BOUILLOUX, 100% (until 31.05.2019)
Santiago CODESIDO SANCHEZ, 100%

Valentina D'ATRI, 100%
Assane Elhadji DIOP, 50% (until 30.06.2019)
Isabel FERNANDEZ COIRA, 100% (since 01.10.2019)
Yoric GAGNEBIN, 100% (since May 2019)
Alexandre GOYON, 100% (01.03-31.05.2019)
Nicolas GUICHARD, 90% (01.10-31.12.2019)
Somnath KANDEKAR, 85% (until 30.06.2019)
Malgorzata KUCINSKA, 100% (until 31.01.2019)
Maria LAPTEVA, 85%
Gioia LENZONI, 100%
Patricia QUINTANA BARCENA, 60%, 100% April - July
Eulalia OLESTI MUNOZ, 100% (since 01.02.2019)
Viorica PATRULEA, 100%
Viola PUDDINU, 85%
Ragupathy SAKTHIKUMAR, 85% (since 01.04.2019)
Martha SIERRA ARREGUI, 100% (Marie Curie)
Islem YOUNES, 50%, 100% since April
Stefan ZWEIFEL, 100% (since 01.04.2019)

RESEARCH AND TEACHING ASSISTANTS

Kenza ABOUIR
Souad ADRIOUACH
Adlin AFZAN
Abdulelah ALFATTANI
Carole BANDIERA
Cintìa BAPTISTA MARQUES
Beatriz BASTOS SOARES DOS SANTOS
Noura BAWAB
Clare BECHET
William BELLO
Aline BOURDIN
Théo BRILLATZ
Christel BRUGGMANN
Joël BRUNNER
Benjamin BUGNON
Evelina CARDOSO
Damien CATEAU
Anne CAYRON
Carlotta CECCHINI
Jennifer CELIO
Aditya DARADE
Carlota DE LACERDA SALGADO
Marianne DOR
Vito DOZIO
Eloïse DUCREY
Bastiaan DUIVELSHOF
Eloïse DUPUYCHAFFRAY
Radhia EL PHIL
Akram FARHAT
Micaela FARIA FREITAS
Jonathan FARO BARROS
Sabrina FERRE
Angelica FERRO
Audrey FLORNOY
Yoric GAGNEBIN
Arnaud GARCIA
Alexandra GARNIER
Frédéric GASPAR
Arnaud GAUDRY
Elinam GAYI
Laura GONZALEZ IGLESIAS
Si GOU
Alexandre GOYON
Ghali GUEDIRA
Nicolas GUICHARD
Dina HANY
Sébastien HEVIN
Sandra HOCEVAR
Joëlle HOURIET
Robin HUBER
Mégane JERMINI
Martin KIENING
Marko KRSTIC
Céline LEMOINE
Camille LENOIR
Angela LISIBACH
Sophie LONCHAMPT
Luca Gioacchino LOSACCO
Gaëlle MAGLIOCCO
Alice MAINETTI
Blanca MARIN BOSCH
Franck MARQUET
Josep MASSANA-CODINA
Tamara MELNIK
Stéphanie MENA
Yves MICHIELS
Hugo MORIN
Amarande MURISIER
Aline MUTABAZI
Ivana NOVAKOVIC
Lucie OBERHAUSER
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
Davide RIGHI
Rafael RINCON
Thomas RUDOLF VON ROHR
Adriano RUTZ
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
Betül TASKOPARAN
Francesca TESSARO
Vasundhara TYAGI
Gioele VISCONTI
Vassily VOROBIEV
Tatjana VUJIC
Julia WAGNER
Chantal WALTER
Wenyuan XIONG
Marloes ZOETEMELK

RESEARCH ASSISTANTS (ARE)

Anne-Laure CIANTAR
Killian CURRAN
Albin DEDA
Léa GERARD
Feliha IDIR
Giuseppina LONDINO
Aurélie MARMY
Nikola NOWOTARSKA
Camille PACCARD
Antoine SANDOZ
Laetitia TERNON
Sandrine VERISSIMO
Sara WERLEN

INTERNSHIP STUDENTS / VISITING SCHOLARS

Mathieu AGOSTINI (March - May / July 2019)
Chinedu ANOKWURU (August - December 2019)
Mohsen BAGHERA
Julien CAMPERI (February 2019)
Solène CHALEAT (June - July 2019)
Rachid CHAWECH (June 2019)
Ilaria COCCHIARARO (February - June 2019)
Geanne CONSERVA (April 2019)
Riccardo DEIDDA (September - December 2019)
Evelin FARSANG (September - December 2019)
Noëlla GROSSI (July - September 2019)
Harry HAGEN (September - October 2019)
Erika LAZZARIN (February -June 2019)
Hao LIN (March 2019)
Stefan LOOS (February - April 2019)
Fabian MAYR (February - April 2019)
Alya MAZAT (November 2019)
Lucie NOWAKOVA (July - August 2019)
Nicolas ONATE (June 2019)
Katerina PLACHKA (September - December 2019)
Pauline PRADAL (February - August 2019)

Eva PRIAN (June 2019)
Andrei ROTARI (February - June 2019)
Luiz SALDANHA (May - November 2019)
Bianka SIEWERT (February - March 2019)

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

Solène MASLOH
Federico PONZETTO

ADMINISTRATIVE STAFF

Nathalie CHIAVAROLI, 50%
Danielle COOSEMANS, 60%
Annick de MORSIER, 100%(until 31.12.2019)
Marilyn FREIRE BARJA ZLASSI, 80%
Nathalie GOFFIN, 80%
Dominique HUNZIKER, 80%
Elisa MASSON, 80%
Elena ONATE, 80% (90% since 01.10.2019)
Sylvia PASSAQUAY-RION, 50%
Miroslava REBETEZ-GRALEWICZ, 50% (auxiliary)
Natalie SCHREGLE, 80%
Marie SOTTAS (temporary), 40%
Françoise VÉDY, 100% (since 01.11.2019)
Florence VON OW, 90% (20% progdoc + 50% Research unit secretary +20% secretary for the Faculty)
Anne-Françoise WITTA, 50%

IT STAFF

Loris FRANCO, 100%
Yann MANET, 100%
Xavier MELICH, 25%

TECHNICAL STAFF

Montserrat ALVAREZ, 90% (100% since April 2019)
Said BENOHOUD, 50%
Frédéric BORLAT, 100%
Nathalie BOULENS, 60%
Carole DUPRAZ, 35%
Christophe FRANCEY, 100%
Sarah GARDI, 100%
Aurélie GOUILLER, 80%
Tayeb JBILOU, 80%
Sara LEONI, 20% (since October 2019)
Laurence MARCOURT, 100%
Aristea MASSARAS, 100%
Xavier MELICH, 100% (incl. 25% helpdesk support)
Hélène MOTTAZ, 50%
Jessica ORTELLI, 90%
Marco PERDIGAO, 100%
Olivier PETERMANN, 80%
Barbara PINHEIRO, 70% (40% since March 2019)
Colette SAUTY, 50%
Cédric SCHELLING, 100%
Emmanuelle SUBLET, 20%

BUDGET

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

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

EXTERNAL FUNDS (CHF)	2019
Research funds (SNSF and others)	5 929 762
Service agreements and related activities	1 201 419
Total	**7 131 181**

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

TOTAL BUDGET (CHF)	2019	2018	2017	2016
Total	**20 664 440**	**18 033 730**	**18 897 002**	**18 601 979**

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

PARTICIPATION OF ETAT DE VAUD (CHF)	2019	2018	2017	2016
Total contribution	2 625 807 (*)	5 026 985	4 987 368	5 004 976
(*) La convention étant arrivée à échéance le 8 juillet 2019, la subvention 2019 est calculée au prorata sur 189 jours.				

2019 AT A GLANCE

2019 TOTAL BUDGET (CHF)	20 664 440

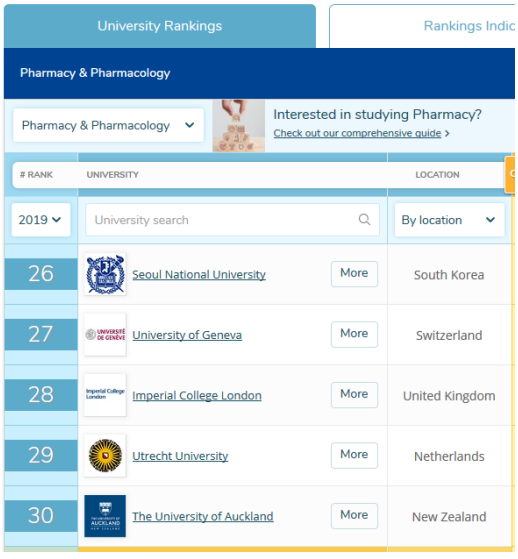
TOTAL STUDENTS	2019	2018	2017	2016
Bachelor	352	339	309	287
Master	170	152	152	159
Master of advanced studies	20	20	19	19
Total	**542**	**511**	**480**	**465**

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

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

2019 KEY EVENTS

- Classification (ranking) by domains of QS World University



Our School of Pharmaceutical Sciences obtained an excellent ranking of 27 according to QS World University Rankings by Subject.
This ranking identifies the world's strongest universities in 51 individual subject areas. 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.

- Agency of Accreditation and Quality Assurance ('AAQ') re-accreditation

The School of Pharmaceutical Sciences has successfully passed the AAQ re-accreditation process.

The Agency of Accreditation and Quality Assurance safeguards and promotes the quality of teaching and research at universities in Switzerland. It is independent and uses internationally recognised methods. The AAQ develops guidelines and quality standards, conducts accreditation and evaluation procedures, and works at an international level.

- New professor (PAST) Stéphane Guerrier

The Prof. Stéphane Guerrier started in 2019 as the lead of the Data Analytics Lab, which aims at contributing to the development of new methodologies for data analysis and decision-making. Specifics research fields are computational statistics and simulation methods, life sciences analytics as well as machine learning.

ANALYTICAL SCIENCES

Professor Serge Rudaz

Professor Jean-Luc Veuthey

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 and biopharmaceutical compounds. 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 environmentally friendly analytical techniques (green chemistry).

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

2019 at a glance

- Publications with impact factor : 40
- Publications without impact factor : 6
- Patents : 0
- Book and chapters : 0
- Congresses / conferences organisation : 8
- Posters presentations : 17
- Oral presentations : 43
- Invited oral presentations : 25
- Number of projects at FNRS and assimilated (Research funds) : 6
- Service agreements and related activities : 2
- Ph.D. Theses presented in 2019 : 4

- Awards and distinctions: 6
- Public outreach activities : 0
- Research funds

FNRS
Steroidomics, an innovative metabolomic approach to extend the steroid profile monitoring in human
Main applicant: Serge Rudaz
Total funding of the project: CHF 525'000.-
Total duration of the project: 3 years
Allocation 2019: CHF 150'000. –
Starting date: 11.01.2017

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 2019: CHF 44'000.-
Starting date: 01.10.2019

SCAHT

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 2019: CHF 207'783.-

Starting date: 01.01.2017

University of Lausanne
Tramadol
Main applicant: Serge Rudaz
Total funding of the project: CHF 50'000.-
Total duration of the project: 5 months
Allocation 2019: CHF 50'000.-
Starting date: 01.12.2018

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 2019: $ 50'000. - (CHF 48'200.-)
Starting date: 01.05.2019

Nestlé
Evaluation of SFC for the characterization of natural products.

Main applicant: Jean-Luc Veuthey

Total funding of the project: CHF 716'902.99

Total duration of the project: 6 years (end 31.05.2021)

Allocation 2019: CHF 215'000

Starting date: 01.10.2014

Total amount for all research funds for 2019: CHF 714'983.-

Service agreements and related activities

Bracco Suisse S.A.
Service
CHF 15'000.-

Swiss anti-doping laboratory
Service
CHF 15'000.-

Total amount (for all service agreements and related activities) for 2019: CHF 30'000.-

Scientific publications (with impact factor)

Ferre, S.; Gonzalez-Ruiz, V.; Guillarme, D.; Rudaz, S., Analytical strategies for the determination of amino acids: Past, present and future trends. J Chromatogr B Analyt Technol Biomed Life Sci 2019, 1132, 121819. *2.813*

Diop, E. H. A.; Queiroz, E. F.; Marcourt, L.; Kicka, S.; Rudaz, S.; Diop, T.; Soldati, T.; Wolfender, J. L., Antimycobacterial activity in a single-cell infection assay of ellagitannins from Combretum aculeatum and their bioavailable metabolites. J Ethnopharmacol 2019, 238, 111832. *3.414*

Codesido, S.; Rudaz, S.; Guillarme, D.; Horvath, K.; Fekete, S., Apparent efficiency of serially coupled columns in gradient elution liquid chromatography: Extension to the combination of any column formats. J Chromatogr A 2019, 1588, 159-162. *3.858*

Guillarme, D.; Hage, D. S., Characterization of charge variants for antibody-based biopharmaceuticals by mass spectrometry. J Chromatogr B Analyt Technol Biomed Life Sci 2019, 1134-1135, 121879. *2.813*

Aquino, N.; Queiroz, E.; Marcourt, L.; Freitas, L.; Araújo, E.; Leal, L.; Bezerra, A.; Boccard, J.; Wolfender, J.-L.; Silveira, E., Chemical Composition and Anti-Inflammatory Activity of the Decoction from Leaves of a Cultivated Specimen of Myracrodruon urundeuva. Journal of the Brazilian Chemical Society 2019, 30 (8), 1616-1623. 1.335

Pezzatti, J.; Berge, M.; Boccard, J.; Codesido, S.; Gagnebin, Y.; H., V. P.; Gonzalez-Ruiz, V.; Rudaz, S., Choosing an Optimal Sample Preparation in Caulobacter crescentus for Untargeted Metabolomics Approaches. Metabolites 2019, 9 (10), 193. *3.303*

Guichard, N.; Fekete, S.; Guillarme, D.; Bonnabry, P.; Fleury-Souverain, S., Computer-assisted UHPLC-MS method development and optimization for the determination of 24 antineoplastic drugs used in hospital pharmacy. J Pharm Biomed Anal 2019, 164, 395 *2.983*

Beck, A.; D'Atri, V.; Ehkirch, A.; Fekete, S.; Hernandez-Alba, O.; Gahoual, R.; Leize-Wagner, E.; Francois, Y.; Guillarme, D.; Cianferani, S., Cutting-edge multi-level analytical and structural characterization of antibody-drug conjugates: present and future. Expert Rev Proteomics 2019, 16 (4), 337-362. *2.963*

Codesido, S.; Randazzo, G. M.; Lehmann, F.; Gonzalez-Ruiz, V.; Garcia, A.; Xenarios, I.; Liechti, R.; Bridge, A.; Boccard, J.; Rudaz, S., DynaStI: A Dynamic Retention Time Database for Steroidomics. Metabolites 2019, 9 (5), 85. 3.303

Drouin, N.; Kubáň, P.; Rudaz, S.; Pedersen-Bjergaard, S.; Schappler, J., Electromembrane extraction: Overview of the last decade. TrAC Trends in Analytical Chemistry 2019, 113, 357-363. *8.428*

Regalado, E. L.; Haidar Ahmad, I. A.; Bennett, R.; D'Atri, V.; Makarov, A. A.; Humphrey, G. R.; Mangion, I.; Guillarme, D., The Emergence of Universal Chromatographic Methods in the Research and Development of New Drug Substances. Acc Chem Res 2019, 52 (7), 1990-2002. *21.661*

Duivelshof, B. L.; Fekete, S.; Guillarme, D.; D'Atri, V., A generic workflow for the characterization of therapeutic monoclonal antibodies-application to daratumumab. Anal Bioanal Chem 2019, 411 (19), 4615-4627. *3.286*

Duivelshof, B. L.; Jiskoot, W.; Beck, A.; Veuthey, J. L.; Guillarme, D.; D'Atri, V., Glycosylation of biosimilars: Recent advances in analytical characterization and clinical implications. Anal Chim Acta 2019, 1089, 1-18. *5.256*

Codesido, S.; Rudaz, S.; Veuthey, J. L.; Guillarme, D.; Desmet, G.; Fekete, S., Impact of particle size gradients on the apparent efficiency of chromatographic columns. J Chromatogr A 2019, 1603, 208 215. *3.858*

Sandstrom, J.; Kratschmar, D. V.; Broyer, A.; Poirot, O.; Marbet, P.; Chantong, B.; Zufferey, F.; Dos Santos, T.; Boccard, J.; Chrast, R.; Odermatt, A.; Monnet-Tschudi, F., In vitro models to study insulin and glucocorticoids modulation of trimethyltin (TMT)-induced neuroinflammation and neurodegeneration, and in vivo validation in db/db mice. Arch Toxicol 2019, 93 (6), 1649-1664. 5.741

Gonzalez-Ruiz, V.; Schvartz, D.; Sandstrom, J.; Pezzatti, J.; Jeanneret, F.; Tonoli, D.; Boccard, J.; Monnet-Tschudi, F.; Sanchez, J. C.; Rudaz, S., An Integrative Multi-Omics Workflow to Address Multifactorial Toxicology Experiments. Metabolites 2019, 9 (4). *3.303*

D'Atri, V.; Pell, R.; Clarke, A.; Guillarme, D.; Fekete, S., Is hydrophobic interaction chromatography the most suitable technique to characterize site-specific antibody-drug conjugates? J Chromatogr A 2019, 1586, 149-153. *3.858*

Marsousi, N.; Rudaz, S.; Desmeules, J. A.; Daali, Y., Liquid Chromatography-Tandem Mass Spectrometry Method for Ticagrelor and its Active Metabolite Determination in Human Plasma: Application to a Pharmacokinetic Study. Current Analytical Chemistry 2019, 15. *1.242*

Farsang, E.; Murisier, A.; Horváth, K.; Colas, O.; Beck, A.; Guillarme, D.; Fekete, S., Optimization of MS-Compatible Mobile Phases for IEX Separation of Monoclonal Antibodies. LC GC Europe 2019, 32, 29-34. *0.972*

Farsang, E.; Murisier, A.; Horváth, K.; Colas, O.; Beck, A.; Guillarme, D.; Fekete, S., Optimization of MS-Compatible Mobile Phases for IEX Separation of Monoclonal Antibodies. LC-GC North America 2019, 37 (s6), 34-38. *0.424*

D'Atri, V.; Novakova, L.; Fekete, S.; Stoll, D.; Lauber, M.; Beck, A.; Guillarme, D., Orthogonal Middle-up Approaches for Characterization of the Glycan Heterogeneity of Etanercept by Hydrophilic Interaction Chromatography Coupled to High-Resolution Mass Spectrometry. Anal Chem 2019, 91 (1), 873-880. *6.35*

Murisier, A.; Lauber, M.; Shiner, S. J.; Guillarme, D.; Fekete, S., Practical considerations on the particle size and permeability of ion-exchange columns applied to biopharmaceutical separations. J Chromatogr A 2019, 1604, 460487. *3.858*

Palaric, C.; Pilard, S.; Fontaine, J. X.; Boccard, J.; Mathiron, D.; Rigaud, S.; Cailleu, D.; Mesnard, F.; Gut, Y.; Renaud, T.; Petit, A.; Beaumal, J. Y.; Molinie, R., Processing of NMR and MS metabolomics data using chemometrics methods: a global tool for fungi biotransformation reactions monitoring. Metabolomics 2019, 15(8), 107. 3.167

Fekete, S.; Beck, A.; Veuthey, J. L.; Guillarme, D., Proof of Concept To Achieve Infinite Selectivity for the Chromatographic Separation of Therapeutic Proteins. Anal Chem 2019, 91 (20), 12954-12961. *6.35*

Schvartz, D.; Gonzalez-Ruiz, V.; Walter, N.; Antinori, P.; Jeanneret, F.; Tonoli, D.; Boccard, J.; Zurich, M. G.; Rudaz, S.; Monnet-Tschudi, F.; Sandstrom, J.; Sanchez, J. C., Protein pathway analysis to study development-dependent effects of acute and repeated trimethyltin (TMT) treatments in 3D rat brain cell cultures. Toxicol In Vitro 2019, 60, 281-292. *3.067*

Diop, E. A.; Jacquat, J.; Drouin, N.; Queiroz, E. F.; Wolfender, J. L.; Diop, T.; Schappler, J.; Rudaz, S., Quantitative CE analysis of punicalagin in Combretum aculeatum extracts traditionally used in Senegal for the treatment of tuberculosis. Electrophoresis 2019, 40 (21), 2820-2827. 2.754

D'Atri, V.; Fekete, S.; Clarke, A.; Veuthey, J. L.; Guillarme, D., Recent Advances in Chromatography for Pharmaceutical Analysis. Anal Chem 2019, 91 (1), 210-239. 6.35

Boccard, J.; Tonoli, D.; Strajhar, P.; Jeanneret, F.; Odermatt, A.; Rudaz, S., Removal of batch effects using stratified subsampling of metabolomic data for in vitro endocrine disruptors screening. Talanta 2019, 195, 77-86. 4.916

Pezzatti, J.; Gonzalez-Ruiz, V.; Codesido, S.; Gagnebin, Y.; Joshi, A.; Guillarme, D.; Schappler, J.; Picard, D.; Boccard, J.; Rudaz, S., A scoring approach for multi-platform acquisition in metabolomics. J Chromatogr A 2019, 1592, 47-54. 3.858

Ponzetto, F.; Boccard, J.; Nicoli, R.; Kuuranne, T.; Saugy, M.; Rudaz, S., Steroidomics for highlighting novel serum biomarkers of testosterone doping. Bioanalysis 2019, 11(12), 1169-1185. 2.321

Goyon, A.; Kim, M.; Dai, L.; Cornell, C.; Jacobson, F.; Guillarme, D.; Stella, C., Streamlined Characterization of an Antibody-Drug Conjugate by Two-Dimensional and Four-Dimensional Liquid Chromatography/Mass Spectrometry. Anal Chem 2019, 91 (23), 14896-14903. 6.35

Losacco, G. L.; Veuthey, J. L.; Guillarme, D., Supercritical fluid chromatography – Mass spectrometry: Recent evolution and current trends. TrAC Trends in Analytical Chemistry 2019, 118, 731-738. 8.428

Gagnebin, Y.; Pezzatti, J.; Lescuyer, P.; Boccard, J.; Ponte, B.; Rudaz, S., Toward a better understanding of chronic kidney disease with complementary chromatographic methods hyphenated with mass spectrometry for improved polar metabolome coverage. J Chromatogr B Analyt Technol Biomed Life Sci 2019, 1116, 9-18. 2.813

Neyroud, D.; Cheng, A. J.; Donnelly, C.; Bourdillon, N.; Gassner, A. L.; Geiser, L.; Rudaz, S.; Kayser, B.; Westerblad, H.; Place, N., Toxic doses of caffeine are needed to increase skeletal muscle contractility. Am J Physiol Cell Physiol 2019, 316 (2), C246-C251 3.553

Farsang, E.; Murisier, A.; Horvath, K.; Beck, A.; Kormany, R.; Guillarme, D.; Fekete, S., Tuning selectivity in cation-exchange chromatography applied for monoclonal antibody separations, part 1: Alternative mobile phases and fine tuning of the separation. J Pharm Biomed Anal 2019, 168, 138-147. 2.983

Murisier, A.; Farsang, E.; Horvath, K.; Lauber, M.; Beck, A.; Guillarme, D.; Fekete, S., Tuning selectivity in cation-exchange chromatography applied for monoclonal antibody separations, part 2: Evaluation of recent stationary phases. J Pharm Biomed Anal 2019, 172, 320-328. 2.983

Queiroz, E. F.; Alfattani, A.; Afzan, A.; Marcourt, L.; Guillarme, D.; Wolfender, J. L., Utility of dry load injection for an efficient natural products isolation at the semi-preparative chromatographic scale. J Chromatogr A 2019, 1598, 85-91. *3.858*

Camperi, J.; Schick, A. J.; Guillarme, D.; Wecksler, A. T., Utilizing Multidimensional LC–MS for Hydroxyl Radical Footprinting Analysis. LC GC North America 2019, 37 (s11), 36-39. *0.424*

Guichard, N.; Rudaz, S.; Bonnabry, P.; Fleury-Souverain, S., Validation and uncertainty estimation for trace amounts determination of 25 drugs used in hospital chemotherapy compounding units. J Pharm Biomed Anal 2019, 172, 139-148. *2.983*

Guichard, N.; Boccard, J.; Rudaz, S.; Bonnabry, P.; Fleury Souverain, S., Wipe-sampling procedure optimisation for the determination of 23 antineoplastic drugs used in the hospital pharmacy. European Journal of Hospital Pharmacy 2019, 1-6. *0.275*

Scientific publications (without impact factor)

Guillarme, D., Multidimensional Liquid Chromatography Approaches for Characterization of Protein Biopharmaceuticals. LC GC Europe 2019, 32, 318-320.

Barbas, C.; Chankvetadze, B.; Furlanetto, S.; Haginaka, J.; Li, S.; Moaddel, R.; Veuthey, J. L., Editorial for Sergio and Sandor. J Pharm Biomed Anal 2019, 165, 410.

Fekete, S., A fehérje-kromatográfia alapvető problémái. Kromatografus 2019, 18-21.

Kormány, R.; Fekete, S., Az ultranagy-hatékonyságú folyadékkromatográfia határai. Magyar Kémiai Folyóirat 2019, 125 (3), 134-142.

Farsang, E.; Fekete, S.; Horváth, K., Tömegspektrométer- barát mozgófázis alkalmazása terápiás fehérjék ioncserés elválasztásához. Kromatográfus 2019, 24-27.

Beck, A.; Guillarme, D.; Fleury-Souverain, S.; Bodier-Montagutelli, E.; Respaud, R., Anticorps monoclonaux biosimilaires: Étude comparative des qualités analytique et fonctionnelle. Med Sci (Paris) 2019, 35 (12), 1146-1152.

Congresses / conferences and Symposia

- Congresses / conferences organisation : 8
- Posters presentations : 17
- Oral presentations : 43
- Invited oral presentations : 25

Ph.D. Theses presented in 2019

- Yoric Gagnebin
  New Analytical and Data Handling Strategies in Clinical Metabolomics: Application to Chronic Kidney Disease
  Serge Rudaz and Julien Boccard

- Alexandre Goyon
  Evaluation de méthodes chromatographiques et électrophorétiques pour la caractérisation de protéines thérapeutiques
  Jean-Luc Veuthey and Davy Guillarme

- Federico Ponzetto

- New Strategies for the Longitudinal monitoring of biological markers indicative of doping practices
  Serge Rudaz and Martial Saugy

- Nicolas Guichard
  Sécurisation de l'analyse des agents anticancéreux dans un contexte hospitalier et environnemental
  Serge Rudaz and Pascal Bonnabry

Awards and distinction

Desfontaine, V., **Ervin sz. Kováts Award for Young Scientists**. from the Hungarian Society of Separation Sciences and the Connecticut Separation Science Council (USA).

González-Ruiz, V. ; Pezzatti, J. ; Jeanneret, F. ; Tonoli, D. ; Sandström, J. ; Tschuddi-Monnet, F. ; Boccard, J. ; Rudaz, S. ; Getting more information from less samples: a new algorithm for analysis of omics data in multifactorial experimental designs, **Runner-up Best Oral Communication to Young Researcher MSB 2019.** MSB 2019, 25-27 March, 2019, Corvallis - Oregon (USA).

González-Ruiz, V., **Mario Martín Velamazán** prize to outstanding young researchers in pharmaceutical Sciences, CEU San Pablo University, Madrid (Spain).

Guillarme, D., **100 most influential people in analytical sciences**. Analytical Scientist, 2019, 2019, 81, 18-43.

Veuthey, J.L., **Csaba Horvath Memorial Award** from the Hungarian Society of Separation Sciences and the Connecticut Separation Science Council (USA).

Vorlet, O.; Roth. S.; Rohrbasser C.; Rudaz, S.; Bonnabry, P., Open source capillary electrophoresis device for quality control of medicine **Best Poster Award**. International Symposium on Electro- and Liquid Phase-separation Techniques (ITP) 2019, 2-5 September, 2019, Toulouse (France).

BIOPHARMACY

Professor Gerrit Borchard

General description of Unit

Biopharmaceutical sciences describe mechanisms at the interface of a drug or dosage form and the biological environment, typically the human body. This includes the quantitative description of drug absorption, distribution, metabolism and elimination (ADME) of drugs, as well as the pharmacokinetic/pharmacodynamic (PK/PD) and toxicity profiles of drugs. Based on these data, drug properties or those of the dosage form delivering the drug can be optimized in order to improve their performance and/or reduce toxicity. Classic examples are the use of excipients to increase drug solubility, or enable controlled/sustained drug release.

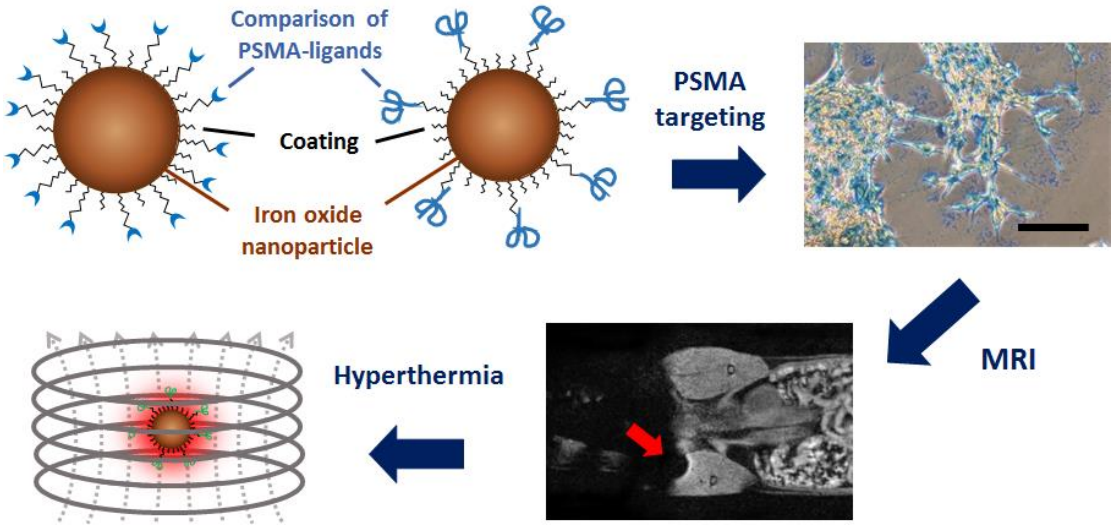
The application of nanotechnology to drug delivery has opened new avenues in terms of the targeted delivery of drugs. These so-called "nanomedicines" while complex in nature provide new possibilities to safer, more efficient, and in a personalized approach deliver drugs to the patient. Especially in the treatment of solid tumors, nano-sized systems such as liposomes and nanoparticles play a key role, as they are able to exploit unique properties of the tumor environment, resulting in passive targeting and thus a reduction in dose and unwanted side effects. In addition, these nanomedicines can be equipped with targeting moieties that address specific cell populations for selective tissue accumulation (active targeting). On the other hand, and in contrast to classical dosage forms, nanomedicines do interact with the immune system, which recognizes them to be foreign. As recognition is triggered by adsorption of plasma proteins (corona formation), the surface of these carriers needs to be engineered in order to delay immune recognition. Here again, insight into complex biological mechanisms is needed in order to optimise therapy using nanomedicines.

In this framework, the unit of Biopharmaceutical Sciences is developing and testing nanomedicines, focusing on cancer immunotherapy and preventive vaccination. While several projects - partially funded by SNF - are focusing on the delivery of advanced therapeutics such as siRNA and adjuvants (STING, TLR ligands) to enhance the immune response against neo-antigens and render anti-tumor therapy more effective, a more recent project is examining the surface properties of nanoparticles that determine interaction with plasma proteins. The ultimate goal is to engineer the particle surface such that a protein corona is formed that favors a directed distribution of the drug carriers (targeting). Another focus deals with the detection of early cancer metastases by means of MRI-visible nano-engineered probes, targeting cancer cells, which display PSMA prostate-specific membrane antigen.

In the field of preventive vaccines, we are developing delivery systems on the basis of polymeric particles and liposomes in collaboration with our partners in Switzerland, in Europe, in Indonesia and Thailand and funded by several agencies. Previously concentrating on H5N1 and Dengue fever vaccines, the corona virus pandemic has triggered a collaboration on the development and evaluation of mRNA and DNA SARS-CoV-2 vaccines between Chulalongkorn University Bangkok (Thailand) and our group.

Antimicrobial resistance threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria. In this context, we developed novel nanocarriers based on biopolymer conjugates of antimicrobial peptides. This collaborative project involves dendrimer peptide chemists at University of Bern and clinicians at the CHUV Burn Center. The conjugation strategy potentiates the antimicrobial effect, enabling a prolonged antibacterial action. With the help of an Innogap award, a patent was filed in the course of the year.

Pharmaceutical Sciences are essentially translational. Making use of our hands-on experience we are contributing to the translation of technological concepts of nanomedicines to products by interaction within the Translational Research Center for Oncohaematology (TRCOH) at the University of Geneva, regulatory authorities (FDA, EMA), the European Pharmacopoeia, as well as national (contactpointnano.ch) and international organisations (DIA). In this sense FABIO, and with it ISPSO, is well prepared to bring nanomedicines to the next level for the benefit of the patient.



Summary of the imaging approach for early metastases detection: IRM probes (SPIONs) labeled with PSMA-targeting aptamer binds LNCaP cancer cells, are visible under MRI and may generate heat for tumor treatment.

Specific research fields

- Nanomedicines
- Carrier systems for immuno-oncology
- Vector systems for preventive vaccines
- Strategies for epithelial drug absorption enhancement
- Polymeric systems for antibacterial wound dressings

2019 at a glance

- Publications with impact factor : 12
- Publications without impact factor : 0
- Patents : 2
- Book and chapters : 1
- Congresses / conferences organisation : 8
- Posters presentations : 15
- Oral presentations : 11
- Invited oral presentations : 12
- Number of projects at FNRS and assimilated (Research funds) : 6
- Service agreements and related activities : 3
- Ph.D. Theses presented in 2019 : 0
- Awards and distinctions: 5
- 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 2019: 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 2019: 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 2019: CHF 141'200.-
Starting date: 01.07.2019

CTI
Nanotox Polymeric NanobioMaterials for drug delivery: developing and implementation of safe-by-design concept enabling safe healthcare solutions
Main applicant: G. Borchard
Total funding of the project: CHF 129'504.-
Total duration of the project: 2 years
Allocation 2019: CHF 25'901.-
Starting date: 01.04.2017

MERCK
Evaluation of Merck polymers for development of a single-shot H5N1 influenza vaccine
Co-investigators: G. Borchard, N. Collin
Total funding of the project: CHF 47'410.-
Total duration of the project: 1 year
Allocation 2019: CHF 9'291.-
Starting date: 01.02.2018

THAI/VACC
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 2019: CHF 85'000.-
Starting date: 01.04.2018

Innogap Fund
Research
Total amount for 2019 CHF 30'000

Fonds A. Patry (SACAD)
Service
Total amount for 2019 CHF 14'000

Total amount for all research funds for 2019 (CHF): CHF 305'392.-

Service agreements and related activities

Merck
Research
Total amount for 2019 CHF 47'410

Total amount (for all service agreements and related activities) for 2019: CHF 47'410.-

Scientific publications (with impact factor)

Casalini, T.; Limongelli, V.; Schmutz, M.; Som, C.; Jordan, O.; Wick, P.; Borchard, G.; Perale, G., Molecular modeling for nanomaterials-biology interactions: opportunities, challenges and perspectives. Front. Bioengin. and Biotech. 2019, 7, 268. *5.12*

Di Francesco, T.; Sublet, E.; Borchard, G., Nanomedicines in clinical practice: Are intravenous iron sucrose ready-to-use solutions interchangeable? Eur J Pharm Sci 2019, 131, 69-74. *3.53*

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. 2019, 143:105180 *3.53*

Flühmann, B.; Ntai, I.; Borchard, G.; Gaspar, S.; Simoens, S.; Mühlebach, S., Nanomedicines: The magic bullets reaching their target? Eur J Pharm Sci 2019, 128, 73-80. *3.53*

Halamoda-Kenzaoui, B. ; Baconnier, S. ; Bastogne, T. ; Bazile, D. ; Boisseau, P. ; Borchard, G.; Borgos, S. E.; Calzolai, L.; Cederbrant, K.; Di Felice, G.; Di Francesco, T. ; Dobrovolskaia, M. A.; Gaspar, R.; Gracia, B.; Hackley, V. A.; Leyens, L.; Liptrott, N.; Park, M.; Patri, A.; Roebben, G.; Roesslein, M.; Thurmer, R.; Urban, P.; Zuang, V.; Bremer-Hoffmann, S., Bridging communities in the field of nanomedicine. Regul Toxicol Pharm 2019, 106, 187-196. *3.00*

Jesus, S.; Schmutz, M.; Som, C.; Borchard, G.; Wick, P.; Borges, O., Hazard assessment of polymeric nanobiomaterials for drug delivery: what can we learn from literature so far. Front Bioengin. and Biotech 2019, 7, 261. *5.12*

Martin-Malo, A.; Borchard, G.; Flühmann, B.; Mori, C.; Silverberg, D.; Jankowska, E. A., Differences between intravenous iron products: focus on treatment of iron deficiency in chronic heart failure patients. Esc Heart Fail 2019, 6 (2), 241-253. *3.41*

Do Amaral Montanheiro, T. L.; Montagna, L. S.; Patrulea, V.; Jordan, O.; Borchard, G.; Matheus Monteiro Lobato, G.; Catalani, L. H.; Lemes, A. P., Evaluation of cellulose nanocrystal addition on morphology, compression modulus and cytotoxicity of poly (3-hydroxybutyrate-co-3-hydroxyvalerate) scaffolds. J Mater Sci 2019, 54 (9), 7198-7210. *1.36*

Do Amaral Montanheiro, T. L.; Montagna, L. S.; Patrulea, V.; Jordan, O.; Borchard, G.; Ribas, R. G.; Campos, T. M. B.; Thim, G. P.; Lemes, A. P., Enhanced water uptake of PHBV scaffolds with functionalized cellulose nanocrystals. Polym Test 2019, 79, 106079. *2.94*

Patrulea, V.; Laurent-Applegate, L. A.; Ostafe, V.; Borchard, G.; Jordan, O., Polyelectrolyte nanocomplexes based on chitosan derivatives for wound healing application. Eur J Pharm Biopharm 2019, 140, 100-108. *4.71*

Trubitsyn, G.; Nguyen, V. N.; Di Tommaso, C.; Borchard, G.; Gurny, R.; Möller, M., Impact of covalently Nile Red and covalently Rhodamine labeled fluorescent polymer micelles for the improved imaging of the respective drug delivery system. Eur J Pharm Biopharm 2019, 142, 480-487. *4.71*

Serairi, R., Younes, I., Snoussi, M., Ksouri, R., Yahyaoui, K., Borchard, G., Frachet, V., Ksouri, W. Ethanolic extract of Tunisian propolis: chemical composition, antioxidant, antimicrobial and proapoptotic activity against bladder cancer cells. Journal of Apicultural Research, 1-11. *1.75*

Patents

Patrulea, V.; Jordan, O.; Borchard, G.; Gan, B.H.; Reymond, J.L., Antimicrobial tailored chitosan. European PCT 51747/EP 19172726.2, field 05.05.2019.

Ragupathy, S.; Borchard, G., Peptidic protein kinase C inhibitors and uses thereof (US National phase – Application) PCT/EP2017/081962

Books or books chapters

Patrulea, V.; Younes, I.; Jordan, O.; Borchard, G., Chitosan-based systems for controlled delivery of antimicrobial peptides for biomedical application, In: Functional chitosan, drug delivery and biomedical applications, Ch. 14, Sougata Jana, Subrata Jana Editors, Springer Singapore (2019).

Congresses / conferences and Symposia

- Congresses / conferences organisation : 8
- Posters presentations : 15
- Oral presentations : 11
- Invited oral presentations : 12

Awards and distinction

Patrulea, V., Scholarship from Tokyo University of Science, Japan for Foreign Faculty Member Invitation Project, 2019

Patrulea, V., Galenus Support Prize (Galenus-Privatstiftung), Wien, Austria

Younes, I., Galenus Support Prize (Galenus-Privatstiftung), Wien, Austria

Ragupathy, S., 13e journée de l'innovation aux Hôpitaux universitaires de Genève, la lutte contre la dégénérescence maculaire, projet APERI. Prix et trophées de l'Innovation, 3e prix. Centre de l'Innovation, 31 octobre 2019, Genève (Suisse).

Ragupathy, S., 13e journée de l'innovation aux Hôpitaux universitaires de Genève, la lutte contre la dégénérescence maculaire, projet APERI. Prix Startup, 1er prix. Centre de l'Innovation, 31 octobre 2019, Genève (Suisse).

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 as well as palliative care,
- Promote translational research by enhancing synergies between basic sciences and clinical medicine.

As such, we are engaged in different projects such as the study “Human genomic population structure and phenotype-genotype variations in ADME genes along a latitudinal transect from Africa to Europe” in collaboration with the Department of Genetics and Evolution with the group of Dr Estella Poloni.

Other collaborations are ongoing with Prof. Jean-Charles Sanchez’s group (proteomic analysis of paracetamol hepatotoxicity), Prof. P. Fontana and Prof. J.L. Reny’s Geneva Platelet group (pharmacogenetics of antithrombotics), Prof. Christian Lovis’s group (phenomic approaches and Neuro-Linguistic Programming to detect adverse drug reactions), Prof. Marc Ansari’s oncopediatric group (busulfan dose individualization), and Prof. Markus Kosel’s psychiatric group (prescription in adults with intellectual disabilities), Dr Petros Tsantoulis (molecular tumor board) and Prof. Aurelien Thomas’ group (metabolomics approaches), as well as pharmaceutical sciences groups (Prof. Serge Rudaz) and the Swiss Center for Applied Human Toxicology (Prof. Martin Wilks).

2019 at a glance

- Publications with impact factor : 22
- Publications without impact factor : 7
- Patents : 1
- Book and chapters : 1
- Congresses / conferences organisation : 0
- Posters presentations : 19
- Oral presentations : 4
- Invited oral presentations : 32
- Number of projects at FNRS and assimilated (Research funds) : 6 + 9 (private funding)
- Service agreements and related activities : 2
- Ph.D. Theses presented in 2019 : 6 actives (1 presented in 2019)

- Awards and distinctions: 3
- Public outreach activities : 6

Research funds

Public funds
FNRS 159669
Human genomic population structure and phenotype-genotype variation in ADME genes along a latitudinal transect from Africa to Europe
Dr Estella POLONI, PhD, Prof. Youssef DAALI, Prof. Jules DESMEULES
CHF 429'000.-
2015-2019

FNRS investigator initiated clinical trials (IICT) 173539
N-of-1 within-patient trials to improve the rational use of therapeutic drugs: Evaluation of their contribution in personalizing the treatment of chronic pain
Prof. Thierry BUCLIN, Dr Valérie PIGUET, Prof. Isabelle DECOSTERD
CHF 499'400.-
2017-2021

FNRS 182686
Identification of genetic determinants for central pain sensitization in fibromyalgia patients
Prof. Jules DESMEULES
CHF 387'300.-
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.-
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.-
2017- 2020

Swiss Innovation Agency 37848.1
NDMC as a new antihyperalgesic
Dr Marie BESSON, CC, PD
CHF 454'971.-
2019-2021
CHF 227'486.-

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.-
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.-
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.-
2019-2021

Foundation privée des HUG projet Priority
Détection des effets indésirables graves par datamining dans le dossier patient intégré: développement et validation d'un outil
Prof. Caroline SAMER, Dr Kuntheavy ING LORENZINI, PhD
CHF 57'000.-
2017-2019

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.-
2018-2020

Fondation privée des HUG projet Priority
Swiss Cheese Model: the PRESTIGE study
Prof. Caroline SAMER, Dr Nathalie VERNAZ HEGI, Prof. Arnaud PERRIER, Rodolphe MEYER, Prof. Jules DESMEULES, Prof. Christian LOVIS
CHF 55'000.-
2017-2019

Fondation privée des HUG projet Priority
The MAGIC2 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.-
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 ongoing from 2017 to 2023: CHF 3'452'862.-

Service agreements and related activities

REDs (Center of Research & Expertise in antidoping sciences)
Service agreement
Total amount for 2019: CHF 40'000.-

Nestlé Institute of Health Sciences Ltd
Service agreement
Total amount for 2019: CHF 11'000.-

Total amount (for all service agreements and related activities) for 2019: CHF 51'000.-

Scientific publications (with impact factor)

Samer, C. ; Gloor, Y. ; Rollason, V. ; Guessous, I. ; Doffey-Lazeyras, F. ; Saurat, J. ; Sorg, O. ; Desmeules, J. ; Daali, Y., Cytochrome P450 1A2 activity and incidence of thyroid disease and cancer after chronic or acute exposure to dioxins. Basic & Clinical Pharmacology & Toxicology 2019, 126(3), 296-303. *2.452*

Ing Lorenzini, K.; Girardin, F., Direct-Acting Antivirals interactions with opioids, alcohol or illicit drugs in HCV-infected patients. Liver int 2019, 40(1), 32-44. *5.542*

Bosilkovska, M. ; Magliocco, G. ; Desmeules, J. ; Samer, C. ; Daali, Y., Interaction between fexofenadine and CYP phenotyping probe drugs in Geneva cocktail. Journal of Personalized Medicine 2019, 2;9(4). *1.118*

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. Pediatric Research 2019, 87(3), 441-449. *2.88*

Gloor, Y.; Schvartz, D.; Samer, C., Old problem, new solutions: biomarker discovery for acetaminophen liver toxicity. Expert Opinion on Drug Metabolism & Toxicology 2019, 15(8), 659-669. *3.487*

Rodieux, F.; Piguet, V.; Desmeules, J.; Samer, C., Safety issues of pharmacological acute pain treatment in children. Clin Pharmacol Ther 2019, 105(5), 1130-1138. *7.39*

Coleman, J. ; Samer, C. ; Zeitlinger, M. ; van Agtmael, M.; Rongen, G.; Marquet, P.; Simon, T.; Singer, D.; Manolopoulos, V.; Böttiger, Y., The European Association for Clinical Pharmacology and Therapeutics – 25 years' young and going strong.
European Journal of Clinical Pharmacology 2019, 75(6), 743-750. *2.774*

Bovet, L.; Samer, C.; Daali, Y., Letter to Editor „Preclinical Evaluation of Safety of Fucoidan Extracts from Undaria pinnatifida and Fucus vesiculosus for Use in Cancer Treatment". Integrative Cancer Therapies 2019, 18. *2.657*

Galova, A. ; Berney, P. ; Desmeules, J. ; Sergentanis, I. ; Besson, M., A case report of cholinergic rebound syndrome following abrupt low-dose clozapine discontinuation in a patient with type I bipolar affective disorder. BMC Psychiatry 2019, 19(1), 73. *2.666*

Lenoir, C.; El Biali, M.; Luthy, C.; Grosgurin, O.; Desmeules, J.; Rollason, V., Snapshot of proton pump inhibitors prescriptions in a tertiary care hospital in Switzerland: less is more ? Int J Clin Pharm 2019, 41(6), 1634-1641. *1.692*

Blanc, AL. ; Fumeaux, T. ; Stirnemann, J. ; Dupuis Lozeron, E. ; Ourhamoune, A. ; Desmeules, J. ;Chop ard, P. ; Perrier, A. ; Schaad, N. ; Bonnabry, P., Development of a predictive score for potentially avoidable hospital readmissions for general internal medicine patients. PLoS One 2019, 14(7). *2.776*

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. European Journal of Pain 2019, 24(3), 555-567. 2019. *3.188*

Storelli, F.; Desmeules, J.; Daali, Y., Physiologically-Based Pharmacokinetic Modeling for the Prediction of CYP2D6-Mediated Gene-Drug-Drug Interactions. CPT Pharmacometrics Syst Pharmacol 2019, 8(8), 567-576. *3.370*

Magliocco, G.; Thomas, A.; Desmeules, J.; Daali, Y., Phenotyping of Human CYP450 Enzymes by Endobiotics: Current Knowledge and Methodological Approaches. Clin Pharmacokinet 2019, 58(11), 1373-1391. *4.68*

Storelli, F.; Desmeules, J.; Daali, Y., Genotype-sensitive reversible and time-dependent CYP2D6 inhibition in human liver microsomes. Basic Clin Pharmacol Toxicol 2019, 24(2), 170-180. *2.452*

Porchet, H. ; Vidal, V. ; Kornmann, G. ; Malpass, S.; Curtin, F., A High-dose Pharmacokinetic Study of a New IgG4 Monoclonal Antibody Temelimab/GNbAC1 Antagonist of an Endogenous Retroviral Protein pHERV-W Env. Clin Ther 2019, 41(9), 1737-1746. *2.935*

Nicoletti, F. ; Mazzon, E. ; Fagone, P. ; Mangano, K. ; Mammana, S. ; Cavalli, E. ; Basile, MS. ; Bramanti, P. ; Scalabrino, G. ; Lange, A. ; Curtin, F., Prevention of clinical and histological signs of MOG-induced experimental allergic encephalomyelitis by prolonged treatment with recombinant human EGF. J Neuroimmunol 2019, 332, 224-232. *2.832*

Girardin, F. ; Hearmon, N. ; Castro, E. ; Negro, F. ; Eddowes, L. ; Gétaz, L. ; Wolff, H., Modelling the Impact and Cost-effectiveness of Extended Hepatitis C Virus Screening and Treatment with Direct-acting Antivirals in a Swiss Custodial Setting. Clin Infect Dis 2019, 69(11), 1980-1986. *9.055*

Girardin, F. ; Hearmon, N. ; Negro, F. ; Eddowes, L. ; Bruggmann, P.; Castro, E., Increasing hepatitis C virus screening in people who inject drugs in Switzerland using rapid antibody saliva and dried blood spot testing: A cost-effectiveness analysis. J Viral Hepat 2019, 26(2), 236-245. *4.016*

Girardin, F. ; Poncet, A. ; Perrier, A. ; Vernaz, N. ; Pletscher, M. ; Samer, C. ; Lieberman, JA. ; Villard, J., Cost-Effectiveness of HLA-DQB1/HLA-B pharmacogenetic-guided treatment and blood monitoring in US patients taking clozapine. Pharmacogenomics J 2019, 19(2), 211-218. *3.503*

Ziesenitz, VC. ; Rodieux, F.; Atkinson, A.; Borter, C.; Blielicki, JA. ; Haschke, M.; Duthaler, U.; Bachmann, F.; Erb, TO; Gürtler, N.; Holland-Cunz, S.; van den Anker, JN.; Gotta, V.; Pfister, M. Dose evaluation of intraveinous metamizole (dipyrone) in infants and children: a prospective population pharmacokinetic study. Eur J Clin Pharmacol 2019, 75(11), 1491-1502. *2.774*

Siebert, JN. ; Bloudeau, L. ; Ehrler, F. ; Combescure, C.; Haddad, K.; Hugon, F.; Suppan, L.; Rodieux, F.; Lovis, C.; Gervaix, A. ; Manzano, S., A mobile device app to reduce prehospital medication errors and time to drug preparation and delivery by emergency medical services during simulated pediatric cardiopulmonary resuscitation : study protocol of a multicenter, prospective, randomized controlled trial. Trials 2019, 20(1), 634. *1.975*

Scientific publications (without impact factor)

Rodieux, F.; Ing Lorenzini, K.; Rollason, V., Importance and specificity of pharmacovigilance in the pediatric population.
Rev Med Suisse 2019, 15(645), 743-747.

Souche, A.; Piguet, V.; Desmeules, J.; Cedraschi, C., Why propose cognitive-behavioural therapy for chronic pain patients?
Rev Med Suisse 2019, 15(656), 1272-1275.

Hoehn, LA.; Barros, F.; Desmeules, J.; Ing Lorenzini, K., Importance of adverse drug-drug interactions in cancer: comparison of computerized detection programs.
Doul Analg 2019, 32, 21-36.

Bollondi Pauly, C.; Kupferschmid, S.; Tairraz, P.; Samer, C.; Rehberg-Klug, B., Training of doctors and nurses in the use of opiates by a serious game.
Doul Analg 2019, 32, 54-60.

Bollondi Pauly, C.; Boegli, M.; Breton, C.; Cedraschi, C.; Desmeules, J.; da Rocha Rodrigues, MG., Le Toucher-massage® : experience de patients hospitalisés souffrant de douleur chronique.
Doul Analg 2019, 32, 61-5.

Desmeules, J.; Collin. E., Douleur et cancer.
Doul Analg 2019, (32) 1-2

Chytas, V.; Costanza, A.; Piguet, V.; Cedraschi, C.; Bondolfi, G., Démoralisation et sens de la vie dans l'idéation suicidaire: un role chez les patients douloureux chroniques?
Rev Med Suisse 2019, 15, 1282-5.

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, 2019, Patent number EP16709145.3

Books or books chapters

Crombez, G.; Cedraschi, C.; Hasenbring M.; HØgh, M.; Keogh, E.; Klinger, R.; Lauwerier, E.; Miro, J.; Pincus, T.; Valentini, E., European Pain Federation EFIC Core Curriculum for the European Diploma Pain Psychology, European Pain Federation EFIC: Brussels, sept 2019.

Congresses / conferences and Symposia

- Posters presentations : 19
- Oral presentations : 4
- Invited oral presentations : 32

Ph.D. Theses presented in 2019

- Dozio, Vito, Proteomic Phenotyping of CNS Cells Exposed to Inflammatory Stimuli and Opioids, thesis number 5364, director Prof. Desmeules, J.; co-directors Prof. Sanchez, JC; Prof. Daali, Y.

Awards and distinction

Ing Lorenzini, K. (Hoehn, LA.; Barros, F.; Desmeules, J.), Importance des interactions médicamenteuses néfastes chez le patient oncologique: comparaison de programmes de détection informatisés.
Prix du Syndicat de la Presse et des Editions des Professionnels de Santé, Catégorie meilleur article de formation pour les professionnels pharmaciens, revue Douleur et Analgésie 2019.

Storelli, F., Physiologically Based Pharmacokinetic (PBPK) Modeling for the Prediction of CYP2D6-mediated Gene-Drug-Drug Interactions.
Prix de la Société Suisse de pharmacologie et toxicologie cliniques 2019.

Lenoir, C., Impact of acute inflammation on cytochromes P450 activity measured with dried blood spot.
Presidential Trainee Award, ASCPT.

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

Samer, C., Les Automnales, November 8th-17th, 2019, Geneva (Switzerland).
Desmeules, J., Ing Lorenzini K., Les opioïdes, TSR, Temps Présent, 2019

CLINICAL PHARMACY SCIENCES

Professor Chantal Csajka

General description of the Unit

The mission of the clinical pharmacy science group is to promote post-marketing 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.

As of July 2019, a new network for research and innovation in clinical pharmaceutical sciences (CRISP) has been set up at the CHUV by the group, with the strategic objectives to promote a transversal and coordinated research on post-approval drug optimization between different academic groups. A specific new centre of competence within the CRISP dedicated to teaching and research in biological and cellular therapies has been set up to bring the necessary expertise for the creation and diffusion of knowledge in this new and important field in pharmacy.

Specific research fields

The following achievements have taken place in 2019.

- **Drug individualisation**. Several projects on the pharmacokinetic characterisation of antiretroviral and psychoactive drugs have been fulfilled, with direct implication for clinical practice. In the field of HIV, population pharmacokinetic studies on antiretroviral drugs and co-administered drugs in this population and studies on drug-drug interaction of HIV drugs in the elderly population has provided innovative results. In oncology, the 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 drugs have been translated into clinical recommendations.

- **Drug efficacy and security**. A clinical study evaluating potentially inappropriate medications in elderly hospitalized patients with the aim of quantifying their clinical implications in this population and of evaluating the benefit of tools facilitating their detection has been achieved. Several projects related to improvement of the knowledge and security of use of drugs during pregnancy and lactation has been initiated, based on cohort studies and administrative data.

- **Tools for drug optimisation in clinical practice**. The collaborative project with the EPFL and the HEIG-VD supported by the Nano-Tera project of the SFN aiming at developing a software (www.tucuxi.ch) for Bayesain dosage adjustment is still ongoing (ISyPeM: Intelligent Integrated Systems for Personalized Medicine, www.nano-tera.ch/projects/405.php and ISyPeM II, www.nano-tera.ch/projects/368.php). The SNF project (PNR74) aiming at elaborating an automatic detection tool of adverse drug events related to antithrombotic use in the geriatric population trough structured data mining and natural language processing is ongoing.

2019 at a glance

- Publications with impact factor : 17
- Publications without impact factor : 5
- Patents : 0
- Book and chapters : 3
- Congresses / conferences organisation : 0
- Posters presentations : 9
- Oral presentations : 3
- 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 2019 : 3
- Awards and distinctions: 0
- Public outreach activities : 2

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 2019:	CHF 168'416.-
Starting date:	01.09.2017

Fonds européen
IMI2-H2020-ConcePTION

Main applicant :	Alice Panchaud
Total funding of the project:	CHF 418'206
Total duration of the project:	5 years
Allocation 2019:	N/A
Starting date:	01.04.2019

VKF
PregREC

Main applicant:	Alice Panchaud
Total funding of the project:	CHF 190'000.-
Total duration of the project:	3 years
Allocation 2019:	N/A
Starting date:	01.03.2019

Ferring
PregREC (Obstetric field)

Main applicant:	Alice Panchaud
Total funding of the project:	CHF 60'000.-
Total duration of the project:	2 years
Allocation 2019:	CHF 60'000.-
Starting date:	01.03.2020

Vifor Pharma
Follow App PregREC

Main applicant:	Alice Panchaud
Total funding of the project:	CHF 40'000.-
Total duration of the project:	2 years
Allocation 2019:	CHF 20'000.-

Starting date: 01.03.2020

Total amount for all research funds for 2019: CHF 248'416.-

Service agreements and related activities

Debiopharm
Service
Total amount for 2019: CHF 17'988.48

Total amount (for all service agreements and related activities) for 2019: CHF 17'988.48

Scientific publications (with impact factor)

Barcelo, C., et al., Population pharmacokinetics of dolutegravir: influence of drug-drug interactions in a real-life setting. J Antimicrob Chemother, 2019. 74(9): p. 2690-2697. *5.11*

Courlet, P., et al., Emtricitabine and lamivudine concentrations in saliva: a simple suitable test for treatment adherence. J Antimicrob Chemother, 2019. 74(8): p. 2468-2470. *5.11*

Courlet, P., et al., Escitalopram population pharmacokinetics in people living with human immunodeficiency virus and in the psychiatric population: Drug-drug interactions and probability of target attainment. Br J Clin Pharmacol, 2019. 85(9): p. 2022-2032. *3.86*

Courlet, P., et al., Polypharmacy, Drug-Drug Interactions, and Inappropriate Drugs: Challenges in the Aging Population With HIV. Open Forum Infect Dis, 2019. 6(12): p. ofz531. *3.37*

Courlet, P., et al., UHPLC-MS/MS assay for simultaneous determination of amlodipine, metoprolol, pravastatin, rosuvastatin, atorvastatin with its active metabolites in human plasma, for population-scale drug-drug interactions studies in people living with HIV. J Chromatogr B Analyt Technol Biomed Life Sci, 2019. 1125: p. 121733. *2.81*

Fischer Fumeaux, C.J., et al., Risk-benefit balance assessment of SSRI antidepressant use during pregnancy and lactation based on best available evidence - an update. Expert Opin Drug Saf, 2019. 18(10): p. 949-963. *3.22*

Glatard, A., et al., Influence of body weight and UGT2B7 polymorphism on varenicline exposure in a cohort of smokers from the general population. Eur J Clin Pharmacol, 2019. 75(7): p. 939-949. *2.77*

Guidi, M., et al., Population pharmacokinetics and pharmacodynamics of the artesunate-mefloquine fixed dose combination for the treatment of uncomplicated falciparum malaria in African children. Malar J, 2019. 18(1): p. 139. *2.79*

Jermini, M., et al., Complementary medicine use during cancer treatment and potential herb-drug interactions from a cross-sectional study in an academic centre. Sci Rep, 2019. 9(1): p. 5078. *4.01*

MacDonald, S.C., et al., Identifying pregnancies in insurance claims data: Methods and application to retinoid teratogenic surveillance. Pharmacoepidemiol Drug Saf, 2019. 8(9): p. 1211-1221. *2.87*

Pomar, L., et al., Placental infection by Zika virus in French Guiana. Ultrasound Obstet Gynecol, 2019. *5.59*

Pomar, L., et al., Zika virus during pregnancy: From maternal exposure to congenital Zika virus syndrome. Prenat Diagn, 2019. 39(6): p. 420-430. *2.43*

Sottas, O., et al., Adherence to intermittent preventive treatment for malaria in Papua New Guinean infants: A pharmacological study alongside the randomized controlled trial. PLoS One, 2019. 14(2): p. e0210789. *2.77*

Terrier, J., et al., Towards Personalized Antithrombotic Treatments: Focus on P2Y12 Inhibitors and Direct Oral Anticoagulants. Clin Pharmacokinet, 2019. 58(12): p. 1517-1532. *4.68*

Vouga, M., et al., A critical analysis of the neurodevelopmental and neurosensory outcomes after 2 years for children with in utero Zika virus exposure. Nat Med, 2019. 25(11): p. 1641-1642. *30.64*

Wagner, A.D., et al., Gender medicine and oncology: report and consensus of an ESMO workshop. Ann Oncol, 2019. 30(12): p. 1914-1924. *14.19*

Wagner, A.D., B. Ozdemir, and C. Csajka, Reply to L. Pala et al. J Clin Oncol, 2019. 37(5): p. 439-440. *28.34*

Scientific publications (without impact factor)

Guignard, B., et al., Cas clinique n°6 : Une épilepsie tardive traitée par du *lévétiracétam. .* PharmaJournal, 2019. 2/2019: p. 4-5.

Levray, A., et al., *Cas clinique n°7 : Gestion du traitement de l'asthme chez la femme enceinte.* PharmaJournal, 2019.

Panchaud, A., *Editorial – édition Grossesse et médicaments.* Obstetrica, 2019.

Panchaud, A., *Médicaments, grossesse et allaitement : les sources d'information spécialisées sont indispensables au bon choix thérapeutique.* Obstetrica, 2019.

Simalatsar, A., et al., *Robustness anaylsis of personalised delivery rate computation for IV administered anesthetic.* Smart Health, 2019. 9-10: p. 101-114.

Books or books chapters

Panchaud A., Di Paolo E. Safety of medication use during pregnancy and breastfeeding In: Swiss recommendations for adult cystic fibrosis care. Chêne-Bourg: Médecine & Hygiène; 2019. https://www.revmed.ch/Guidelines/Cystic-fibrosis

Curtin F., Meier C., Panchaud A. Pharmacoepidémiologie. In: Bases de la thérapeutique médicamenteuse. Basel: Documed SA; 2019.

Panchaud A. Médicaments et allaitement. In Pedibook.ch, CHUV, Lausanne; 2019.

Congresses / conferences and Symposia

- Congresses / conferences organisation : 0
- Posters presentations : 9
- Oral presentations : 3
- Invited oral presentations : 1

Ph.D. Theses presented in 2019

- Anaïs Glatard Optimisation and individualisation of psychotropic therapies: focus on varenicline, amisulpride and quetiapine
  Prof. Chin-Bin Eap and Prof. Chantal Csajka

- Evelina Cardoso Optimization of the Potential Therapeutic Benefit of Protein Kinase Inhibitors Used in Cancer
  Prof. Chantal Csajka

- Wenyuan Xiong Model-Informed Dose Selection in Early Oncology Drug Development
  Prof. Chantal Csajka and Dr Pascal Girard

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

Panchaud A. Les femmes enceintes et allaitantes, parents pauvres de la recherché. Journal Le Temps, July 17th 2019.

Panchaud A. Quels médicaments les femmes enceintes peuvent-elles prendre ? Journal 24 Heures Lausanne, July 22th 2019. https://www.24heures.ch/suisse/medicaments-femmes-enceintes-peuventelles-prendre/story/26171177

COMMUNITY PHARMACY PRACTICE RESEARCH UNIT

Professor Olivier BUGNON

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 interprofessionalism, 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).

Through its chief pharmacist (Prof. Olivier Bugnon), associate professor in Community Pharmacy Practice, who is also co-head of the Department of Ambulatory Care in Unisanté, the Community pharmacy practice research Unit is currently affiliated to:

- Center 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
- Center 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 cantonal, national and international levels for its clinical pharmacy, research/development and educational activities. Our work focus on understanding the determinants, development, implementation and (clinical, humanistic, economic) evaluation of pharmacy practices 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-centered 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.

2019 at a glance

- Publications with impact factor : 10
- Publications without impact factor: 52
    - Peer-reviewed publications: 3
    - Publications in professional press: 22
    - Clinical practice guidelines published on the Unisanté's intranet: 27
- Patents : 0

- Book and chapters : 0
- Congresses / conferences organisation : 3
- Posters presentations : 1
- Oral presentations : 12
- Invited oral presentations : 11
- Continuing education conference : 64
- Number of projects at FNRS and assimilated (Research funds) : 6 (557'498 CHF)
- Service agreements and related activities : 15 (585'791 CHF)
- Ph.D. Theses :
    - Ph.D. students in 2019: 7
    - Ph.D. Theses presented in 2019 : 3
    - Ph.D. Theses jury in 2019: 1 (France)
- Master Theses supervised in 2019: 3
- Awards and distinctions: 3
- Public outreach activities : 6
- Various:
    - National expert committees: 5
    - Advisory Board: 1
    - Global Pharmacy project: 1 (Madagascar)

Research funds

FNRS (NPR 74)
Opportunities and limits of deprescribing for older people in nursing homes (OLD-NH).
Research project funded by FNRS (NRP74 « Smarter Health Care »)
Main applicants: O. Bugnon and A. Niquille Charrière
Total funding of the project: CHF 378'714
Total duration of the project: 3 years
Allocation 2019: CHF 126'238
Starting date: 01.01.2017

FNRS (NPR 74)
How to improve care integration, coordination and continuity? Designing policy from population needs and preferences.
Main applicant: J. Marti (Unisanté, Lausanne)
Co-applicants: C. Perraudin, O. Bugnon, I. Peytremann Bridevaux, J. Wagner
Total funding of the project: CHF 337'060
Total duration of the project: 3 years
Allocation 2019: CHF139'370
Starting date : 01.01.2019

FEDERAL OFFICE OF PUBLIC HEALTH (FOPH)
Implementation study of a person-centered and integrated care concept for type-2 diabetes patients (SISCare®-DT2].
Main applicants: O. Bugnon (Unisanté) et C. Rossier (SISPha SA)
Total funding of the project: CHF 216'000
Total duration of the project: 4.5 years
Allocation 2019: CHF 24'840
Starting date: 01.01.2015

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 2019: CHF 180'000
Starting date: 01.01.2019

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 46'691
Allocation 2019: CHF 46'691
Starting date: 01.01.2019

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 40'359
Allocation 2019: CHF 40'359
Starting date: 01.01.2019

Total amount for all research funds for 2019: CHF 557'498.-

Service agreements and related activities

FEDERAL OFFICE OF PUBLIC HEALTH (FOPH)
Service agreement (Examen fédéral en Pharmacie 2019)
Main applicant: O. Bugnon for the Institute of pharmaceutical sciences of Western Switzerland (ISPSO), University of Geneva, University of Lausanne.
Total amount for 2019: CHF 333'534

CP3
Service agreement
Total amount for 2019: CHF 14'606

HJ29
Service agreement
Total amount for 2019: CHF 700

HN8
Service agreement
Total amount for 2019: CHF 3'000

MEL52
Service agreement
Total amount for 2019: CHF 111'859

NOS5
Service agreement
Total amount for 2019: CHF 39'900

NUT8
Service agreement
Total amount for 2019: CHF 3'000

7ONP
Service agreement
Total amount for 2019: CHF 1'220

S311
Service agreement
Total amount for 2019: CHF 500

SUS4
Service agreement
Total amount for 2019: CHF 4'345
Development
Total amount for 2019: CHF 1'282
Research
Total amount for 2019: CHF 15'000

SV3
Service agreement
Total amount for 2019: CHF 6'900
Research
Total amount for 2019: CHF 27'735

SV10
Service agreement
Total amount for 2019: CHF 600
Research
Total amount for 2019: CHF 5'735

U2
Service agreement
Total amount for 2019: CHF 1'200

U3
Service agreement
Total amount for 2019: CHF 11'675

VOR5
Service agreement
Total amount for 2019: CHF 3'000

Total amount (for all service agreements and related activities) for 2019: CHF 585'791.-

Scientific publications (with impact factor)

Berger J., Bourdin A., Pires F., Backes C., Perraudin C., Bugnon O. Improving patient access to hepatitis C antiviral medicines in Switzerland: Understanding the financial risks for community pharmacies. Journal of evaluation in clinical practice 2019, 25 (3), 476-481. *1.536*

Bourdin, A.; Schluep, M.; Bugnon, O.; Berger, J. Promoting transitions of care, safety, and medication adherence for patients taking fingolimod in community pharmacies. American journal of health-system pharmacy: AJHP: official journal of the American Society of Health-System Pharmacists 2019, 76 (15), 1150-1157. *1.882*

Cateau, D.; Bugnon, O.; Niquille, A. Retrospective Analysis of Potentially Inappropriate Medications Use in Swiss Nursing Homes. Abstracts of the 15th International Congress of the European Geriatric Medicine Society. Eur Geriatr Med 2019, 10, 1–325. *1.233*

Dotta-Celio, J.; Alatri, A.; Locatelli, I.; Salvi, M.; Bugnon, O.; Schneider, M. P.; Mazzolai, L.,Patient adherence to rivaroxaban in deep vein thrombosis, a cohort study in Switzerland: quantitative results. Int J Clin Pharm 2019, 41 (6), 1625-1633. *1.692*

Michiels, Y.; Bugnon, O.; Chicoye, A.; Dejager, S.; Moisan, C.; Allaert, F. A, Hunault, C.; Romengas, L.; Mechin, H.; Verges, B., Impact of a Community Pharmacist-Delivered Information Program on the Follow-up of Type-2 Diabetic Patients: A Cluster Randomized Controlled Study. Advances in therapy 2019, 36 (6), 1291-1303. *3.26*

Perraudin, C.; Locca, J. F.; Rossier, C.; Bugnon, O.; Schneider, M. P., Implementation of an interprofessional medication adherence program for chronic patients in community pharmacies: how much does it cost for provider? BMC health services research 2019, 19 (1), 15. *1.932*

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. *5.325*

Quintana-Barcena, P.; Lalonde, L.; Lauzier, S. Beliefs influencing community pharmacists' interventions with chronic kidney disease patients: A theory-based qualitative study. Research in social & administrative pharmacy: RSAP 2019, 15 (2), 145-153. *2.719*

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. *1.47*

Schneider, M. P.; Achtari Jeanneret, L.; Chevaux, B.; Backes, C.; Wagner, A. D.; Bugnon, O.; Luthi, F.; Locatelli, I., A Novel Approach to Better Characterize Medication Adherence in Oral Anticancer Treatments. Frontiers in pharmacology 2018, 9, 1567. *4.4*

Peer-reviewed publications

Gouveia A.; Berger J.; Staeger P.; Bugnon O., L'interprofessionnalité médecins-pharmaciens dans les soins ambulatoires : un potentiel à exploiter. RevMed 2019, 15 (669), 1962-1966.

Hamada N; Quintana Bárcena P; Maes KA; Bugnon O; Berger J. Clinical Pharmacy Activities Documented (ClinPhADoc): Development, Reliability and Acceptability of a Documentation Tool for Community Pharmacists. Pharmacy 2019, 7 (4), 162.

Michiels, Y.; Bugnon, O.; Michiels, J. F.; Mazellier, S., Detection of a new melanoma in a patient treated with fingolimod. BMJ Case Rep. 2019, 12(4), e227951

Publications in professional press

Frossard, T.; Carli, D.; Bugnon, O.; Berger, J., Prise en charge à l'officine de la cystite aiguë non-compliquée chez la femme. pharmaJournal 2019, 4, 9-11

Frossard, T.; Carli, D.; Bugnon, O.; Berger, J., Behandlung der akuten unkomplizierten Cystitis in der Offizin pharmaJournal 2019, 4, 9-11

Pavon, V.; Carli, D.; Bugnon, O.; Berger, J., Thrombose du voyageur: comment la prévenir et la guérir? pharmaJournal 2019, 5, 7-9

Pavon, V.; Carli, D.; Bugnon, O.; Berger, J., Reisethrombose : vorbeugen und heilen? pharmaJournal 2019, 5, 7-9

Nayak, J.; Carli, D.; Berger, J., Glucocorticoïdes oraux: arrêt de traitement et schémas dégressifs. pharmaJournal 2019, 5, 1-2

Nayak, J.; Carli, D.; Berger, J., Orale Glucocorticoide: absetzen und Ausschleichen der Therapie. pharmaJournal 2019, 5, 4-5

Voisin, A.; Berger, J.; Bugnon, O., Sphère uro-génitale: bon usage des spasmolytiques. pharmaJournal 2019, 6-7, 4-6

Voisin, A.; Berger, J.; Bugnon, O., Urogenitaler Bereich: good practice bei Spasmolytika. pharmaJournal 6-7.2019, 4-6

Bandiera, C.; Carli, D.; Berger, J., La luminothérapie, traitement de premier choix. pharmaJournal 2019, 9, 5-6

Bandiera, C.; Carli, D.; Berger, J., Lichttherapie ist erste Wahl. pharmaJournal 2019, 9, 5-6

Levray, A.; Berger, J.; Guignard, B.; Beney, J.; Csajka, C.; Panchaud, A., Gestion du traitement de l'asthme chez une femme enceinte. pharmaJournal 2019, 10, 4-6

Levray, A.; Berger, J.; Guignard, B.; Beney, J.; Csajka, C.; Panchaud, A., Therapiemanagement von Asthma bei einer schwangeren Frau. pharmaJournal 2019, 10, 4-6

Fassotte, V.; Pittet, N.; Frossard, T.; Barbalat, M.-J.; Carli, D.; Berger, J., Une sélection d'outils de traduction médicale. pharmaJournal 2019, 10, 7-8

Fassotte, V.; Pittet, N.; Frossard, T.; Barbalat, M.-J.; Carli, D.; Berger, J., Übersetzungstools für Patientengespräche:eine Auswahl. pharmaJournal 2019, 10, 7-8

Pittet, N.; Savary, J.; Carli, D.; Bugnon, O.; Berger, J., Prise en charge des patients séropositifs à l'officine. pharmaJournal 2019, 10, 10-12

Pittet, N.; Savary, J.; Carli, D.; Bugnon, O.; Berger, J., Behandlung seropositiver Patienten in der Offizin. pharmaJournal 2019, 10, 10-12

Cordonier, A.-C.; Frossard, T.; Carli, D.; Berger, J., Bon usage des formes topiques - Comment choisir la forme galénique et quelle quantité appliquer? pharmaJournal 2019, 11, 4-5

Cordonier, A.-C.; Frossard, T.; Carli, D.; Berger, J., Good Practice bei topischen Formen - Auswahl der galenischen Form und richtige Menge? pharmaJournal 2019, 11, 4-5

Pittet, N.; Nayak, J.; Carli, D.; Bugnon, O.; Berger, J., Prise en charge du diabète - Quelle est la place des nouvelles classes thérapeutiques? pharmaJournal 2019, 11, 7-9

Pittet, N.; Nayak, J.; Carli, D.; Bugnon, O.; Berger, J., Betreuung bei Diabetes - Welchen Stellenwert haben die neuen Therapieklassen? pharmaJournal 2019, 11, 7-9

Pittet, N.; Bandiera, C.; Carli, D.; Berger, J., Traitement et prévention de la goutte - Bon usage de la colchicine. pharmaJournal 2019, 12, 1-2

Pittet, N.; Bandiera, C.; Carli, D.; Berger, J., Therapie und Prävention von Gicht - Good Practice bei Colchicin. pharmaJournal 2019, 12, 1-2

Clinical practice guidelines published on the Unisanté's intranet

Bandiera, C.; Carli, D.; Berger, J., Luminothérapie : aspects pratiques de ce traitement de premier choix de la dépression saisonnière. Ipharm 1/2019 (janvier)

Carli, D. ; Berger, J., Informations de sécurité importantes relatives à Prezista® (darunavir): Risque accru d'échec thérapeutique et de transmission de l'infection par le VIH de la mère à l'enfant en raison de faibles taux d'exposition au darunavir et au cobicistat au cours du deuxième et du troisième trimestre de la grossesse. Imed janvier 2019.

Carli, D. ; Berger, J., Fluoroquinolones – risque de survenue d'un anévrisme et d'une dissection aortique : ajout d'une nouvelle mise en garde dans l'information sur le médicament. Imed février 2019.

Carli, D. ; Berger, J., Valproate : Nouvelles restrictions sur l'utilisation ; Programme de Prévention de la Grossesse à mettre en œuvre. Imed février 2019.

Pittet, N.; Carli, D.; Berger, J., Prise en charge des poux de tête. Ipharm 2/2019 (février)

Carli, D.; Hugentobler, D.; Berger, J., Place du Tamiflu® (Oseltamivir) dans la prise en charge de la grippe saisonniere chez l'adulte. Ipharm 3/2019 (mars)

Carli, D. ; Berger, J. : Informations de sécurité importantes concernant Néo-Mercazole (carbimazole), comprimés : (1) Risque de pancréatite aiguë et (2) recommandation renforcée concernant la contraception. Imed avril 2019

Carli, D.; Berger, J., Zalendronate (Aclasta®, Zometa® et génériques) : deux « case reports » de rhabdomyolyse sur Dystrophie musculaire de Duchenne (DMD). Imed mai 2019

Fassotte, V.; Pittet, N.; Frossard, T.; Barbalat, M.-J.; Carli, D.; Berger, J., Les outils informatiques de traduction médicale. Ipharm 4/2019 (mai)

Gagnebin, P.; Gauthier, R.; Favrat, B.; Pittet, N.; Carli, D.; Berger, J., Bon usage des suppléments de fer en per os. Ipharm 5/2019 (mai)

Carli, D. ; Berger, J., Genvoya® (elvitégravir/cobicistat/emtricitabine/ténofovir alafénamide) Stribild® (elvitégravir/cobicistat/emtricitabine/ténofovir disoproxil) Tybost® (cobicistat) Risque accru d'échec thérapeutique et de transmission de l'infection par le VIH de la mère à l'enfant en raison d'une exposition réduite à l'elvitégravir au cours du deuxième et du troisième trimestre de la grossesse. Imed juin 2019

Carli, D. ; Berger, J., Information importante concernant XELJANZ (tofacitinib) : restriction de l'utilisation de la posologie de 10 mg deux fois par jour chez les patients présentant un risque élevé d'embolie pulmonaire. Imed juin 2019

Carli, D.; Berger, J., Actemra® (tocilizumab) – Identification d'un nouveau risque important : hépatotoxicité. Imed juin 2019

Pittet, N.; Carli, D.; Berger, J., Aspects pratiques liés à la prescription d'antiparasitaires. Ipharm 6/2019 (juin)

Carli, D.; Berger, J., L'utilisation de l'apixaban (Eliquis), du dabigatran etexilate (Pradaxa), de l'edoxaban (Lixiana) et du rivaroxaban (Xarelto, Xarelto vascular) n'est pas recommandée chez les patients présentant un syndrome des antiphospholipides en raison d'une possible augmentation du risque d'événements thrombotiques récidivants. Imed juillet 2019

Gauthier, R.; Frossard, T.; Carli, D.; Hugentobler, D.; Berger, J., Ulcogant® : alternatives prises en charge par l'assurance de base. Ipharm 7/2019 (juillet)

Pittet, N.; Bandiera, C.; Carli, D.; Berger, J., Bon usage de la colchicine dans le traitement de la goutte. Ipharm 8/2019 (juillet)

Carli, D.; Berger, J., Actualisation des mises en garde relatives à l'utilisation de méthotrexate pendant la grossesse, à la contraception et à la fertilité. Imed août 2019

Cordonier, A.-C.; Frossard, T.; Berger, J., Bon usage des formes topiques. Ipharm 9/2019 (août)

Bourdin, A. ; Carli, D. ; Berger, J., Fingolimod (Gilenya®) : nouvelles données sur le risque potentiel de malformations congénitales. Imed septembre 2019

Nayak, J.; Barbalat, M.-J.; Pittet, N.; Carli, D.; Berger, J., Supplémentation en calcium et vitamine D : quelles spécialités prescrire en prévention de l'ostéoporose ? Ipharm 10/2019 (septembre)

Frossard, T. ; Carli, D. ; Berger, J., Information rupture longue durée : comprimés vaginaux/ovules. Imed octobre 2019

Frossard T. ; Carli, D. ; Berger, J., Informations importantes relatives à la sécurité de Picato® (mébutate d'ingénol) Risque de cancer de la peau chez les patients atteints de kératose actinique. Imed octobre 2019

Nayak, J. ; Carli, D. ; Berger, J., Contraceptifs hormonaux combinés (CHC) : risque accru de thromboembolie veineuse associé à l'utilisation de CHC à base de diénogest/éthinylestradiol (Valette, Jeanine) en comparaison avec les CHC contenant du lévonorgestrel - données limitées concernant les CHC à base de diénogest/valérate d'estradiol (Qlaira). Imed octobre 2019

Pittet, N. ; Carli, D. ; Berger, J., Révision complète des informations professionnelles de Haldol® Decanoas et Haldol® Comprenant d'importantes restrictions dans les rubriques « indications/possibilités d'emploi », « posologie/mode d'emploi », « contre-indications » et « interactions ». Imed octobre 2019

Papin, P.; Frossard, T.; Carli, D.; Berger, J., Diminution possible de l'effet cardio-protecteur de l'aspirine par les AINS: comment l'éviter en pratique? 11/Ipharm 2019 (octobre)

Ferrier, S.; Hugentobler, D.; Berger, J., Changements de la loi sur les produits thérapeutiques (LPTH). Ipharm 12/2019 (novembre)

Congresses / conferences and Symposia

- Congresses / conferences organisation : 3
- Posters presentations : 1
- Oral presentations : 12
- Invited oral presentations : 11
- Continuing education conference : 64

Ph.D. Theses presented in 2019

- Aline Bourdin
  Programmes d'accompagnement en pharmacie d'officine de patients traités par des médicaments spécialisés: un immunomodulateur associé à un plan de gestion des risques (fingolimod) et un produit sanguin auto-perfusé (immunoglobulines G)
  Directors : O. Bugnon, J. Berger

- Jennifer Celio
  Études en adhésion thérapeutique : avancements dans la collaboration interprofessionnelle et dans les domaines cliniques de l'anticoagulation, de l'insuffisance rénale chronique et du diabète
  Directors: O. Bugnon, M. P. Schneider

- Yves Michiels
  Développement et évaluation d'un programme de soins pharmaceutiques chez le patient diabétique de type II dans le contexte pharmaceutique français
  Director: O. Bugnon

- Irène Supper
  Thèse de doctorat de l'Université de Lyon ; Ecole doctorale interdisciplinaire Sciences Santé (EDISS) N°205. Spécialité de doctorat : Santé publique. Discipline : Recherche sur les services de santé.
  Thesis defense, 28th September 2019, Lyon, France.
  La coopération interprofessionnelle en soins primaires autour des pathologies chroniques : application au diabète de type 2.

  Member of thesis jury : O. Bugnon

Awards and distinction

Bugnon, O. **FIP Distinguished Practice Award 2019.** International Pharmaceutical Federation, 22th September, 2019, Abu Dhabi (Emirates).

Bawab, N. Adherence to oral antidiabetics: A cohort study of patients participating in the interprofessional chronic patients support program in Switzerland. **Best student Contribution Award, Espacomp**, 23th November 2019, Porto (Portugal).

Vo Nam-Linh, C. Enquête de satisfaction auprès des personnes vaccinées contre la grippe dans les pharmacies vaudoises durant l'automne 2018 - EVAC-VD III. **Ofac Pharmacy Awards**, 8th November 2019, Bern (Suisse).

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

O. Bugnon, D. Hugentobler, A. Niquille. Opportunités et limites de la déprescription dans les EMS (OLD-NH). Visite de la Pharmacie d'Unisanté et Exposés. CONNAISSANCE 3- L'Université des seniors, Unil. 19.3.2019, Lausanne.

J. Berger. Apotheken verweigern Kranken teure Medikamente. SonntagsZeitung, April 7th, 2019.

J. Berger. Apotheken verweigern Kranken teure Medikamente. 20 Minuten, April 8th, 2019.

O. Bugnon. Aînés et médicaments: l'overdose! Télévision RTS, Emission 36.9, May 15th 2019. Available at pages.rts.ch/emissions/36-9/10334309-aines-et-medicaments-l-overdose.html?anchor=10433223#timeline-anchor-integral-10404826.

J. Berger. Chez les seniors, le cocktail risqué de l'alcool et des médicaments. Journal le Temps, May 24th, 2019.

S. Du Pasquier. Addiction aux opioïdes : quand un médicament tue… RTS la 1ère, Emission On en parle, June 21st, 2019.

Various

Bugnon O. Membre de la Commission fédérale des examens de Pharmacie.

Bugnon O. Visiting Professor at the University of Antananarivo, Madagascar, 15th-25th April 2019 : about 50 hours of teaching in Community Pharmacy Practice for 5th (25) and 6th year (25) students. Project in collaboration with the NGO Pharmaciens sans frontières - Switzerland.

Bugnon O. Membre du Groupe de suivi spécialisé du programme national progress! La sécurité de la médication en EMS, Fondation sécurité des patients Suisse (https://www.securitedespatients.ch/programmes-progress/la-securite-de-la-medication-en-ems/)
Bugnon O. Membre de l'Advisory Board de la société Sispha (www.sispha.com), entreprise du groupe OFAC qui vise à faciliter la transformation des pratiques officinales en y intégrant des prestations, notamment pour soutenir l'adhésion thérapeutique-

Berger J. et Bugnon O. Membres du groupe de travail pharmaSuisse et de Curafutura pour le développement et l'évaluation de nouvelles prestations dans le cadre de la convention tarifaire nationale RBP V.

Berger J. et Carli D. Membres du groupe de travail pharmaSuisse et Promotion Santé Suisse pour le développement et l'évaluation d'un projet de prévention des chutes en officine.

Bugnon O. Mitglied der Begleitgruppe Machbarkeitsstudie Einzelabgabe Antibiotika, Bundesamt für Gesundheit (BAG/OFSP), since 2019

HOSPITAL PHARMACY (HUG)

Professor Pascal BONNABRY

General description of Unit

HUG hospital pharmacy group (http://pharmacie.hug-ge.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

2019 at a glance

- Publications with impact factor : 11
- Publications without impact factor : 3
- Patents : 0
- Book and chapters : 0
- Congresses / conferences organisation : 3
- Posters presentations : 15
- Oral presentations : 6
- Invited oral presentations : 18
- Number of projects at FNRS and assimilated (Research funds) : 2
- Service agreements and related activities : 1
- Ph.D. Theses presented in 2019 : 2
- Awards and distinctions: 1
- Public outreach activities : 3

Research funds

B/Braun, Sanofi, Vifor, Roche, Labatec
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 2019: CHF 60'000
Starting date : 01.01.2019

Canton de Genève, Université de Genève, 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 2019: CHF 98'000
Starting date : 01.01.2014

Total amount for all research funds for 2019: CHF 158'000.-

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 2019: CHF 90'000

Total amount (for all service agreements and related activities) for 2019: CHF 90'000.-

Scientific publications (with impact factor)

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 2019, doi: 10.1 177 / I 078155219875504 *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 2019, doi: 10.1002/jpen.1730 *4.1*

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 2019, doi: 10.1136/ejhpharm-2019-002165 *0.7*

Simon, N.; Odou, P.; Décaudin, B.; Bonnabry, P.; Fleury-Souverain, S., Efficiency of degradation or desorption methods in antineoplastic drug decontamination: A critical review. Journal of Oncology Pharmacy Practice 2019, 25, 929-46 *1.9*

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 2019, doi:10.1136/ejhpharm-2018-001788 *0.7*

Guichard, N.; Fekete, S.; Guillarme, D.; Bonnabry, P.; Fleury-Souverain, S.,Computer-assisted UHPLC-MS method development and optimization for the determination of 24 antineoplastic drugs used in hospital pharmacy. Journal of Pharmaceutical and Biomedical Analysis 2019, 164, 395-401 *3.0*

Carrez, L.; Bouchoud, L.; Fleury, S.; Combescure, C.; Falaschi, L.; Sadeghipour, F.; Bonnabry, P., Work overload is related to increased risk of error during chemotherapy preparation. Journal of Oncology Pharmacy Practice 2019, 25, 1456-66 *1.8*

Blanc, A-L.; Fumeaux, T.; Stirnemann, J.; Dupuis Lozeron, E.; Ourhamoune, A.; Desmeules, J.; Chopard, P.; Perrier, A.; Schaad, N.; Bonnabry, P., Development of a predictive score for potentially avoidable hospital readmissions for general internal medicine patients. PLoS One 2019, 14(7): e0219348 *2.8*

Guichard, N.; Rudaz, S.; Bonnabry, P.; Fleury-Souverain, S., Validation and uncertainty estimation for trace amounts determination of 25 drugs used in hospital chemotherapy compounding units. Journal of Pharmaceutical and Biomedical Analysis 2019, 172, 139-48 *2.8*

Posfay-Barbe, K. M.; Baudet, H.; McLin, V. A.; Parvex, P.; Chehade, H.; Combescure, C.; Bonnabry, P.; Fonzo-Christe, C., Immunosuppressant therapeutic drug monitoring and trough level stabilisation after paediatric liver or kidney transplantation. Swiss Medical Weekly 2019, 149:w20156 *1.8*

Schumacher, L.; Bonnabry, P.; Widmer, N., Emergency and Disaster Preparedness of European Hospital Pharmacists: A Survey. Disaster Medicine and Public Health Preparedness 2019, doi : 10.1017/dmp.2019.112 *1.0*

Scientific publications (without impact factor)

Videau, M. ; Chemali, L. ; Stucki, C. ; Saavedra-Mitjans, M. ; Largana, S. ; Guerin, A. ; Bonnabry, P. ; Delhauteur, B. ; Van Hees, T. ; Lebel, D. ; Bussières, J-F., Drug Shortages in Canada and Selected European Countries: A Cross-Sectional, Institution-Level Comparison. Canadian Journal of Hospital Pharmacy 2019, 72, 7-15.

Deschênes, PJ. ; Leguelinel-Blache, G. ; Bonnabry, P. ; Philippe, G. ; Bussières, J-F., Analyse comparative du cadre juridique et normatif encadrant la pratique de la pharmacie au Canada (Québec), en France, en Suisse (Genève) et en Belgique. Le Pharmacien Hospitalier et Clinicien 2019, 54, 356-75.

Chabrier, A. ; Atkinson, S. ; Bonnabry, P. ; Bussières, J-F.,Utilisation des jeux d'évasion en santé: une revue de la littérature. Canadian Journal of Hospital Pharmacy 2019, 72, 388-402.

Congresses / conferences and Symposia

- Congresses / conferences organisation : 3
- Posters presentations : 15
- Oral presentations : 6
- Invited oral presentations : 18

Ph.D. Theses presented in 2019

- Clare Bechet
  Le rôle du pharmacien dans l'élaboration de savoirs sur les médicaments pour le médecin en milieu hospitalier
  Pr Pascal Bonnabry

- Nicolas Guichard
  Sécurisation de l'analyse des agents anticancéreux dans un contexte hospitalier et environnemental
  Pr Pascal Bonnabry, Pr Serge Rudaz

Awards and distinction

Rudolf Von Rohr, T.; De Luca, R.; Bonnabry, P.; Pfister, R.; Fonzo-Christe, C., The NeoCheck Project: Development of a Prescription-screening Tool Specific to Neonatology 22èmes Journées Franco-Suisses de Pharmacie Hospitalière, 5-6 December 2019, Lausanne (**best presentation award, 1st prize**).

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

P. Bonnabry. Ruptures de médicaments. RTS, Emission TTC, September 30th, 2019.

P. Bonnabry. Novartis biffe ses rabais aux hôpitaux, qui se rebiffent. L'Agefi, October 14th, 2019.

P. Bonnabry. Le monde des medocs. L'Illustré, October

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

2019 at a glance

- Publications with impact factor : 6
- Publications without impact factor : 1
- Patents : 0
- Book and chapters : 0
- Congresses / conferences organisation : 3
- Posters presentations : 17
- Oral presentations : 4
- Invited oral presentations : 2
- Number of projects at FNRS and assimilated (Research funds) : 0
- Service agreements and related activities : 0
- Ph.D. Theses presented in 2019 : 0
- Awards and distinctions: 1
- Public outreach activities : 1

Scientific publications (with impact factor)

Spaggiari S., Gehri M., Di Benedetto L., Hafen G.M., Pauchard J.-Y., Gervaix A., Pannatier A., Sadeghipour F. Di Paolo E.; Inhalation technique practical skills and knowledge among physicians and nurses in two pediatric emergency settings, Journal of Asthma, 2019; doi.org/10.1080/02770903.2019.1674329 *0.98*

Carrez, L.; Bouchoud, L.; Fleury, S.; Combescure, C.; Falaschi, L.; Sadeghipour, F.; Bonnabry, P., Work overload is related to increased risk of error during chemotherapy preparation. Journal of Oncology Pharmacy Practice 2019, soi: 10.1177/1078155219845432 *1.8*

Nachar C., Lamy O., Sadeghipour F., Garnier A., Voirol P.; Medication reconciliation in a Swiss hospital: methods, benefits and pitfalls; Eur J Hosp Pharm 2019, doi: 10.1136/ejhpharm-2017-001358 *0.717*

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 Eur J Hosp Pharm, 2019; doi:10.1136/ejhpharm-2018-001788 *0.717*

Palmero D., Di Paolo E. , Stadelmann C., Pannatier A., Sadeghipour F., Tolsa J.-F.; Incident reports versus direct observation to identify medication errors and risk factors in hospitalised newborns; European journal of pediatrics 2019; doi.org/10.1007/s00431-018-3294-8 *2.188*

Bruggmann C., Iglesias J., 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 1-year follow-up study; American journal of cardiovascular drugs, 2019; doi.org/10.1007/s40256-019-00361-5 *2.578*

Scientific publications (without impact factor)

Fauchere F., Berger-Gryllaki M., Sadeghipour F.; Investigation of Drug-Packaging Interactions with Mass Spectroscopy Detectors: A Meta-Synthesis of the Literature; Pharmaceutical Technology in Hospital Pharmacy 2019; https://doi.org/10.1515/pthp-2018-0027

Congresses / conferences and Symposia

- Congresses / conferences organisation : 3
- Posters presentations : 17
- Oral presentations : 4
- Invited oral presentations : 2

Awards and distinction

Bruggmann C, Adjedj J, Held A, Diezi A-S, Morf A., Sohrmann M., Müller O., Voirol P., Sadeghipour F. « Mon cœur, Mon BASIC » : développement d'un outil e-learning destiné aux patients en post-infarctus du myocarde; 22èmes Journées Franco-Suisses de Pharmacie Hospitalière, 5-6 December 2019, Lausanne (**best poster award, 1st prize**).

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

F. Sadeghipour. Ruptures de médicaments. RTS, Emission TTC, September 30th, 2019.

IMMUNOPHARMACOLOGY OF CANCER

Professor Carole BOURQUIN

General description of Unit

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

Our research aims first at uncovering new mechanisms leading to activation of the immune system, for example during viral infections. Using this bioinspiration, our goal is to develop pharmacological ways to stimulate anticancer immunity.

We are currently working on the following questions:

- What is the early sequence of immune activation during a viral infection? How can we reproduce this sequence pharmacologically?
- How do virally-derived components, such as Toll-like receptor ligands, activate anti-cancer immunity and decrease cancer-associated immunosuppression?
- Can we enhance migration of effector T cells into the tumor with virally-derived components?
- Can we use nanoparticles as delivery system to focus their action and prevent unwanted side effects?

Specific research fields

- Impact of virally-derived components in anti-tumoral immune responses and lymphocyte migration
- Design of tumor-targeted immunostimulatory nanoparticles (TiNaps)
- Tumor and immune cell metabolism: their interplay for the development of tumor-related immune responses

2019 at a glance

- Publications with impact factor : 7
- Publications without impact factor : 0
- Patents : 0
- Book and chapters : 0
- Congresses / conferences organisation : 10
- Posters presentations : 14
- Oral presentations : 12
- Invited oral presentations : 9
- Number of projects at FNRS and assimilated (Research funds) : 7
- Service agreements and related activities : 0
- Ph.D. Theses presented in 2019 : 0
- Awards and distinctions: 4
- Public outreach activities : 9

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 2019 : CHF 177'006.—
Starting date : 01.01.2019

Swiss Cancer Research
"Impact of obesity on anti-tumor response to immunotherapy." (KFS-4535-08-2018-R)
Main applicant : Carole Bourquin
Total funding : CHF 368'850.--
Duration : 3 years
Allocation 2019 : CHF 123'000.—
Starting date : 01.03.2019

Horizon 2020 Marie Sklodowska – Curie Action Innovative Training Network "IMMUTRAIN - Training Network for the Immunotherapy of Cancer"
Grant Agreement n° 641549 (Swiss participation funded by SEFRI to C. Bourquin)
Coordinator: Ludwig-Maximilians-Universität München
Co-applicants: Stichting Katholieke Universiteit, The Netherlands, Roche Diagnostics, Germany, The Nottingham Trent University, United Kingdom, Istituto Europeo di Oncologia, Italy, Medizinische Universität Innsbruck, Austria, Fundacion Centro Nacional de Investigationes Oncologicas Carlos III, Spain, Region Hovedstaden, Denmark, Institut Gustave Roussy, France, Université de Genève, Switzerland
Total funding (Bourquin project): CHF 334'310.--
Duration: 4 years
Allocation 2019: CHF 74'094.--
Overheads: CHF 24'000.--
Starting date : 01.12.2015

Fondation Ernest Boninchi
"Le métabolisme des glococorticoïdes dans l'immunité anti-tumorale"
Main applicant: Carole Bourquin
Total funding: CHF 80'000.-
Duration: 2 years
Allocation 2019: CHF 80'000.-
Starting date: 01.05.2019

Cell Migration
Programme doctoral SwissUniversities Cell Migration
Main applicant : Carole Bourquin
Total funding: CHF 24'000.-
Duration: 2 years
Allocation 2019: CHF 12'000.- Starting date : 01.07.2018

Fondation Ernst et Lucie Schmidheiny
Soutien à l'achat de l'appareil Incucyte
Main applicant : Carole Bourquin
Total funding : CHF 80'000.-
Duration : one-off payment
Allocation 2019 : CHF 80'000.-
Starting date : 01.05.2019

Société Académique

Soutien à l'achat de l'appareil Incucyte
Main applicant : Carole Bourquin
Total funding : CHF 14'500.-
Duration : one-off payment
Allocation 2019 : CHF 14'500.-
Starting date : 01.07.2019

Total amount for all research funds for 2019: CHF 383'594.-

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 2019, 15:1267-1281. *4.5*

Hočevar S.; Milošević A.; Rodriguez-Lorenzo L.; Ackermann-Hirschi L.; Mottas I.; Petri-Fink A.; Rothen- Rutishauser B.; Bourquin C.*; Clift MJD.* (*shared senior authorship). Polymer-coated gold nanospheres do not impair the innate immune function of human B lymphocytes in vitro. ACS Nano 2019, 13:6790-6800. *13.9*

Thauvin C.; Widmer J.; Mottas I.; Hocevar S.; Allémann E.; Bourquin C.*; Delie F.* (*shared senior authorship). Development of resiquimod-loaded modified PLA-based nanoparticles for cancer immunotherapy: A kinetic study. Eur J Pharm Biopharm 2019, 139:253-261. *4.6*

Rapp M.; Wintergerst M.; Kunz W.; Vetter V.; Knott M.; Lisowski D.; Haubner S.; Moder S.; Thaler R.; Eiber S.; Meyer B.; Röhrle N, Piseddu I, Grassmann S, Layritz P, Kühnemuth B, Stutte S, Bourquin C*, von Andrian U*, Endres S*, Anz D* (*shared senior authorship). CCL22 controls immunity by promoting regulatory T cell communication with dendritic cells in lymph nodes. Journal of Experimental Medicine, 2019, 216:1170-1181. *10.8*

Mottas I.*; Bekdemir A.*; Cereghetti A.; Spagnuolo L.; Yang YS.; Müller M.; Irvine D.; Stellacci F.*; Bourquin C.* (*shared first and senior authorship). Amphiphilic nanoparticle delivery enhances the anticancer efficacy of a TLR7 ligand via local immune activation. Biomaterials 2019, 190-191:111-120. *8.8*

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, 2019; 154:104192. *5.6*

Bourquin C.: Bionanomaterials for the Delivery of Cancer Immunotherapy. Chimia, 2019; 73(1):69-72. *1.1*

Congresses / conferences and Symposia

- Congresses / conferences organisation : 10
- Posters presentations : 14
- Oral presentations : 12
- Invited oral presentations : 9

Awards and distinction

Taskoparan, B., Puddinu, V., Spagnuolo, L., Bourquin, C., The immune regulatory impact of intratumoral HMGB1 on anticancer immunity. **SSAI Travel Award**,. 13th World Immune Regulation Meeting (WIRM-XIII), 5 to 9 April, 2019, Davos (Switzerland).

Wagner, J., Novel vaccines, delivery systems and drug discovery methods. **Best Presentation Award**, World Immune Regulation Meeting (WIRM-XIII), April 5 to 9 April 2019, Davos (Switzerland).

Taskoparan, B., Puddinu, V., Spagnuolo, L., Bourquin, C. Intratumoral expression of HMGB1 controls the anticancer immune response (**Travel Award**). 17th CIMT Annual Meeting, 21-23 May 2019, Mainz (Germany).

Bourquin, C. Etudes pratiquées in vitro sur les interactions entre nanoparticules et système immunitaire. **Prix FENRIV de la Fondation E. Naef pour la Recherche In Vitro**, November 23, 2019, Geneva (Switzerland).

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

C. Bourquin. “International Day of Women and Girls in Science”, organisé par le CERN. Présentation à la classe de 4P de l’école Pont-Bochet, February 11, 2019, Thônex (Switerland).

C. Bourquin. Organisation d'un atelier pratique pour classes d'école primaire "Développons un médicament contre le cancer" avec Prof. M. Cuendet et Prof. P. Nowak. Université de Genève, March 14, 2019, Geneva (Switzerland).

C. Bourquin. Stage d’un collégien, Gilles Georges. Université de Genève, 17-21 June 2019, Geneva (Switzerland).

C. Bourquin. Medicines made of solid gold. Press release from the University of Geneva, June 27, 2019, Geneva (Switzerland).

C. Bourquin. Des médicaments en or massif. Communiqué de presse de l’Université de Genève, June 28, 2019, Geneva (Switzerland).

C. Bourquin. Journée Futur en tous genres : accueil d’une élève en laboratoire pour une journée. Université de Genève, November 14, 2019, Geneva (Switzerland).

C. Bourquin. Le rôle de l’inflammation dans le cancer. Radio RTS, Emission CQFD, November 2019, Geneva (Switzerland).

C. Bourquin. La recherche alternative est à l’honneur. Le journal de l’UNIGE No 168, December 2019, Geneva (Switzerland).

C. Bourquin. Un test in vitro pour étudier les nanomédecines. Présentation grand public, Hôtel Royal, December 2019, 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 signaling pathways, unexpected mechanisms of resistance and may lead to new drug discovery alleys.

Specific research fields

Multidrug combination optimizations for cancer treatment

Cell fate mechanisms

3D patient-derived co-cultures to test drug combinations

2019 at a glance

- Publications with impact factor: 9
- Publications without impact factor: 1
- Patents : 1
- Book and chapters: 0
- Congresses / conferences organisation: 1
- Posters presentations: 11
- Oral presentations: 5
- Invited oral presentations: 10
- Number of projects at FNRS and assimilated (Research funds): 3
- Service agreements and related activities: 0
- Ph.D. Theses presented in 2019: 0
- Awards and distinctions: 4
- Public outreach activities: 7

Research funds

Swiss Innovation Agency - InnoSwiss
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: 361'000 CHF
Total duration of the project: 18 months
Allocation 2019: 65'000 CHF
Starting date : 01.11.2018

Foundation or the cancer fight and for the medico-biological research
Personalized drug combination optimization for effective treatment of colorectal cancer
Main applicant: Prof. Patrycja Nowak-Sliwinska
Total funding of the project: 150'000 CHF
Total duration of the project: 3 years
Allocation 2019: 50'000 CHF
Starting date : 01.11.2018

ERC Starting Grant (ERC-2015-StG -LS7-680209)
Optimized drug combinations for effective cancer treatment: a personalized approach
Main applicant: Prof. Patrycja Nowak-Sliwinska
Total funding of the project: 1'200'000 EURO
Total duration of the project: 4 years
Allocation 2019: 300'000 CHF
Starting date : 01.05.2016

Total amount for all research funds for 2019: CHF 415'000.-

Scientific publications (with impact factor)

Berndsen, R. H.; Castrogiovanni, C.; Weiss, A.; Rausch, M.; Dallinga, M. G.; Miljkovic-Licina, M.; Klaassen, I.; Meraldi, P.; van Beijnum, J. R.; Nowak-Sliwinska, P., Anti-angiogenic effects of crenolanib are mediated by mitotic modulation independently of PDGFR expression. Br J Cancer 2019, 121 (2), 139-149. *5.92*

Berndsen, R. H.; Swier, N.; van Beijnum, J. R.; Nowak-Sliwinska, P., Colorectal Cancer Growth Retardation through Induction of Apoptosis, Using an Optimized Synergistic Cocktail of Axitinib, Erlotinib, and Dasatinib. Cancers (Basel) 2019, 11 (12), 1878. *6.16*

Griffioen, A. W.; Nowak-Sliwinska, P., Cell death rocks. Apoptosis 2019, 24 (3-4), 205-207. *4.02*

Nowak-Sliwinska, P.; Scapozza, L.; Ruiz, I. A. A., Drug repurposing in oncology: Compounds, pathways, phenotypes and computational approaches for colorectal cancer. Biochim Biophys Acta Rev Cancer 2019, 1871 (2), 434-454. *8.82*

Nowak-Sliwinska, P.; van Beijnum, J. R.; Huijbers, E. J. M.; Gasull, P. C.; Mans, L.; Bex, A.; Griffioen, A. W., Oncofoetal insulin receptor isoform A marks the tumour endothelium; an underestimated pathway during tumour angiogenesis and angiostatic treatment. Br J Cancer 2019, 120 (2), 218-228. *5.92*

Renfrew, A. K.; Karges, J.; Scopelliti, R.; Bobbink, F. D.; Nowak-Sliwinska, P.; Gasser,G.; Dyson, P. J., Towards Light-Activated Ruthenium-Arene (RAPTA-Type) Prodrug Candidates. Chembiochem 2019, 20 (22), 2876-2882. *2.52*

Weiss, A.; Le Roux-Bourdieu, M.; Zoetemelk, M.; Ramzy, G. M.; Rausch, M.; Harry,D.; Miljkovic-Licina, M.; Falamaki, K.; Wehrle-Haller, B.; Meraldi, P.; Nowak-Sliwinska, P., Identification of a Synergistic Multi-Drug Combination Active in Cancer Cells via the Prevention of Spindle Pole Clustering. Cancers (Basel) 2019, 11 (10). *6.16*

Yetkin-Arik, B.; Vogels, I. M. C.; Nowak-Sliwinska, P.; Weiss, A.; Houtkooper, R. H.; Van Noorden, C. J. F.; Klaassen, I.; Schlingemann, R. O., The role of glycolysis and mitochondrial respiration in the formation and functioning of endothelial tip cells during angiogenesis. Sci Rep 2019, 9 (1), 12608. *4.12*

Zoetemelk, M.; Rausch, M.; Colin, D. J.; Dormond, O.; Nowak-Sliwinska, P., Short-term 3D culture systems of various complexity for treatment optimization of colorectal carcinoma. Sci Rep 2019, 9 (1), 7103. *4.12*

Scientific publications (without impact factor)

Rausch, M.; Dyson, P. J.; Nowak-Sliwinska, P., Recent Considerations in the Application of RAPTA-C for Cancer Treatment and Perspectives for Its Combination with Immunotherapies. Advanced Therapeutics 2019, 2 (9), 1900042.

Patents

Nowak-Sliwinska, P.; Merladi, P.; Weiss, A.; LeRoux-Bourdieu, M., Methods of identification of synergistic anti-cancer multidrug combinations and uses thereof 2019, Patent number P2398EP00

Congresses / conferences and Symposia

- Congresses / conferences organisation: 1
- Posters presentations: 11
- Oral presentations: 5
- Invited oral presentations: 10

Awards and distinction

Nowak-Sliwinska, P., **2019 award from The Swiss Laboratory Animal Science Association SGV)**, **one prize per year**, 12-13 December 2019, Zurich (Switzerland).

Zoetemelk, M.; Rausch, M.; Colin, D. J.; Dormond, O.; Nowak-Sliwinska, P., **Biomedical Picture of the day by the London Institute of Medical Sciences**, 15 June 2019, London (United Kingdom).

Ducrey E. **The best master thesis. 1st prize**, School of Pharmaceutical Sciences, September 23rd, 2019, Geneva (Switzerland).

Zoetemelk, M.; Rausch, M.; Ducrey, E.; Zweifel, S.; Ramzy, G.; Nowak-Sliwinska, P., **Best poster presentation, 2nd prize**. 2nd Symposium of Transitional Center in Oncohaematology, *Bridging the gap between basic science and clinical practice, October 14th, 2019, Geneva (Switzerland).*

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

P. Nowak-Sliwinska. La 3D pour tester en 5 jours des traitements personnalises. Radio RTS, Emission CQFD, June 23rd, 2019, Geneva (Switzerland).

P. Nowak-Sliwinska. Cellules d'elevage et placenta pour réduire les tests sur l'animal. Tribune de Genève, Novembre 30th, 2019, Geneva (Switzerland).

P. Nowak-Sliwinska. Un traitement personnalisé contre le cancer colorectal en cinq jours, Campus, September 2019, n0138, Geneva (Switzerland).

P. Nowak-Sliwinska. 100 women and thousands more (https://100femmes.ch/#campagne).

P. Nowak-Sliwinska. Elargis tes horizons (https://www.unige.ch/rectorat/egalite/egalite-et-cite/jeunes/elargishorizons/), Geneva (Switzerland).

P. Nowak-Sliwinska. Un mélange inédit de molécules offre l'espoir d'une nouvelle arme anticancer. Le Journal, 166, November 7th 2019, Geneva (Switzerland).

P. Nowak-Sliwinska. Cancer: un mélange chimique prometteur à Genève, Le Matin, October 23rd, 2019, Geneva (Switzerland).

PHARMACEUTICAL BIOCHEMISTRY

Professor Yogeshvar KALIA

Professor Leonardo SCAPOZZA

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.

2019 at a glance

- Publications with impact factor : 31
- Publications without impact factor : 2
- Patents : 0
- Book and chapters : 1
- Congresses / conferences organisation : 1
- Posters presentations : 22
- Oral presentations : 7
- Invited oral presentations : 10
- Number of projects at FNRS and assimilated (Research funds) : 14
- Service agreements and related activities : 5
- Ph.D. Theses presented in 2019 : 1
- Awards and distinctions: 3
- Public outreach activities : 4

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 2019: 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 2019: CHF 73'185
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 2019: CHF 0
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 2019: CHF 0
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 2019: 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 2019: CHF 0
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 2019: CHF 110’268.62
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 2019: Euro 25’000 - CHF 28’892.5
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 2'279'020.Fr.)
Total duration of the project: 3.5 years
Allocation 2019: CHF 83’542
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
Total duration of the project: 2 years
Allocation 2019: CHF 480’000
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 finding of the project: CHF 733’641 (from 2'528'452.- Fr)
Total duration of the project: 4 years
Allocation 2019: CHF 179’259
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 254’030,4
Total duration of the project: 18 months
Allocation 2019: CHF 127’015
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 2019: CHF 62’802
Starting date: 01.10.2019

INNOGAP A2AR NAM UNI S19228
Innogap round 18 , technologie 1045-A983 - “A2AR NAMs for Cancer immunotherapy*
Main applicant: L. SCAPOZZZA
Total funding of the project: CHF 30’000
Total duration of the project: 2 years
Allocation 2019: CHF 0
Starting date: 01.02.2018

Total amount for all research funds for 2019: CHF 1’208’575.12

Service agreements and related activities

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 2019: CHF 40’000
Starting date: 01.07.2018

FILAG MEDICAL CH Ltd - S19353 - FILAG TEXTILE
“Topical delivery of active ingredients from the Filabe textile wipe”
Main applicant: Y.KALIA
Total funding of the project: CHF 88’992
Total duration of the project: 18 months
Allocation 2019: CHF 32’044
Starting date: 18.06.2018

L'Oreal - S 17721 (Development)
"Topical delivery of excipients into skin"
Main applicant : Y. KALIA
Total amount for 2019: CHF 39'812

CRB SA Centre de Recherches Biocosmétiques - S19504 (Development)
"Investigation into the dermal and transdermal delivery of tocopheryl nicotinate"
Main applicant : Y. KALIA
Total amount for 2019: CHF 9'086

ECLOSION-AIDD - S19649 (Development)
Main applicant: L. SCAPOZZA
Total amount for 2019: CHF 71'288.55

Total amount (for all service agreements and related activities) for 2019: CHF 192'230.55

Scientific publications (with impact factor)

Arnold, Y. E.; Thorens, J.; Bernard, S.; Kalia, Y. N., Drug Transport across Porcine Intestine Using an Ussing Chamber System: Regional Differences and the Effect of P Glycoprotein and CYP3A4 Activity on Drug Absorption. Pharmaceutics 2019, 11 (3). *4.77*

Daneluti, A. L. M.; Neto, F. M.; Ruscinc, N.; Lopes, I.; Robles Velasco, M. V.; Do Rosario Matos, J.; Baby, A. R.; Kalia, Y. N., Using ordered mesoporous silica SBA-15 to limit cutaneous penetration and transdermal permeation of organic UV filters. Int J Pharm 2019, 570, 118633. *4.21*

Gou, S.; Del Rio-Sancho, S.; Singhal, M.; Laubach, H. J.; Kalia, Y. N., Er:YAG fractional laser ablation for cutaneous co-delivery of pentoxifylline and d-alpha-tocopherol succinate: A new approach for topical treatment of radiation-induced skin fibrosis. Eur J Pharm Sci 2019, 135, 22-31. *3.55*

Kandekar, S. G.; Singhal, M.; Sonaje, K. B.; Kalia, Y. N., Polymeric micelle nanocarriers for targeted epidermal delivery of the hedgehog pathway inhibitor vismodegib: formulation development and cutaneous biodistribution in human skin. Expert Opin Drug Deliv 2019, 16 (6), 667-674. *5.40*

Lapteva, M.; Del Rio-Sancho, S.; Wu, E.; Carbonell, W. S.; Bohler, C.; Kalia, Y. N., Fractional laser ablation for the targeted cutaneous delivery of an anti-CD29 monoclonal antibody - OS2966. Sci Rep 2019, 9 (1), 1030. *4.01*

Lapteva, M.; Mignot, M.; Mondon, K.; Moller, M.; Gurny, R.; Kalia, Y. N., Self-assembled mPEG-hexPLA polymeric nanocarriers for the targeted cutaneous delivery of imiquimod. Eur J Pharm Biopharm 2019, 142, 553-562. *4.70*

Quartier, J.; Capony, N.; Lapteva, M.; Kalia, Y. N., Cutaneous Biodistribution: A High-Resolution Methodology to Assess Bioequivalence in Topical Skin Delivery. Pharmaceutics 2019, 11 (9). *4.77*

Santer, V.; Molliard, S. G.; Micheels, P.; Rio-Sancho, S. D.; Quinodoz, P.; Kalia, Y. N.; Salomon, D., Hyaluronic Acid After Subcutaneous Injection-An Objective Assessment. Dermatol Surg 2019, 45 (1), 108-116. 2.19

Shatz, W.; Aaronson, J.; Yohe, S.; Kelley, R. F.; Kalia, Y. N., Strategies for modifying drug residence time and ocular bioavailability to decrease treatment frequency for back of the eye diseases. Expert Opin Drug Deliv 2019, 16 (1), 43-57. *5.40*

Singhal, M.; Merino, V.; Rosini, M.; Cavalli, A.; Kalia, Y. N., Controlled Iontophoretic Delivery in Vitro and in Vivo of ARN14140-A Multitarget Compound for Alzheimer's Disease. Mol Pharm 2019, 16 (8), 3460-3468. 4.39

Tyagi, V.; Del Rio-Sancho, S.; Lapteva, M.; Kalia, Y. N., Topical iontophoresis of buflomedil hydrochloride increases drug bioavailability in the mucosa: A targeted approach to treat oral submucous fibrosis. Int J Pharm 2019, 569, 118610. 4.21

Crowell, S. R.; Wang, K.; Famili, A.; Shatz, W.; Loyet, K. M.; Chang, V.; Liu, Y.; Prabhu, S.; Kamath, A. V.; Kelley, R. F. Influence of Charge, Hydrophobicity, and Size on Vitreous Pharmacokinetics of Large Molecules. Transl Vis Sci Technol 2019, 8, 1–9. 2.39

Phung, W.; Han, G.; Polderdijk, S.; Dillon, M.; Shatz, W.; Liu, P.; Bingchuan, W.; Pawankumar, S.; Fischer, D.; Spiess, C.; Bailey, A.; Carter, P. J.; Lill, J. R.; Sandoval, W., Characterization of Bispecific and Mispaired IgGs by Native Charge-Variant Mass Spectrometry. IJMS 2019, 446, 1–9. 4.18

Shatz, W.; Hass, P. E.; Peer, N.; Paluch, M. T.; Blanchette, C.; Han, G.; Sandoval, W.; Morando, A.; Loyet, K. M.; Bantseev, V.; Booler, H.; Crowell, S; Kamath, A.; Scheer, J. M.; Kelley, R. F., Identification and Characterization of an Octameric PEG-Protein Conjugate System for Intravitreal Long-Acting Delivery to the Back of the Eye. PLoS ONE 2019, 14, e0218613–e0218620. 2.77

Cui, M.; Qi, Q.*; Gurry, T.; Zhao, T.; An, B; Pu, J; Gui, X; Cheng, A; Zhang, S; Xun, D; Becce, M; Liu, C; Briatico-Vangosa, F; Lu, TK; Zhong, C. Modular genetic design of multi-domain functional amyloids: insights into self-assembly and functional properties. Chemical Science 2019, 10, 4004-4014. 9.6

Brito, I*; Gurry, T; Cleary, B; Stowey, S; Gevers, D; Shea, T; Birren, B; Naisilisili, W; Jenkins, A; Jupiter, S; Alm, EJ. Transmission of human-associated microbiota along family and social networks. Nature Microbiology 2019, doi: 0.1038/s41564-019-0409-6 14.3

Ibrahim, W. W.; Abdelkader, N. F.; Ismail, H. M.; Khattab, M. M., Escitalopram Ameliorates Cognitive Impairment in D-Galactose-Injected Ovariectomized Rats: Modulation of JNK, GSK-3beta, and ERK Signalling Pathways. Sci Rep 2019, 9 (1), 10056. 4.12

Festa, B.P.; Berquez, M.; Gassama, A; Amrein, I.; Ismail, H.M.; Samardzija, M.; Staiano, L.; Luciani, A.; Grimm, C.; Nussbaum, R.L.; De Matteis, M.A.; Dorchies, O.M. Scapozza, L.; Wolfer, D.P.; Devuyst, O., Structure-based drug design Structure-based drug design impairs endolysosomal function in a humanized mouse model for Lowe syndrome and Dent disease. Hum Mol Genet 2019, 28(12), 1931-1946. 4.54

György, B., Nist-Lund, C., Pan, B., Asai, Y., Karavitaki, K. D., Kleinstiver, B. P., Garcia, S. P., Zaborowski, M. P., Solanes, P., Spataro, S., Schneider, B. L., Joung, J. K., Géléoc, G., Holt, J. R., & Corey, D. P. Allele-specific gene editing prevents deafness in a model of dominant progressive hearing loss. Nature medicine 2019, 25(7), 1123–1130. 30.64

Ghattas, M. A.; Eissa, N. A.; Tessaro, F.; Perozzo, R.; Scapozza, L.; Obaid, D.; Atatreh, N., Structure-based drug design and in vitro testing reveal new inhibitors of enoyl-acyl carrier protein reductases. Chem Biol Drug Des 2019, 94 (2), 1545-1555. 2.3

Balaphas, A.; Meyer, J.; Perozzo, R.; Fontana, P.; Berndt, S.; Turzi, A.; Morel, P.; Scapozza, L.; Sadoul, K.; Gonelle-Gispert, C.; Buhler, L., Interactions between platelets and liver sinusoidal endothelial cells promote hepatic stellate cells to drive liver regeneration. British Journal of Surgery 2019, 106, 8-9. 5.57

Dorchies, O.; Neff, L.; Gayi, E.; Baulet, C.; Fabien, S.; de Mestral, R.; Hafner, P.; Fischer, D.; Dor, T.; Scapozza, L., Paediatric use of tamoxifen: good safety profile for boys with Duchenne muscular dystrophy and X-linked myotubular myopathy. Neuromuscular Disorders 2019, 29, S88-S89 *2.61*

2Moll, S.; Desmouliere, A.; Moeller, M. J.; Pache, J. C.; Badi, L.; Arcadu, F.; Richter, H.; Satz, A.; Uhles, S.; Cavalli, A.; Drawnel, F.; Scapozza, L.; Prunotto, M., DDR1 role in fibrosis and its pharmacological targeting. Biochim Biophys Acta Mol Cell Res 2019, 1866, 118474. *4.73*

Nowak-Sliwinska, P.; Scapozza, L.; Altaba, A. R. I., Drug repurposing in oncology: Compounds, pathways, phenotypes and computational approaches for colorectal cancer. Biochimica Et Biophysica Acta-Reviews on Cancer 2019, 1871, 434-454. *6.88*

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 2019, Epub 2019 Dec 13. *57.61*

Arcadu, F.; Benmansour, F.; Maunz, A.; Michon, J.; Haskova, Z.; McClintock, D.; Adamis, A. P.; Willis, J. R.; Prunotto, M., Deep Learning Predicts OCT Measures of Diabetic Macular Thickening From Color Fundus Photographs. Invest Ophthalmol Vis Sci 2019, 60, 852-857. *3.81*

Arcadu, F.; Benmansour, F.; Maunz, A.; Willis, J.; Haskova, Z.; Prunotto, M., Deep learning algorithm predicts diabetic retinopathy progression in individual patients. NPJ (Nature Partner Journals) Digit Med 2019, 2, 92.

Bruschi, M.; Petretto, A.; Santucci, L.; Vaglio, A.; Pratesi, F.; Migliorini, P.; Bertelli, R.; Lavarello, C.; Bartolucci, M.; Candiano, G.; Prunotto, M.; Ghiggeri, G. M., Neutrophil Extracellular Traps protein composition is specific for patients with Lupus nephritis and includes methyl-oxidized alphaenolase (methionine sulfoxide 93). Sci Rep 2019, 9, 7934. *4.01*

Ghiggeri, G. M.; D'Alessandro, M.; Bartolomeo, D.; Degl'Innocenti, M. L.; Magnasco, A.; Lugani, F.; Prunotto, M.; Bruschi, M., An Update on Antibodies to Necleosome Components as Biomarkers of Sistemic Lupus Erythematosus and of Lupus Flares. Int J Mol Sci 2019, 20. *4.18*

Sarkar, A.; Sohail, A.; Dong, J.; Prunotto, M.; Shinki, K.; Fridman, R.; Hoffmann, P. M., Live cell measurements of interaction forces and binding kinetics between Discoidin Domain Receptor 1 (DDR1) and collagen I with atomic force microscopy. Biochim Biophys Acta Gen Subj 2019, 1863, 129402. *3.68*

Zoffmann, S.; Vercruysse, M.; Benmansour, F.; Maunz, A.; Wolf, L.; Blum Marti, R.; Heckel, T.; Ding, H.; Truong, H. H.; Prummer, M.; Schmucki, R.; Mason, C. S.; Bradley, K.; Jacob, A. I.; Lerner, C.; Araujo Del Rosario, A.; Burcin, M.; Amrein, K. E.; Prunotto, M., Machine learning-powered antibiotics phenotypic drug discovery. Sci Rep 2019, 9, 5013. *4.01*

Scientific publications (without impact factor)

Shatz, W.; Blanchette, C.; Holder, P.; Kelley, R. F.; Perozzo, R.; Kalia, Y. N., Ferritin as a natural protein scaffold: Building a multivalent ferritin-Fab conjugate. LC-GC 2019, 37 Suppl 11 (Advances in Biopharmaceutical Analysis): 30-35.

Dorchies, O.M.; Brignol, T.N., Le tamoxifène dans l'arsenal thérapeutique des maladies neuromusculaires ? [Tamoxifen in the therapeutic arsenal of neuromuscular diseases?]. Cah Myol 2019, 19, 25-27.

Books or books chapters

Singhal, M.; Serna Jimenez, C. E.; Lapteva, M.; Kalia, Y. N. Transdermal Medical Devices: Formulation Aspects. [In] Innovative Dosage Forms: Design and Development at Early Stage, Y. Bachhav, Editor, Wiley-VCH Verlag, 2019, 245-280.

Congresses / conferences and Symposia

- Congresses / conferences organisation : 1
- Posters presentations : 22
- Oral presentations : 7
- Invited oral presentations : 10

Ph.D. Theses presented in 2019

- TYAGI Vasundhara
  «Advanced drug delivery systems to enhance topical oromucosal administration of therapeutic agents» - 22.11.19
  Prof. Yogeshvar Kalia

Awards and distinction

Cecchini, C.;Terenzi, C.;de Brito Salgado, D.;Ceserani, V.;Theurillat, J.P.;Tardy, S.; Scapozza, L., Design and synthesis of PROTACs HIF-1α and -2α degraders **SCS-DSM Best Poster Award in Chemical Biology,** SCS Fall Meeting 2019, 6 September 2019, Zurich (Suisse).

Sahi, E.; Garcia-Lopez, A.; Gouiller, A.; Petermann, O.; Scapozza, L., Targeting RNA Conformational Ensemble for Developing Therapeutics against Rare Disease: The Hutchinson-Gilford Progeria Syndrome **Winner of the fellowship for attending the conference** (poster and oral presentation), The 7th Radiz Rare Diseases Summer School, 10-12 July 2019, Zurich (Suisse).

Lazzarin, E.; Tardy, S.; Tessaro, F.; Cecchini, C.; Pannilunghi, S.; Miner, J.H.; Prunotto, M.; Scapozza L, Development of novel small molecule-based therapeutics to reduce fibrosis in Alport **Winner of the fellowship for attending the conference,** The 7th Radiz Rare Diseases Summer School, 10-12 July 2019, Zurich (Suisse).

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

Dorchies, O.M., Vidéo associée à un e-article de Le Temps. Une initiative veut faciliter les oppositions aux expérimentations menées sur des animaux, 28 February 2019, Geneva, Switzerland.
https://www.letemps.ch/suisse/une-initiative-veut-faciliter-oppositions-aux-experimentations-menees-animaux

Dorchies, O.M., Olivier Dorchies et la myopathie de Duchenne. Entretien en marge de Myology 2019, 6th International Congress of Myology, 25-28 March 2019, Bordeaux, France.
https://www.youtube.com/watch?v=Tt9-DFtHDrk

Neff, L.A., Entretien pour le Magazine du vendredi: Téléthon 2019.
https://latele.ch/emissions/telethon/telethon-s-2019-e-1

Gayi, E.; Neff, L.A., Affiche pour la promotion du Téléthon 2019 sur les réseaux sociaux.

PHARMACEUTICAL TECHNOLOGY

Professor Eric ALLEMANN

Professor Norbert LANGE

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 2019, 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

2019 at a glance

- Publications with impact factor : 8
- Publications without impact factor : 1
- Patents : 1
- Book and chapters : 0
- Congresses / conferences organisation : 0
- Posters presentations : 6
- Oral presentations : 4
- Invited oral presentations : 8
- Number of projects at FNRS and assimilated (Research funds) : 7
- Service agreements and related activities : 2
- Ph.D. Theses presented in 2019 : 0
- Awards and distinctions: 0
- Public outreach activities : 5

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 2019: 33'333.-
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 2019: CHF 193'293.-
Starting date: 01.02.2018

FNRS – IZSEZ0-180383
Colloidal nanoparticles as carriers for the delivery of bioactive natural products against cancers
Main applicant: Delie Florence
Total funding of the project: 22'500.-
Total duration of the project: 6 months
Allocation 2019: CHF 0.-
Starting date: 01.09.2018

FNRS –IZSEZ0-183349
Nanomedicines to deliver molecules from Georgian flora for the treatment of arthritic diseases
Main applicant: Allémann Eric
Total funding of the project: 21'500.-
Total duration of the project: 6 months
Allocation 2019: CHF 21'500.-
Starting date: 01.07.2019

INNOGAP Round 21
Phospho-prodrugs of 5-aminolevulinic
Main applicant: Lange Norbert
Total funding of the project:
Total duration of the project: 1 year
Allocation 2019: CHF 0.-
Starting date: 01.12.2019

TWENTYGREEN
Formulation of AMS microorganisms
Main applicant: Allémann Eric
Total funding of the project: 21'874.-
Total duration of the project: 9 months
Allocation 2019: CHF 10'000.-
Starting date: 01.07.2018

OPCW (Organization for the prohibition of chemical weapons
Poly (lactic-co-glycolic acid) (PLGA) nanoparticles as potential carriers of acetylcholinesterase reactivators across the blood brain barrier for nerve agent detoxification
Main applicant: Delie Florence
Total funding of the project: CHF 21'500.-
Total duration of the project: 6 months
Allocation 2019: CHF 20'100.-
Starting date: 01.11.2019

Total amount for all research funds: CHF 278'226.-

Service agreements and related activities

OM Pharma
Service
Total amount for 2019: CHF 8'008.-

BIACORE
Service
Total amount for 2019: CHF 1'700.-

Total amount (for all service agreements and related activities) for 2019: CHF 9'708.-

Scientific publications (with impact factor)

Adriouach, S.; Vorobiev, V.; Trefalt, G.; Allemann, E.; Lange, N.; Babic, A., Squalene-PEG: Pyropheophorbide-a nanoconstructs for tumor theranostics. Nanomedicine-Nanotechnology Biology and Medicine 2019, 15 (1), 243-251. *5.57*

Babic, A.; Vorobiev, V.; Trefalt, G.; Crowe, L. A.; Helm, L.; Vallee, J. P.; Allemann, E., MRI micelles self-assembled from synthetic gadolinium-based nano building blocks. Chemical Communications 2019, 55 (7), 945-948. *6.16*

Delie, F.; Capelle, M. A. H., In Michael Moeller's spirit. Eur J Pharm Biopharm 2019, 144, 1. *4.71*

Ribaux, P.; Britan, A.; Thumann, G.; Delie, F.; Petignat, P.; Cohen, M., Malignant ascites: a source of therapeutic protein against ovarian cancer? Oncotarget 2019, 10 (57), 5894-5905. *5.17*

Rocha, V. P. C.; da Rocha, C. Q.; Queiroz, E. F.; Marcourt, L.; Vilegas, W.; Grimaldi, G. B.; Furrer, P.; Allemann, E.; Wolfender, J. L.; Soares, M. B. P., Antileishmanial Activity of Dimeric Flavonoids Isolated from Arrabidaea brachypoda. Molecules 2019, 24 (1). *3.06*

Sansaloni-Pastor, S.; Bouilloux, J.; Lange, N.,The Dark Side: Photosensitizer Prodrugs. Pharmaceuticals (Basel) 2019, 12 (4). *3.80*

Thauvin, C.; Widmer, J.; Mottas, I.; Hocevar, S.; Allemann, E.; Bourquin, C.; Delie, F., Development of resiquimod-loaded modified PLA-based nanoparticles for cancer immunotherapy: A kinetic study. Eur J Pharm Biopharm 2019, 139, 253-261. *4.71*

Vorobiev, V.; Babic, A.; Crowe, L. A.; Van de Looij, Y.; Lenglet, S.; Thomas, A.; Helm, L.; Vallee, J. P.; Allemann, E., Pharmacokinetics and biodistribution study of self-assembled Gd-micelles demonstrating blood-pool contrast enhancement for MRI. International Journal of Pharmaceutics 2019, 568. *4.21*

Scientific publications (without impact factor)

Furrer, P. Formulation d'un gel oral anesthésiant en officine. PharmaJournal, 8 : 1-3, 2019.

Patents

Babic, A. Lange, N., 5-ALA Derivatives and use thereof 2019, Patent number US2018133320

Congresses / conferences and Symposia

- Congresses / conferences organisation : 0
- Posters presentations : 6
- Oral presentations : 4
- Invited oral presentations : 8

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

P. Furrer. Welcoming for college students and preparing healing creams, Boussole Program, March 5th, 2019, Geneva (Switzerland)

P. Furrer. Hôpital des nounours (manufacture of 25 kg of hydrogels and homeopathic placebo granules), May 13rd – 18th, 2019, Geneva (Switzerland)

P. Furrer. "Future of all kinds" Day welcoming 43 young people (6-12 years old) preparing hand creams, November 14th, 2019, Geneva (Switzerland)

P. Furrer Interview on the manufacture of ointments by Mr. Gabriel Burdet, anthoropology at the University of Lausanne, December 5th, 2019, Lausanne (Switzerland)

P. Furrer Interview on preservatives in cosmetic products by Ms. Marie-Thérèse Tercier, December 17th, 2019, College of Bulle (Switzerland)

PHARMACOGNOSY

Professor Muriel CUENDET

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

2019 at a glance

- Publications with impact factor: 2
- Publications without impact factor: 1
- Patents: 0
- Book and chapters: 0
- Congresses / conferences organisation: 1
- Posters presentations: 5
- Oral presentations: 5
- Invited oral presentations: 4
- Number of projects at FNRS and assimilated (Research funds): 2
- Service agreements and related activities: 0
- Ph.D. Theses presented in 2019: 1
- Awards and distinctions: 0
- Public outreach activities: 3

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 2019: CHF 270'472.00
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: 24 months
Allocation 2019: CHF 121'922.00
Starting date: 01.06.2019

Total amount for all research funds for 2019: CHF 392'394.00

Scientific publications (with impact factor)

Ahoua, A.R.C.; Monteillier, A.; Borlat, F.; Ciclet, O.; Marcourt, L.; Nejad Ebrahimi, S.; Koné, M.W.; Bonfoh, B.; Christen, P.; Cuendet, M., Anti-inflammatory and quinone reductase-inducing compounds from Beilschmiedia mannii. Planta Med 2019, 85 (5), 379-384. *2*.74

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 (2019) ahead of print. 4.25

Scientific publications (without impact factor)

Freitas M.; Issa M.E.; Cuendet M., Targeting the resistance in multiple myeloma. Proceedings. 2019, 11(1).

Congresses / conferences and Symposia

- Congress / conference organisation: 1
  European Society for Medical Oncology meeting (ESMO 2019, Barcelona, Spain). Preparation of the program and abstract selection for the "Developmental therapeutics" track.
- Posters presentations: 5
- Oral presentations: 5
- Invited oral presentations: 4

Ph.D. Theses presented in 2019

- Chantal Walter
  Targeting *Waddlia chondrophila* development cycle using genetic tools and metabolomics
  Director: Prof. Muriel Cuendet
  Co-Directors: Dr Philippe Christen, Dr Karl Perron

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

M. Cuendet. Un compte Twitter remet à leur place les titres tapageurs de la presse sur la science. Heidi. News, May 13, 2019.

M. Cuendet. Jury member for the competition “Ma thèse en 180 secondes”, April 9, 2019, Geneva (Switzerland).

M. Cuendet, C. Bourquin, P. Nowak-Sliwinska. Découvrons ensemble un médicament contre le cancer. Workshop for a class of 12-year old children, March 14, 2019, Geneva (Switzerland).

PHYTOCHEMISTRY AND BIOACTIVE NATURAL PRODUCTS

Professor Jean-Luc WOLFENDER

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

2019 at a glance

- Publications with impact factor : 27
- Publications without impact factor : 0
- Patents : 1
- Book and chapters : 2
- Congresses / conferences organisation : 1
- Posters presentations : 23
- Oral presentations : 10
- Invited oral presentations : 21
- Number of projects at FNRS and assimilated (Research funds) : 1

- Service agreements and related activities : 5
- Ph.D. Theses presented in 2019 : 2
- Awards and distinctions: 0
- Public outreach activities : 0

Research funds

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 319'161.00
Total duration of the project: 48 months
Allocation 2019: CHF 84'859.00
Starting date: 01.04.2019

Total amount for all research funds for 2019: CHF 84'859.-

Service agreements and related activities

Industry Partner, Geneva (ALICE)
Service, development and research agreement
Total amount for 2019: CHF 40'678.00

Industry Partner from the Arc Lemanic (SAPONINES)
Service – research agreement
Total amount for 2019: CHF 13'925.00

Industry Partner from the Arc Lemanic (NIHS)
Service, development and research agreement
Total amount for 2019: CHF 47'056.00

Zhejiang University and WANGBANGDE PHARMACEUTICAL GROUP
Service – research agreement
Total amount for 2019: CHF 16'641.00

Fonds Industrie
Research & Services
Total amount for 2019: CHF 18'992.00

Total amount (for all service agreements and related activities) for 2019: CHF 137'292.-

Scientific publications (with impact factor)

Wolfender, J.-L.; Litaudon, M.; Touboul, D.; Queiroz, E.F., Innovative omics-based approaches for prioritisation and targeted isolation of natural products - new strategies for drug discovery. Nat. Prod. Rep. 2019, 36: 855-868. *11.87*

Wolfender, J.-L.; Nuzillard, J.M.; van der Hooft, J.J.J; Renault J.H.; Bertrand, S., Accelerating metabolite identification in natural product research: toward an ideal combination of LC-HRMS/MS and NMR profiling, in silico databases and chemometrics. Anal. Chem. 2019, 91: 704-742. *6.35*

Olivier-Jimenez, D.; Chollet-Krugler, M.; Rondeau, D.; Beniddir, M.A.; Ferron, S., Delhaye, T.; Allard, P.-M.; Wolfender, J.-L.; Sipman, H.J.M.; Lücking, R.; Boustie, J.; Le Pogam, P., A database of high-resolution MS/MS spectra for lichen metabolites. Scientific Data 2019, 6: 294. *5.92*

Hamard, S.; Robroek, B.J.M.; Allard, P.M.; Signarbieux, C.; Zhou, S.; Saesong, T.; de Baaker, F ; Buttler, A.; Chiapusio, G.; Wolfender, J.-L.; Bragazza, L.; Jassey, V.E.J., Effects of Sphagnum Leachate on Competitive Sphagnum Microbiome Depend on Species and Time. Front Microbiol 2019, 10: 2042. *4.25*

Barthelemy, M.; Elie, N.; Pellissier, L.; Wolfender, J.-L.; Stien, D.; Touboul, D.; Eparvier, V., Structural Identification of Antibacterial Lipids from Amazonian Palm Tree Endophytes through the Molecular Network Approach. Int J Mol Sci 2019, 20. *4.18*

Buhlmann, E.; Horvath, C.; Houriet, J.; Kiehlmann, E.; Radtke, J.; Marcourt, L.; Wolfender, J.-L.; Wolfrum, C.; Schroder, S., Puerariae lobatae root extracts and the regulation of brown fat activity. Phytomedicine 2019, 64: 153075. *4.18*

Butassi, E.; Svetaz, L.A.; Zhou, S.; Wolfender, J.-L.; Cortes, J.C.G.; Ribas, J.C.; Diaz, C.; Palacio, J.P.; Vicente, F.; Zacchino, S.A., The antifungal activity and mechanisms of action of quantified extracts from berries, leaves and roots of Phytolacca tetramera. Phytomedicine 2019, 60: 152884. *4.18*

Kozioł, E ; Deniz, F.S.S ; Orhan, I.E.; Marcourt, L.; Budzyńska, B.; Wolfender, J.-L.; Crawford, A.D.; Skalicka-Woźniak, K., High-performance counter-current chromatography isolation and initial neuroactivity characterization of furanocoumarin derivatives from Peucedanum alsaticum L (Apiaceae). Phytomedicine 2019, 54: 259-264. *4.18*

Toure, S.; Desrat, S.; Pellissier L.; Allard, P.M.; Wolfender, J.-L.; Dusfour, I.,; Stien, D.; Eparvier, V., Characterization, Diversity, and Structure-Activity Relationship Study of Lipoamino Acids from Pantoea sp. and Synthetic Analogues. Int J Mol Sci 2019, 20: 1083. *4.18*

Rutz, A.; Dounoue-Kubo, M.; Ollivier, S.; Bisson, J.; Bagheri, M.; Saesong, T.; Ebrahimi, S.N.; Ingkaninan, K.; Wolfender, J.-L.; Allard, P.M., Taxonomically Informed Scoring Enhances Confidence in Natural Products Annotation. Front Plant Sci 2019, 10: 1329. *4.10*

Queiroz, E.F. ; Alfattani, A.; Afzan, A.; Marcourt, L.; Guillarme, D.; Wolfender, J.L., Utility of dry load injection for an efficient natural products isolation at the semi-preparative chromatographic scale. J Chromatogr A 2019, 1598: 85-91. *3.85*

Afzan, A.; Bréant, L.; Bellstedt, D.U.; Grant, J.R.; Queiroz, E.F.; Wolfender, J.L.; Kissling, J., Can biochemical phenotype, obtained from herbarium samples, help taxonomic decisions? – A case study using Gentianaceae. Taxon 2019, 68 (4), 771-782. *3.82*

Diop, E.H.A.; Queiroz, E.F.; Marcourt, L.; Kicka, S.; Rudaz, S.; Diop, T.; Soldati, T.; Wolfender, J.L., Antimycobacterial activity in a single-cell infection assay of ellagitannins from Combretum aculeatum and their bioavailable metabolites. J Ethnopharmacol 2019, 238: 111832. *3.41*

Righi, D.; Marcourt, L.; Koval, A.; Ducret, V.; Pellissier, L.; Mainetti, A.; Katanaev, V.L; Perron, K.; Wolfender, J.L.; Queiroz, E.F., Chemo-Diversification of Plant Extracts Using a Generic Bromination Reaction and Monitoring by Metabolite Profiling. ACS combinatorial science 2019, 21: 171-182. *3.20*

Afzan. A.; Kasim, N.; Ismail, N.H.; Azmi, N.; Ali, A.M.; Mat, N.; Wolfender, J.L., Differentiation of Ficus deltoidea varieties and chemical marker determination by UHPLC-TOFMS metabolomics for establishing quality control criteria of this popular Malaysian medicinal herb. Metabolomics 2019, 15: 35. *3.16*

Luca, S. V.; Czerwinska, M. E.; Miron, A.; Aprotosoaie, A. C.; Marcourt, L.; Wolfender, J.L.; Granica, S.; Skalicka-Wozniak, K., High-performance countercurrent chromatographic isolation of acylated iridoid diglycosides from Verbascum ovalifolium Donn ex Sims and

evaluation of their inhibitory potential on IL-8 and TNF-alpha production. J Pharm Biomed Anal 2019, 166, 295-303. *3.16*

Zhou. S.; Allard, P.M.; Wolfrum, C.; Ke, C.; Tang, C.; Ye, Y.; Wolfender, J.L., Identification of chemotypes in bitter melon by metabolomics: a plant with potential benefit for management of diabetes in traditional Chinese medicine. Metabolomics 2019, 15: 104. *3.16*

Protti-Sánchez, F. ; Quirós-Guerrero, L.M. ; Vásquez, V. ; Willink, B.; Pachecho, M. ; León, E. ; Pröhl, H. ; Bolaños, F., Toxicity and alkaloids profiling of the skin of the Golfo Dulcean poison frog Phyllobates vittatus (Dendrobatidae). J. Chem. Ecology 2019, 45, 914-925. *3.15*

Matutino Bastos, T.; Mannochio Russo, H.; Silvio Moretti, N.; Schenkman, S.; Marcourt, L.; Gupta, M.P.; Wolfender, J-L.; Ferreira Queiroz, E.; Botelho Pereira Soares, M., Chemical Constituents of Anacardium occidentale as Inhibitors of Trypanosoma cruzi Sirtuins. Molecules 2019, 24: 1299. *3.06*

Rocha, V. P. C.; da Rocha, C. Q.; Queiroz, E. F.; Marcourt, L.; Vilegas, W.; Grimaldi, G. B.; Furrer, P.; Allemann, E.; Wolfender, J. L.; Soares, M. B. P., Antileishmanial Activity of Dimeric Flavonoids Isolated from Arrabidaea brachypoda. Molecules 2019, 24 (1). *3.06*

Saesong, T.; Allard, P.M.; Queiroz, E.F.; Marcourt, L.; Nuengchamnong, N.; Temkitthawon, P.; Khorana, N.; Wolfender, J.L.; Ingkaninan, K., Discovery of lipid peroxidation inhibitors from Bacopa species prioritized through multivariate data analysis and multi–informative molecular network. Molecules 2019, 24 (16), 2989. *3.06*

Allard, S.; Allard, P.M.; Morel, I.; Gicquel, T., Application of a molecular networking approach for clinical and forensic toxicology exemplified in three cases involving 3-MeO-PCP, doxylamine, and chlormequat. Drug Test Anal 2019, 11: 669-677. *2.79*

Diop E.A.; Jacquat, J.; Drouin, N.; Queiroz, E.F.; Wolfender, J.L.; Diop, T.; Schappler, J.; Rudaz, S., Quantitative CE analysis of punicalagin in Combretum aculeatum extracts traditionally used in Senegal for the treatment of tuberculosis. Electrophoresis 2019, 40 (21), 2820-282. *2.75*

Aquino, N. C.; Queiroz, E. F.; Marcourt, L.; Freitas, L. B. N.; Araujo, E. V. O.; Leal, L. K. A. M.; Bezerra, A. M. E.; Boccard, J.; Wolfender, J. L.; Silveira, E. R., Chemical Composition and Anti-Inflammatory Activity of the Decoction from Leaves of a Cultivated Specimen of Myracrodruon urundeuva. J Brazil Chem Soc 2019, 30 (8), 1616-1623. *1.33*

Favre-Godal, Q.; Dorsaz, S.; Rutz, A.; Marcourt, L.; Gupta, M.; Sanglard, D.; Queiroz, E.F.; Wolfender, J.L., Identification of antifungal compounds from the root bark of Cordia anisophylla J.S. Mill. Journal of the Brazilian Chemical Society 2019, 30, 472-478. *1.33*

Koziol, E.; Luca, S. V.; Marcourt, L.; Nour, M.; Hnawia, E.; Jakubowicz-Gil, J.; Paduch, R.; Mroczek, T.; Wolfender, J. L.; Skalicka-Wozniak, K., Efficient extraction and isolation of skimmianine from New Caledonian plant Medicosma leratii and evaluation of its effects on apoptosis, necrosis, and autophagy. Phytochem Lett 2019, 30, 224-230. *1.33*

Luca, S.-V.; Czerwińska, M.E.; Marcourt, L.; Miron, A.; Aprotosoaie, A.C.; Ciocarlan, N.; Wolfender, J.L.; Granica, S.; Skalicka-Woźniak, K., Inhibition of cytokine secretion by scrophuloside A3 and gmelinoside L isolated from Verbascum blattaria L. by high-performance countercurrent chromatography. Phytochemistry Letters 2019, 31: 249-255. *1.33*

Patents

Saldanha, L.L.; Aparecida de Paula Camaforte, N.; Vareda P.M.P.; Marcourt, L.; Ebrahimi, S.N; Vilegas, W.; Bosqueiro, J.R.; Dokkedal, A.L.; Queiroz, E.F.; Wolfender, J.L., Use of cyanoglucosides and pharmaceutical formulations thereof in the treatments of diabetes 2019, Patent number US 16313560.

Books or books chapters

Brkljača, R.; Wolfender, J.L.; Urban, S., Dereplication and Identification of Natural Products Using LC-NMR Based Strategies [In] Reference Module in Chemistry 2019, Molecular Sciences and Chemical Engineering, Editor, Elsevier, 2019.

Wolfender, J.L.; Allard, P.; Donoue-Kubo, M.; Queiroz, E. F., Metabolomics strategies for the dereplication of polyphenols and other metabolites in complex natural extracts [In] Recent Advances in Polyphenol Research, Volume 6. Halbwirth H., Karl S., Veronique C., Stephane Q., Editor, Wiley, 2019, 183-205.

Congresses / conferences and Symposia

- Congresses / conferences organisation : 1
- Posters presentations : 23
- Oral presentations : 10
- Invited oral presentations : 21
- Workshops : 9

Ph.D. Theses presented in 2019

- Davide RIGHI
  “Innovative chemo-diversification strategies to generate “unnatural” natural products”
  Director: Prof Jean-Luc WOLFENDER Co-director: Dr Emerson FERREIRA QUEIROZ

- Joëlle HOURIET
  “Holistic analytical approaches for the investigation of clinically relevant herbal preparations: a way to decipher biological activities at the molecular level for further evidence-based approaches“
  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.
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 interprofessionnality has been launched in 2019. Pharma24 as research partner will support a steady collection of routine-based adherence and patient data.

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 level), with a focus in harnessing the teaching of health communication 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. This research is at the interface between pharmaceutical and medical sciences.

2019 at a glance

- Publications with impact factor : 4
- Publications without impact factor : 3
- Patents : 0
- Book and chapters : 0
- Congresses / conferences organisation : 1
- Posters presentations : 4
- Oral presentations : 2
- Invited oral presentations : 9
- Number of projects at FNRS and assimilated (Research funds) : 3
- Service agreements and related activities : 0
- Ph.D. Theses presented in 2019 : 0
- Awards and distinctions: 1
- Public outreach activities : 1

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: 248 200 CHF
Total duration of the project 4 years
Allocation 2019: 80 191 CHF
Starting date : 01.04.2017

Qualité et Recherche Santésuisse Curafutura et Pharmasuisse
Medication adherence and renal failure
Main applicant : Maire Paule Schneider Voirol
Total funding of the project: 110 000 CHF
Total duration of the project: 5 years
Allocation 2019: 30 000 CHF
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: 124 993 CHF
Total duration of the project: 18 months
Allocation 2019: 92 793 CHF
Starting date: 01.10.2018

Total amount for all research funds for 2019: CHF 202 984.-

Scientific publications (with impact factor):

Sottas, O.; Guidi, M.; Thieffry, B.; Schneider, M.; Decosterd, L.; Mueller, I.; Genton, B.; Csajka, C.; Senn, N., Adherence to intermittent preventive treatment for malaria in Papua New Guinean infants: A pharmacological study alongside the randomized controlled trial. PLOS ONE 2019, 14 (2), e0210789. *2.776*

Perraudin, C.; Locca, J. F.; Rossier, C.; Bugnon, O.; Schneider, M. P., Implementation of an interprofessional medication adherence program for chronic patients in community

pharmacies: how much does it cost for the provider? BMC health services research 2019, 19 (1), 15. *1.932*

Dotta-Celio, J.; Alatri, A.; Locatelli, I.; Salvi, M.; Bugnon, O.; Schneider, M. P.; Mazzolai, L., Patient adherence to rivaroxaban in deep vein thrombosis, a cohort study in Switzerland: quantitative results. International journal of clinical pharmacy 2019, 41 (6), 1625-1633. *1.692*

Schneider, M. P.; Achtari Jeanneret, L.; Chevaux, B.; Backes, C.; Wagner, A. D.; Bugnon, O.; Luthi, F.; Locatelli, I., A Novel Approach to Better Characterize Medication Adherence in Oral Anticancer Treatments. Frontiers in pharmacology 2019, 9, 1567.doi: 10.3389/fphar.2018.01567 *3.845*

Scientific publications (without impact factor)

Schneider, M. P.; Sommer, J.; Senn, N., [Sustainable drug prescription: shared perspectives between physicians and pharmacists]. Revue médicale suisse 2019, 15 (650), 942-946.

Rimaud, C.; Backes, C.; Jeannot, J. G.; Schneider, M. P., Adhésion médicamenteuse: Quelles applications payantes peut-on recommander ? pharmaJournal 2019, 3, 22.

Gonzalez, A.; Pechere-Bertschi, A.; Burnier, M.; Schneider, M., [Medication adherence: the weakest link in blood pressure control]. Revue medicale suisse 2019, 15 (662), 1608-1613.

Congresses / conferences and Symposia

- Congresses / conferences organisation : 1
- Posters presentations : 4
- Oral presentations : 2
- Invited oral presentations : 9

Awards and distinction

Schneider M.P. **Honorary membership** of the International Society for Medication Adherence (ESPACOMP), 22 November 2019, Porto (Portugal).

Public outreach activities (radio, television and other media)

Rencontre avec Marie Schneider, une spécialiste de l'adhésion thérapeutique, Radio RTS, Emission CQFD, February 8, 2019, Lausanne (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

2019 at a glance

- Publications with impact factor: 6
- Publications without impact factor: 9
- Patents: 0
- Book and chapters: 0
- Congresses / conferences organisation: 0
- Posters presentations: 1
- Oral presentations: 6
- Invited oral presentations: 5
- Number of projects at FNRS and assimilated (Research funds): 2
- Service agreements and related activities: 1
- Ph.D. Theses presented in 2019: 1
- Awards and distinctions: 0
- Public outreach activities: 1

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: 1'633'470 CHF
Total duration of the project: 4 years
Allocation 2019: 486'575 CHF
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: 917'280 CHF (246'355 CHF allocated to the University of Geneva)
Total duration of the project: 2 years
Allocation 2019: 0 CHF
Starting date: 01.01.2020

Total amount for all research funds for 2019: CHF 486'575.-

Service agreements and related activities

Research partnership with Dr. Silvia Stringhini (Unité d'Epidémiologie Populationnelle), University of Geneva, Amount: 40'000 CHF

Total amount for 2019: CHF 40'000.-

Scientific publications (with impact factor)

Guerrier, S.; Dupuis-Lozeron, E.; Ma, Y.; Victoria-Feser, M.P., Simulation-based bias correction methods for complex models. Journal of the American Statistical Association 2019, 114 (525), 146-157. *3.412*

Xu, H.; Guerrier, S.; Molinari, R.; Karemera, M., Multivariate signal modeling with applications to inertial sensor calibration. IEEE Transactions on Signal Processing 2019, 67 (19), 5143-5152. *5.230*

Wang, Y.; Gardoni, P.; Murphy, C.; Guerrier, S., Predicting fatality rates due to earthquakes accounting for community vulnerability. Earthquake spectra 2019, 35 (2), 513-536. *2.005*

Radi, A.; Bakalli, G.; Guerrier, S.; El-Sheimy, N.; Sesay, A.B.; Molinari, R., A multisignal wavelet variance-based framework for inertial sensor stochastic error modeling. IEEE Transactions on Instrumentation and Measurement 2019, 68 (12), 4924-4936. *3.067*

Lachance, J.C.; Radhakrishnan, S.; Madiwale, G.; Guerrier, S.; Vanamala, J.K., 2020. Targeting hallmarks of cancer with a food-system–based approach. Nutrition 2020, 69 (110563), 1-23. *3.591*

Wang, Y.V.; 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), 1-26. *2.065*

Scientific publications (without impact factor)

a. Conference proceedings

Khaghani, M.; Guerrier, S.; Skaloud, J.; Zhang, Y., Optimal stochastic sensor error modeling based on actual Impact on quality of GNSS-INS Integrated navigation, Proceedings of the ION GNSS 2019, Miami, FL, USA.

b. E-books

Beckman, M.; Guerrier, S.; Lee, J.; Molinari, R.; Orso, S., An Introduction to Statistical Programming Methods with R, full text: http://r.smac-group.com.

Guerrier, S.; Molinari, R.; Xu, H.; Zhang, Y., Applied Time Series Analysis with R, full text: http://ts.smac-group.com.

c. Selected submitted manuscript in methodological statistics (made available on arXiv)

Guerrier, S.; Karemera, M.; Orso, S.; Victoria-Feser, M.-P., Asymptotically optimal bias reduction for parametric models, full text: https://arxiv.org/abs/2002.08757.

Guerrier, S.; Molinari, R.; Victoria-Feser, M.-P., Robust two-step wavelet-based inference for time series models, full text: https://arxiv.org/abs/2001.04214.

Guerrier, S.; Karemera, M.; Orso, S.; Victoria-Feser, M.-P., A simple recipe for making accurate parametric inference in finite sample, full text: https://arxiv.org/abs/1901.06750.

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: 1
- Oral presentations: 6
- Invited oral presentations: 5

Ph.D. Theses presented in 2019

- Dr. Samuel Orso
  Contributions to simulation-based estimation methods
  Directors: Maria-Pia Victoria-Feser, Stéphane Guerrier
  PhD awarded in January 2019

Public outreach activities
R Programming for Data Sciences, 3 ECTS, Geneva Summer School, July 2019

PhD PROGRAM

Prof. Y. Kalia, Director

Dr Béatrice Kaufmann, Coordinator

Ms Florence von Ow, Secretary

Introduction – general description

The PhD Program in Pharmaceutical Sciences proves 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.

In 2019, several new doctoral students began their PhD Theses started and in total, there are now 91 PhD students enrolled in the pharmaceutical sciences program. The School of Pharmaceutical Sciences became one of the six component programs of the Interfaculty Doctoral School in Life Sciences (PSLS, launched by the Faculty of Science and the Faculty of Medicine in 2018). The vast majority of our PhD students (75) asked to enroll in this newly created Doctoral School in Life Sciences (PhD in Life Sciences, mention pharmaceutical sciences, awarded jointly by the Faculty of Science and the Faculty of Medicine). Some (16) chose to stay under the previous regulations (PhD in sciences, mention pharmaceutical sciences, awarded solely by the Faculty of Science), these were mostly PhD Students close to their thesis defense, or performing a thesis in hospital pharmacy.
Around 150 of the 275 PhD students enrolled in the PSLS come from the Faculty of Sciences, and PhD students in pharmaceutical sciences represent therefore 25% of the total number of the PhD students in the PSLS.

All activities of our PhD Program are in priority intended for PhD students registered in the program, but we accept registrations from PhD students registered in other programs in the PSLS, when places are still 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. 20 TACS were conducted in 2019 (3 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

In 2019, 55 activities were proposed to the registered PhD students (65, if considering each "Conférence sur sujet specialisé" separately) of these 23 had to be postponed or cancelled, mainly due to a lack of participation. It has also to be highlighted that 3 new activities were proposed in 2019. A total of 488 hours was given within the 2019 PhD program (including all activities) and the level of participation of the PhD students in all five activities of the PhD program in Pharmaceutical Sciences was excellent (615 people registered, of which 396 PhD student inscriptions; see Tables 1-3).
Since numerous PhD theses started in 2019, an information session on the Doctoral programme in pharmaceutical sciences was organized in November. 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, and 62 PhD students of a total of 75 attended the session (83% attendance). Three members of the teaching staff were also present (including the Vice-Dean of the Faculty of Sciences), as well as the General Secretary of the CUSO, who honored us with his presence.

In 2019, there was also the third edition of the CILS, launched in 2017 by Academics from the Faculty of Science, Life Sciences employers and the Career Center of the University of Geneva (Uni-Emploi). So, the offer of courses common to CILS and doctoral school was maintained in 2019, with 44 PhD students participating in those activities.

The PhD Day was organized by the students of analytical sciences groups (Prof. J.-L. Veuthey and Prof. S. Rudaz) and was held on 12 June 2019 at the Hardt Foundation (Geneva). More than 70 attendees were present to start the program at 9 AM in a beautiful historical auditorium. Introductory speeches were given by Dr Gary Vachicouras presenting the history of the Hardt Foundation to the audience, followed by Prof. Leonardo Scapozza highlighting the importance of this traditional event for the students in the Life Sciences doctoral school. Afterwards, Prof. Jean-Luc Veuthey and Prof. Serge Rudaz illustrated the importance of analytical sciences through the increasing challenges accompanying the characterization of exo- and endogenous compounds in complex matrices.
Eleven senior PhD students presented their work to the audience and engaging discussions took place after each talk, continuing into the coffee breaks and during lunchtime. Prof. Isabelle Kohler from Leiden University was our invited keynote speaker. She presented and shared her opinions on clinical metabolomics for personalized medicine.
Together with the program, an evaluation form was handed out to the attendees to provide feedback to each PhD speaker. Therefore, the speakers received personalized feedback on their presentations via the collected survey sheets filled in by the audience.
The Doctoral Program Commission held a meeting on October 30th, and we have to highlight the participation of the PhD student representing his peers who was present and actively relayed remarks and questions from all PhD students.
The PhD students also attended the specialized seminars ("conférences spécialisées") proposed within the PhD program; 10 seminars were given by international researchers from academia and industry, for a total of 20 teaching hours. A total of 247 participants attended these lectures including 106 PhD students.

The 33rd « extra-muros » meeting for Ph.D. students in pharmaceutical sciences was held at the Parkhotel Beausite (Zermatt, VS) on the topic “Me, Myself and I”. It took place from September 2 to 5, 2019 and was organized by Pr Serge Rudaz, Pr Jean-Luc Veuthey, Dr Davy Guillarme ; Prof Farshid Sadeghipour, Prof. Pascal Bonnabry; with a great support of Mrs Florence Von Ow (secretary of the doctoral program). 19 national and international speakers, from academia and industry contributed to this event.

A brief overview and summary is provided below:

General Overview

The objective of this seminar was to highlight the latest trends in pharmaceutical sciences to improve patients' health in a translational perspective. For this edition, PhD students, postdocs, junior and senior investigators were present, and a special focus was put on the importance of e-data in the context of personalized medicine as well of the future trends that can be evidenced in pharmaceutical analysis and hospital pharmacy.
The scientific sessions organized for this 33rd edition of the seminar are detailed below, covering both fundamental and clinical aspects of pharmaceutical sciences, involving a wide range of novel treatment options, procedures and technologies. Numerous speakers from the academia and industry were present, including mostly Swiss colleagues and professors from the ISPSO. They presented cutting-edge approaches and results on their latest research, providing a unique view of the ongoing research and successes in pharmaceutical sciences.
Besides the scientific part of the seminar, another important aspect treated during this symposium was soft skills, to have the students informed of these important aspects for their future professional environment. Furthermore, colleagues from the Faculty of Medicine (UNIGE) were invited to manage two mindfulness-based intervention (French and English) and discuss with PhD the impact of stress to the thesis curriculum.

Last but not least, the participants were also required to present their own projects in the 5'5'5 (5 minutes, 5 slides, 5 questions) research sessions. All sessions were chaired by PhD students, giving these young researchers an opportunity to practice their skills as a chairperson. Since most speakers were present for at least two days at the congress venue, this gave rise to networking opportunities to participants alongside the official program. The vivid and friendly atmosphere conveyed by the participants favored many exchanges between them.

The different activities are listed and commented below.
Sessions
Four scientific sessions, and one practical workshop were proposed during the seminar.

Technological breakthrough: This session was mainly dedicated to artificial intelligence (AI) in medicine and to the development of new diagnostic tools in the healthcare system. The potential of artificial intelligence in precision medicine followed by the implementation of AI in a public hospital (HUG) was discussed in two presentations from the same speaker. Thus, the potential of the use of public data from internet for conducting targeted campaigns of public health was reported with nice examples dedicated to the problems of obesity or substance addiction. Finally, new micro-fabricated diagnostic tools used in precision medicine for detecting more rapidly and at lower cost cancer and neurodegenerative diseases were described.

Hospital Pharmacy 2050: This session was principally focused on the future of hospital pharmacy, particularly linked to the advances in all other hospital fields. Artificial intelligence is one of the principal breakthroughs in the matter of managing medical data and their influence on patient care. It will totally change the immediate availability of some information in clinical decision aid tools. It will directly affect the role of hospital pharmacists (clinicians and pharmaceutical technology specialists) in the future. We will have to adapt our vision by considering this technology. The position of clinician pharmacist has to be consolidated in the medical team. On the other hand, creating a culture of innovation in a university hospital is a big challenge, but its implementation in the hospital routine is somehow a much more important one. A striking example is the research issues of supporting continuity of pharmaceutical care from hospital to community. There is a growing requirement for patients to consider their clinical pathway as a whole.

Advances in Analytics: The goal of this session was to highlight some recent trends in the field of pharmaceutical analysis. In this context, two important topics were selected, namely the development of innovative tools for the characterization of proteins biopharmaceuticals, and the use of metabolomic workflow to find out some new disease biomarkers. For the biopharmaceuticals characterization, the first presentation introduces the different types of biopharmaceutical products, with a strong emphasis on antibody drug conjugates (ADCs). Then, the second and third presentations were given by an industrial and an academic researcher, to have both the industrial and academic vision of this type of analysis. Finally, two presentations were given in the field of metabolomics: the first one describes the analytical workflow to perform metabolomic study, highlighting the importance of mass spectrometry, while the last presentation shows how to face the huge amount of data generated in metabolomics.

Personalized Medicine: The goal of this session was first to determine the definition of personalized medicine, but also its limits. One of the main applications of this domain is the cancer treatment. Multidrug combination based on personalized medicine has a strong potential and the results are promising. Concomitantly, the emergence of immunotherapy, based on personalized analysis, seems to be an effective method, even if the costs will be financially problematic for our health systems.

Me, myself and I session: This session, which took place during the Wednesday afternoon, was organized around 2 workshops where small groups of students divided into two activities. The first workshop was given by a job-search specialist while the second concerned the writing of scientific projects. Participation in these workshops was excellent and all participants were satisfied with the quality of the external speakers invited. In addition, participants were invited to participate in mindfulness meditation sessions, conducted by invited colleagues from the Faculty of Medicine.

5'5'5 Sessions (5 minutes, 5 slides, 5 questions) : The students in their 2nd, 3rd, 4th and 5th year of PhD were asked to present their research project orally in 5 minutes, followed by 5 minutes of questions, and using only 5 slides as a support. These oral presentations were aimed at a general audience and were grouped in three sessions, which were chaired by PhD students. These presentations were very much appreciated by the participants, both as an exercise in outreach, to present their own research in a simple and creative manner, and as an entertaining way to discover another participants' research.

Evaluation by the PhD students
As usual, the meeting was evaluated by the participants From the 25 evaluation forms received; it appears that the general evaluation was between very good and excellent.

Positive comments:
• The seminar was very well organized
• Good variety of topics
• Good speakers
• Interesting idea to have PhD student chairing the sessions

To be improved
• During a session held in French a parallel program in English should be provided for non-French speaking attendants
• Some topics were sometimes too specialized
• More presentation from speakers outside university
• More self-development related talks or workshops

Suggestion for the future:
• Would be interesting to let young researchers (1st year of PhD) also presenting their work during the 5/5/5
The schedule, the content of the courses, hours and credits as well as all indications concerning the PhD program in Pharmaceutical Sciences are stored in a MySQL database and posted dynamically on the web page of the PhD program (http://epgl.unige.ch/pharm/fr/ [Etudes/programme doctoral]).

Table 1
List of courses organized within the PhD Program in Pharmaceutical Sciences 2019 and number of participants

Name of course 2019	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	5 (21)
Pharmacie hospitalière et communautaire 2	19H012	F. Sadeghipour	18	3	4 (35)
Design drugs with a computer	19H053	A. Daina, V. Zoete	16	2	9
Introduction to pharmaceutical industry: History, structures and Challenges	19H017	B. Baumeister	30	5	8 (+ 13 CILS students)
Formulation of protein biopharmaceuticals and drug delivery	19H013	T. Arvinte	20	5	4
Drug discovery: an industrial perspective	19H063	M. Prunotto	18	3	4 (+ 13 CILS students)
Biostatistics in drug development and clinical trials design	19H055	D. Warne, F. Curtin	24	4	2 (+ 13 CILS students)
Use of fluorescence spectroscopy in the study of drugs, protein and membrane	19H032	T. Arvinte	16	3	4 (24)
Therapeutic Drug Monitoring and its Application in Diagnostics and Clinical Research	19H045	L. Decosterd	6	1	CANCELLED
Initiation aux méthodes d'analyse multivariées en sciences pharmaceutiques	19H046	S. Rudaz, J. Boccard	12	3	12 (14)
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
Pharmacocinétique clinique	19H051	C. Csajka	16	2.5	CANCELLED
Microscopy and imaging course	14B063P	C. Bauer	32	3	4
Library PhD Camp: from Research to Publication	19H064	A.Bellier, V. Huber	8	1	1
Analytical tools characterizing protein-ligand interactions	19H002	R. Perrozzo	6	1	CANCELLED
Drug development: regulatory aspects and clinical trials	19H009	S. Latour, A. Mc Allister, A. Naik	24	4	4 (+ 13 CILS students) + 19 MSc students
Ethics in research	19H092	D. Sprumont	24	2.5	1 (+ 13 CILS students)
Toxicologie analytique forensique	19H031	C. Staub	8	1.5	CANCELLED
Biotechnology development	19H070	Various speakers from NovImmune	20	3	1 (+ 13 CILS students)
Personal genomics & predictive genetics	19H069	D. Kraus, G. Tanackovic	10	1.5	3 (+ 13 CILS students)
Aperçu de la pharmacovigilance pré et post-marketing	19H068	V. Rollason	16	1.5	3
Gestion de la qualité et responsabilités en sciences pharmaceutiques cliniques	19H058	M.-P. Schneider	16	2	CANCELLED
Suivi thérapeutique des médicaments en pratique clinique	19H059	N. Widmer	8	1.5	POSTPONED TO 2020
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	12 (13)
RMN	19H066	P. Miéville	12	2	CANCELLED
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	?	3	CANCELLED
Combination therapies for cancer and personalized medicine	19H080	P. Nowak-Sliwinska	6	1	3
Theory into practice: creating a successful business in Life Sciences	19H072	J. Camblong	10	1.5	5 (+ 13 CILS students)
Quality By Design (QBD) to ensure product quality and operational excellence (Lean 6 Sigma)	19H065	J. Repiton, J. Boccadoro	20	3	6 (+ 13 CILS students)
Pharmaceutical project and portfolio management	19H075	A. Sadler	6	1	9 (+ 13 CILS students)
Pre-clinical in vivo models	19H073	F. Chadaud-Barandun	20	4	0 (+ 13 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	1 (+ 13 CILS students)
SciFinder	19H090	G. Badet, M. Wick, P. Kamalaprija	3	0.5	6
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	47		730		117 PhD 263 others

Table 2
List of symposia organized within the PhD Program in Pharmaceutical Sciences 2019 and number of participants.

Name of course 2019	# Course no.	Course organizer	Total no. of hours	Credits	# No. of participants
PhD Day	19H020	Y. Kalia	8	1 or 2	54 PhD students, 7 post-doc, 5 profs/others
Conférences sur sujets spécialisés		Y. Kalia	10 days (20 hrs)	1,5 for 5 conf.	106 PhD students (247 total)
32nd « extra-muros » meeting, Zermatt	19H025	J.-L. Veuthey, S. Rudaz, P. Bonnabry, F. Sadeghipour, D. Guillarme	4 days (24 hrs)	1 or 2	37 PhD students, 2 post-doc, 5 profs/others
Ask the expert session « multiple sclerosis"	19H091	C. Bourquin	4	0.5	11

Table 3
List of networking activities organized within the PhD Program in Pharmaceutical Sciences 2019 and number of participants.

Name of course 2019	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	9
Votre programme doctoral se présente : general information session on the PhD in pharmaceutical sciences	19H093	Y. Kalia, B. Kaufmann	2	N/A	62 (+ 1 post-doc and 5 Profs/others)
L'industrie pharmaceutique se présente *	19H050	Y. Kalia	6	1	CANCELLED
Career day **	19H007	Y. Kalia	7	1	30 (?)

*to be reorganized next year

**the career day of the Faculté des Sciences was proposed to the PhD students, and they forgot to register on our website as well.

Public research funds (CUSO)

Conférence Universitaire de Suisse Occidentale (CUSO)

A budget reduction of 23% was announced by the CUSO for 2019 in comparison with 2018. The readapted program as well as the budget for 2019 were submitted to the CUSO in Sep 2018 and they were duly accepted. The total budget in 2019 for the five activities (Seminar Extra-Muros, Conférences spécialisées, Cours, Symposia as well as Networking activities) was 65'200.- CHF and was covered by the funds allocated by the CUSO. One 2018 activity was rescheduled in 2019 along with its budget, and the final amount for 2019 activities was 67'340.-.

We dramatically reduced the amount allocated to the extra-muros Zermatt seminar, and took advantage of the financing of activities common with the CILS by the Faculty of Sciences (the number of CILS students largely exceeds the PhD students attending those courses).

The costs for 2019 for all the activities were 61'898.12.- CHF, thus leaving 5'441.88- CHF unused (including the budget of the reported 2018 activity, which unfortunately had to be cancelled). The difference between the requested budget and the costs incurred was due to the cancellation of events. One of them was carried over to 2020 along with its budget (1 course for a total of 80.- CHF), as well as lower expenses for some courses, including "conférences sur sujets spécialisés". Part of the unused money could be used for covering the costs related to the new activities that were not budgeted initially, such as "votre programme doctoral se présente".

We 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.