



THE UNIVERSITY OF BRITISH COLUMBIA

Molecular and Systems Pharmacology

Faculty of Pharmaceutical Sciences

Annual Report

2019-2021





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About Us

The research scope of the Molecular and Systems Pharmacology (MSP) theme at the Faculty of Pharmaceutical Sciences includes all aspects of drug discovery and development process, with expertise in cancer pharmacology, cardiovascular pharmacology, diabetes, drug metabolism, neuropharmacology, and pharmacogenomics.

Highlights

Journal Publications



97

Trainees



8 Completed
28 Active

2019: MSP theme-based activities developed and implemented under Dr. Brian Rodrigues, including seminars with invited speakers from other UBC departments: Mr. Sean McKelvey (CEO and Co-founder, Institute for Personalized Therapeutic Nutrition, UBC), Ms. Kathryn Gretsinger (Graduate School of Journalism, UBC), Dr. Michael Griffin (Department of Philosophy, UBC), Dr. Antje Ellermann (Institute of European Studies, Department of Political Science, UBC), and Dr. Janet F. Werker (Department of Psychology, UBC).

2020: Leadership changed from Dr. Brian Rodrigues to Dr. Judy Wong. Despite COVID interruption, the MSP group has successfully maintained research momentum, hired new faculty members, and conducted successful transition to online activities. Apart from student-led seminars, Dr. Judy Wong also hosted seminars with invited speakers Dr. Rachel F. Tyndale (Department of Pharmacology and Toxicology, University of Toronto), and Dr. Celia Lourenco (Health Canada).

Highlights - continued

New Recruitments

2019 - Dr. Sarah Hedtrich - Assistant Professor with Tenure Track
2021 - Dr. Thomas J. Velenosi - Assistant Professor

Promotions

2019 - Dr. Kathleen MacLeod retired from the Faculty on December 31st after 37 years of service
2019 - Dr. Abby Collier - Professor; Dr. Corey Nislow - Professor; Dr. Colin Ross - Associate Professor
2020 - Dr. Judy Wong - Professor
2021 - Dr. Sarah Hedtrich - Associate Professor

Main Areas of Research

Dr. Abby Collier and Dr. Michael Coughtrie Labs

Pharmacology and toxicology of pregnancy, drug metabolism and pharmacokinetics, particularly Phase II conjugation enzymes; and in vitro in vivo extrapolation (IVIVE) with physiologically-based pharmacological modeling (PBPK).

Dr. Guri Giaever and Dr. Corey Nislow Labs

Genetic mutations responsible for variations in drug efficacy, yeasts in space

Dr. Sarah Hedtrich Lab

Next generation therapies, regeneration of human tissues and disease models

Dr. Anil Maharaj Lab

Novel DM/PK maturational models, drug dosing in childhood

Dr. Colin Ross Lab

Pharmacogenomics for drug safety, gene therapy, therapeutic gene editing.

Dr. Brian Rodrigues Lab

Cardiac lipoproteins, cardiac metabolism, diabetes

Dr. Karla Williams Lab

Extracellular vesicles, cancer cell invasion, breast cancer metastasis

Dr. Thomas J. Velenosi Lab

Pharmacometabolomics, metabolic biomarkers of drug response and characterization of therapeutic targets in cancer, computational methods for mass spectrometry

Dr. Judy Wong Lab

Role of telomeres and telomerase in preventing chromosomal erosion health and disease, role of G-quadruplexes in genome regulation and in the integrity of DNA/RNA quadruplexes

Faculty List



Abby Collier, PhD
Professor in Molecular and Systems Pharmacology
Email: abby.collier@ubc.ca **Phone:** 604-827-2380



Michael Coughtrie, BSc (Hons) PhD FCAHS
Professor in Molecular and Systems Pharmacology
Dean, Faculty of Pharmaceutical Sciences
Email: michael.coughtrie@ubc.ca **Phone:** 604-827-2178



Guri Giaever, PhD
Associate Professor in Molecular and Systems Pharmacology
Email: g.giaever@ubc.ca **Phone:** 604-827-1789



Anil Maharaj, BSc (Pharm), PhD
Assistant Professor in Molecular and Systems Pharmacology
Email: anil.maharaj@ubc.ca **Phone:** 604-219-2149



Sarah Hedtrich, PhD
Assistant Professor in Molecular and Systems Pharmacology,
Nano Medicine, and Chemical Biology
Email: sarah.hedtrich@ubc.ca **Phone:** 604-822-2466



Corey Nislow, PhD
Professor in Molecular and Systems Pharmacology
Email: corey.nislow@ubc.ca **Phone:** 604-827-1579



Brian Rodrigues, PhD
Professor in Molecular and Systems Pharmacology
Email: brian.rodrigues@ubc.ca **Phone:** 604-822-4758

Faculty List - continued



Colin Ross, BSc, MSc, PhD

Associate Professor in Pharmacogenomics, Nano Medicine, and Chemical Biology,
Faculty of Pharmaceutical Sciences, University of British Columbia
Scientist, Child & Family Research Institute, BC Children's Hospital

Email: colin.ross@ubc.ca **Phone:** 604-827-2017



Thomas J. Velenosi, PhD

Assistant Professor in Molecular and Systems Pharmacology

Email: thomas.velenosi@ubc.ca **Phone:**



Karla Williams, PhD

Assistant Professor in Molecular and Systems Pharmacology

Email: karla.williams@ubc.ca **Phone:** 604-822-9915



Judy Wong, PhD

Professor in Molecular and Systems Pharmacology

Email: judy.wong@ubc.ca **Phone:** 604-827-3314

Trainees List

Total Trainees from 2019-2020: 36

Postdoctoral Fellows

Active: 5
Completed: 2
Total: 7

Active

Dr. Nikki Salmond
Dr. Merlyn Emmanuel
Dr. Sunny Yang
Dr. Nisreen Shumayrikh
Dr. Partho Adhikary

Completed

Dr. Alexander Smith
Dr. Estefania Campos

PhD Candidates

Active: 15
Completed: 3
Total: 18

Active

Michael Doerksen
Hayley Price
Yuejian Liu
Zheng Tan
Belal Tafech
Mina Khoshnoodi
Rui Shang
Chae Syng (Jason) Lee
Tiffany Carlaw
Alice Yu
Erika Scott
Kristen Gibson
Sumreen Javed
Sepideh Soukhtehzari
Karan Khanna

Completed

Nathaniel Lai
Jialin Xu
Sunny Yang

Trainees List - continued

Total Trainees from 2019-2020: 36

MSc Students

Active: 8
Completed: 3
Total: 11

Active

Ai Nan (Irien) Zhang
Brandon Haefling
Juliana Bolsoni
Yajie (Sophia) Zhai
Tessa Morin
Esther Afolayan
Xuewei Chen
Kathryn Nguyen

Completed

Samantha Breaux
Sogand Assarnia
Nida Bilal

Research Staff

Dickson Lai
Dr. Marjan Barazandeh (Nislow Lab)
Bahira Hussein (Rodrigues Lab)
Dr. Nazarine Fernandes (Williams Lab)

Funding

Source	Project Title	MSP Lead PI
Office of the Vice President Research and Innovation, UBC	Research Support for the Pharmaceutical Sciences Analytical Suite	A. Collier
Faculty of Pharm Sci Office of Associate Dean Research	Improved PBPK Scaling from Preclinical Models to First-in-Human Trials	A. Collier
NSERC	A UHPLC for steroid analysis	A. Collier
Genentech Ltd	Improved PBPK Scaling from Preclinical Models to First-in-Human Trials	A. Collier
CIHR	Drug Safety And Effectiveness Network (DSEN) Search	A. Collier
NSERC	Post Translational Mechanisms of UGT Function	A. Collier
MITACS Accelerate	Rational Nanoparticle Design for Efficient Transmucosal Gene Delivery	S. Hedtrich
CIHR	Development of novel small-molecule inhibitors of TSLP for the treatment and prevention of atopic diseases	S. Hedtrich, B. Page
BC Lung Association	Skin-Lung Crosstalk: Approaching the Atopic March	S. Hedtrich
NSERC Discovery Grant	Development of complex human-based tissue models	S. Hedtrich

Funding - continued

Source	Project Title	MSP Lead PI
CIHR	Development a topical approach for correcting monogenic skin diseases in situ using gene editing	S. Hedtrich (co-I C.Ross)
Thrasher Research Institute		A. Maharaj
Canada Research Chair	Canada Research Chair Tier 1	C. Nislow
Heart and Stroke Foundation of Canada (HSFC)	Role of cardiac lipoprotein lipase in diabetic heart disease	B. Rodrigues
CIHR	Role of cardiac lipoprotein lipase in diabetic heart disease	B. Rodrigues
UBC Research Excellence Cluster Funding	BC Diabetes Research Network Established Cluster	B. Rodrigues
Canada Breast Cancer Foundation	Identification of genetic biomarkers predictive of cardiotoxicity in adult breast-cancer patients	C. Ross
Genome BC	<i>Sector Innovation Program:</i> In vivo genome editing by non-viral gene delivery	C. Ross
BC Children's Hospital; Evidence to Innovation Research Theme	<i>Seed Grant:</i> Investigating pharmacogenomic biomarkers of corticosteroid induced avascular necrosis	C. Ross
CIHR Targeted Research	Active surveillance for evaluation of harm of direct acting oral anticoagulants (DOACs) in real-world patients	C. Ross

Funding - continued

Source	Project Title	MSP Lead PI
CIHR	Clinical and Pharmacogenomics predictors of inter-patient variation in Direct Acting Oral Anticoagulant (DOAC) plasma concentrations in real-world patients	C. Ross
UBC VP Research Strategic Research Opportunity Grant	Development of a novel reporter mouse model to explore <i>in vivo</i> ABE gene repair	A. Maharaj
CIHR	Optimizing Chronic Hepatitis C Treatment	C. Ross
Canada Foundation for Innovation (CFI)	Personalized genomic medicine for improved paediatric drug safety and effectiveness	C. Ross
CIHR Team Grant	DSEN-SEARCH & PREVENT: (active Surveillance and Evaluation of Adverse Reactions in Canadian Healthcare) & (Pharmacogenomics of Adverse Reaction EVENTS National Team) <i>(Role: Major role as co-PI and lead of all genomics studies)</i>	C. Ross
CIHR Project Grant (PI)	<i>Project Grant:</i> Discovery, validation, and pre-clinical development of targeted cardio-protectants for the prevention of anthracycline-induced cardiotoxicity	C. Ross
Genome Canada (Major co-funders include: CIHR, BCCH Foundation; Genome BC)	<i>Large-scale Applied Research Research Project (LSARP):</i> Go-PGx: Genomic and Outcomes Databank for Pharmacogenomic and Implementation Studies	C. Ross
Genome BC	<i>Sector Innovation Program:</i> In vivo genome editing by non-viral gene delivery	C. Ross

Funding - continued

Source	Project Title	MSP Lead PI
National Centres of Excellence (NCE): Nanomedicines Innovation Network (NMIN)	Development and utilization of in vivo systems to optimize lipid nanoparticles for therapeutic genome editing	C. Ross
National Research Council of Canada (NCE funded)	AAV Gene Therapy for the Treatment of Lipoprotein Lipase Deficiency - Cell and Gene Therapy Challenge Program	C. Ross
CIHR Team Grant	DSEN-SEARCH & PREVENT: (active <u>S</u> urveillance and <u>E</u> valuation of <u>A</u> dverse <u>R</u> eactions in <u>C</u> anadian <u>H</u> ealthcare) & (Pharmacogenomics of Adverse Reaction <u>E</u> vents <u>N</u> ational <u>T</u> eam)	C. Ross
Canadian Cancer Society	Preclinical therapeutic development of targeted cardio-protectants for use in cancer patients receiving anthracycline chemotherapy	C. Ross
CIHR	The role of the tumor microenvironment in regulating metastatic growth	K. Williams
CIHR	Extracellular vesicle detection methods and probe development	K. Williams
NSERC	Extracellular vesicles biogenesis and function	K. Williams
GlycoNet	Extracellular vesicle associated glycans as a novel platform for breast cancer detection	K. Williams
Susan G. Komen	Targeting breast cancer dissemination and developing novel prognostic methods	K. Williams

Funding - continued

Source	Project Title	MSP Lead PI
University of Pennsylvania Orphan Disease Centre	Characterization of Telomere Maintenance in Tumor Models of Dyskeratosis Congenita	J. Wong
NSERC	Biochemical and Cellular Characterization of Dyskerin Functions	J. Wong
CRS	Tumor-Specific Targeting of Telomere with Combination Therapeutics	J. Wong

Publications

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Publication Highlights

Salmond, N, Khanna K, Owen, G, **Williams, KC**. Nanoscale Flow Cytometry of Extracellular Vesicles in Plasma: Important Technical Considerations of an Emerging Liquid Blood Biopsy Technology. *Nanoscale*. 2021 Jan 28;13(3):2012-2025.

* *Specially selected and featured in an Editor's Choice web collection focusing on recent breakthroughs in nanobiotechnology*

Wright, GEB, Amstutz, U, Drögemöller, B.I., Shih, J., Rassekh, S.R., Carleton, BC, and **Ross, CJ**. Pharmacogenomics of vincristine-induced peripheral neuropathy implicates pharmacokinetic and inherited neuropathy genes. *Clinical Pharmacology & Therapeutics*. Feb 105(2):402-410. 2019. PMID: 29999516. (SA)

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MSP Special Seminars 2019-2020

Useful Tips for Research Success - A Female Perspective



In November 2019, the MSP student group invited outstanding female pharmacologists in our faculty – Dr. Abby Collier, Dr. Sarah Hedtrich, Dr. Judy Wong, and Dr. Karla Williams – to share their success stories with us.

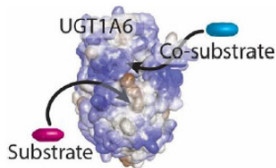
Three Deans Insights into Academic Leadership



In January 2020, the MSP student group organized another faculty-wide seminar in which we invited three honorable deans of our faculty – Dr. Robert Sindelar, Dr. John McNeill, and Dr. Michael Coughtrie – to share their amazing journeys as academic leaders.

MSP Special Seminars 2020-2021

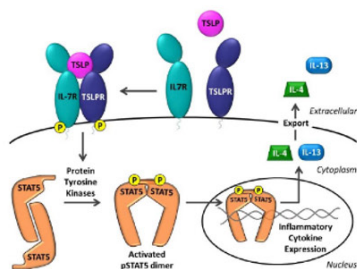
MSP Post-Doc Seminars



Homology modeling of human UGT1A6: insights into substrate and co-substrate binding

Alexander Smith, PhD

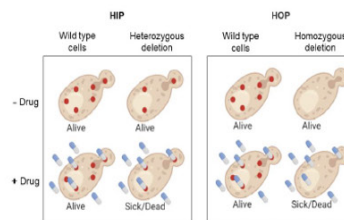
Research Associate
Faculty of Pharmaceutical Sciences, UBC
Supervisor: Dr. Abby Collier



Targeting TSLP - Novel anti-inflammatory compounds for the treatment and prevention of atopic diseases

Partho Adhikary, PhD

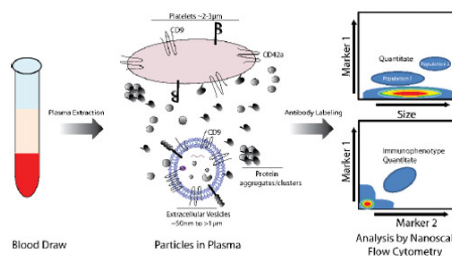
Postdoctoral Fellow
Faculty of Pharmaceutical Sciences, UBC
Supervisor: Dr. Sarah Hedtrich



HIP-HOP: fitness assay to identify mechanisms of drug action

Marjan Barzandeh, PhD

Postdoctoral Fellow
Faculty of Pharmaceutical Sciences, UBC
Supervisor: Dr. Corey Nislow



Nanoscale Flow Cytometry for Immunophenotyping and Quantitating Extracellular Vesicles in Blood Plasma

Dr. Nikki Salmond

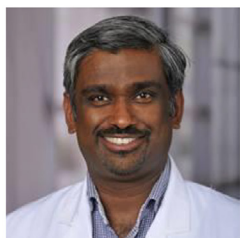
Postdoctoral Fellow
Faculty of Pharmaceutical Sciences, UBC
Supervisor: Dr. Karla Williams

MSP organized post-doc seminars delivered by the esteemed post-docs of our MSP group, including Dr. Alexander Smith, Dr. Marjan Barzandeh, Dr. Partho Adhikary, and Dr. Nikki Salmond.

MSP Special Seminars 2020-2021 - continued

In February 2021, the MSP group invited three distinguished alumni who currently hold academic roles to learn from their journey and inspire our young graduate students who want to take this career pathway.

Academic Career Pathway Seminar



Dr. Prabhakara Nagareddy
Associate Professor
Ohio State College of Medicine
(Alumni: Dr. John McNeill lab)



Raina Tamakawa
Enterprise Research Program
Manager
Oregon Health and Science Unit
(Alumni: Dr. Judy Wong lab)



Dr. Dake Qi
Assistant Professor
University of Manitoba
(Alumni: Dr. Brian Rodrigues lab)

In March 2021, we invited three MSP alumni who currently hold positions in the industry sector to share their valuable insights with our students.

Industry Career Pathway seminar



Kyle Hukezalie
Research Scientist
AbCellera Biologics
(Alumni: Dr. Judy Wong's lab)



Marysol Garcia Patiño
Laboratory Manager
GenXys Health Care Systems
(Alumni: Dr. Kath MacLeod's lab)



Ramaswamy Subramanian
Associate Director, Regulatory Affairs
Apotex Inc
(Alumni: Dr. Kath MacLeod's lab)

MSP Retreat 2019

In December 2019, MSP faculty and students celebrated the first MSP retreat at the Thunderbird Community Centre. The group discussed various collaboration possibilities to create cohesiveness and engagement among the members. The retreat organization team included Dr. Brian Rodrigues, Dr. Bob Conway, Brandon Haefling (Collier Lab), Sumreen Javed (Williams Lab), Karan Khana (Williams Lab), Rui Shang (Rodrigues Lab), and Zheng Tan (Hedtrich Lab).



MSP Faculty-Led Seminars

In 2019 – 2020, Dr. Brian Rodrigues hosted several seminars with invited speakers from diverse UBC departments: Mr. Sean McKelvey (CEO and Co-founder, Institute for Personalized Therapeutic Nutrition, UBC), Ms. Kathryn Gretsinger (Graduate School of Journalism, UBC), Dr. Michael Griffin (Department of Philosophy, UBC), Dr. Antje Ellermann (Institute of European Studies, Department of Political Science, UBC), and Dr. Janet F. Werker (Department of Psychology, UBC).



Therapeutic Nutrition, Diabetes Remission and Medication Safety: Navigating the Turbulent Waters of a Paradigm Shift?

Sean McKelvey, BSc (PHARM), RPH
CEO and Co-Founder
Institute for Personalized Therapeutic Nutrition, UBC



**Journalism Today:
The challenge of figuring out what journalism is (and is not)**

Kathryn Gretsinger
Senior Instructor, Graduate School of Journalism, UBC
Broadcaster, Canadian Broadcasting Corporation



The origins of the PhD: Educating character and compassion in the Ancient Greek University

Michael Griffin, PhD
Associate Professor, Philosophy Department, UBC
Co-Editor, Ancient Commentators Project (Bloomsbury)



The politics of migration and citizenship in liberal democracies

Antje Ellermann, PhD
Associate Professor and Director, Institute of European Studies Political Science Department at UBC

In 2021, Dr. Judy Wong also hosted some amazing MSP-themed seminars with invited speakers Dr. Rachel F. Tyndale (Department of Pharmacology and Toxicology, University of Toronto), and Dr. Celia Lourenco (Health Canada).



**Can defective genes be good for you?
Genetic variation in nicotine metabolism alters Smoking and Cessation**

Rachel F. Tyndale, PhD
Professor, Department of Pharmacology & Toxicology
University of Toronto



Career paths at Health Canada for scientists in the life sciences

Celia Lourenco, PhD
Director General of the Biologic and Radiopharmaceutical Drugs Directorate (BRDD) of the Health Products and Food Branch of Health Canada

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Dr. Brian Rodrigues for being the MSP Faculty Lead for 2019 - 2020.

Dr. Judy Wong for being the MSP Faculty Lead from 2020 onwards.

Sumreen Javed (Williams Lab) and Rui Shang (Rodrigues Lab) for being the MSP Student Lead. Mina Khoshnoodi (Nislow Lab) joined the team and replaced Sumreen in the second quarter of 2021.

Sumreen Javed for initiating and developing the report. Rui Shang, Mina Khoshnoodi, and Kathryn Nguyen for their participation in the project and editorial services.



Sumreen Javed
Williams Lab



Rui Shang
Rodrigues Lab



Mina Khoshnoodi
Nislow Lab



Kathryn Nguyen
Wong Lab



**Faculty of Pharmaceutical Sciences
2405 Wesbrook Mall
Vancouver, BC Canada V6T 1Z3**

<https://pharmsci.ubc.ca/research/research-themes/molecular-and-systems-pharmacology>

Lab Pages

Hedtrich Lab

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<https://twitter.com/hedtrichlab?lang=en>

Maharaj Lab

<https://pkms.ca/>

Nislow and Giaever Labs

<https://www.ggcnlab.com/>

Ross Lab

<https://colinrosslab.com/>

Williams Lab

https://twitter.com/williamslab_ubc?lang=en