THE UNIVERSITY OF BRITISH COLUMBIA

Molecular and Systems Pharmacology
Faculty of Pharmaceutical Sciences

Annual Report
2022–2024

The Faculty of Pharmaceutical Sciences building is located on the traditional, ancestral, unceded territory of the hən̓q̓əmin̓əm̓ speaking xʷməθkʷəy̓əm (Musqueam people). We also acknowledge the many lands and territories in which our pharmacists study and practice across the country.

Design: Nathan Ehret, UBC Faculty of Pharmaceutical Sciences; Cover image: Justin Ohata, UBC Faculty of Pharmaceutical Sciences

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CHAIR'S MESSAGE

Welcome to our biannual report, a snapshot of the incredible journey we've undertaken over the past two years. I'm thrilled to share the achievements and milestones that make our group truly exceptional.

This report isn't just about numbers and data; it's a reflection of the hard work, dedication, and collaboration that define us. From ground-breaking research to academic accomplishments, each page tells a story of the collective efforts of our faculty, researchers, students, and staff. As we reflect on the achievements highlighted in this report, let us take a moment to appreciate the collaborative spirit that defines our pharmacology research family. The exchange of ideas, the mentorship provided, and the support extended within our community have been instrumental in fostering an environment conducive to research and academic excellence.

I want to express my sincere gratitude to each member of our Molecular and Systems Pharmacology group. Your contributions, large and small, have shaped our shared success. Let's carry this momentum forward, staying true to our collaborative ethos and spirit that define the MSP group.

Thank you for your dedication, and here's to much more progress and discovery.

Judy Wong, PhD
Professor in Molecular and Systems Pharmacology

ABOUT US

Molecular and Systems Pharmacology (MSP) at the Faculty of Pharmaceutical Sciences research focuses on drug discovery and development processes, with expertise in cancer pharmacology, cardiovascular pharmacology, diabetes, drug metabolism, neuropharmacology and pharmacogenomics.

HIGHLIGHTS

Promotions

Colin Ross – Professor
Karla Williams – Associate Professor with Tenure
Alex Smith – Assistant Professor of Teaching

New Hires

Rishi Somavanshi – Assistant Professor
Nicole Krentz – Assistant Professor

Awards

CRCI – Corey Nislow renewed
AFPC Pfizer Career Award – Brian Rodrigues
Bridge Award – Colin Ross
MSFHR – Anil Maharaj
CRCII – Ly Vu
MSFHR – Ly Vu

Early Career Researcher Jump Start Awards – Ly Vu
Terry Fox Research Institute New Investigator Award – Ly Vu
American Society of Hematology (ASH) Award – Ly Vu
V Foundation for Cancer Research Translational Grant – Ly Vu
Stem Cell Network: Early Career Researcher Jump Start Awards – Ly Vu
CRCII – Karla Williams renewed
MSFHR – Simon Wisnovsky

Main Areas of Research

Dr. Abby Collier and Dr. Michael Coughtrie Labs
Pharmacology and toxicology of pregnancy, drug metabolism and pharmacokinetics, phase II conjugation enzymes, in vitro and in vivo extrapolation (IVIVE) with physiologically-based pharmacological modelling.

Dr. Guri Giaver and Dr. Corey Nislow Labs
Genetic mutations responsible for variations in drug efficiency, yeasts in space.

Dr. Sarah Hedtrich Lab
Next generation therapies, regeneration of human tissues and disease models.

Dr. Jessica Kalra Lab
Developing and implementing in vitro and in vivo models for streamlined testing of drug efficacy and innovation and evidence-based research and practice in STEM education.

Dr. Anil Maharaj Lab
Optimizing the safe and effective use of medicines through pharmacokinetic modeling and simulation.

Dr. Brian Rodrigues Lab
Lipoprotein lipase, cardiac metabolism, angiogenesis, cardiomyopathy, diabetes.

Dr. Colin Ross Lab
Pharmacogenomics for drug safety, gene therapy, therapeutic gene editing.

Dr. Thomas J. Velenosi Lab
Pharmacometabolomics, metabolic biomarkers of drug response and characterization of therapeutic targets in cancer, computational methods for mass spectrometry.

Dr. Ly Vu Lab
Molecular mechanisms underlying control of stem cells, pathogenesis of hematological malignancies with a focus on RNA modifications and RNA biology.

Dr. Karla Williams Lab
Extracellular vesicles, cancer cell invasion, breast cancer metastasis.

Dr. Simon Wisnovsky Lab
Functional genomic screens to better define the molecular function of glycans and identify new therapeutic targets for the treatment of glycomic diseases.

Dr. Harvey Wong Lab
Translational modeling and simulation techniques to optimize drug dose, cancer tumor drug resistance.

Dr. Judy Wong Lab
Chromosome Structure and Genome Maintenance in Health and Disease.

FACULTY LIST

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Judy Wong, PhD
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TRAINEES LIST

Postdoctoral Fellows

Total: 13

1. Merlyn Emmanuel
2. Nikki Salmond
3. Tegan Williams
4. Lina Abou Zeid
5. John Daly
6. Neel Metha
7. Miguel Cordova
8. Maryam Ghashghaei
9. Zhen Jin
10. Zongmin Liu
11. Ritu Gupta
12. Amber Louwagie
13. Luke Saville

PhD Students

Ongoing: 26 Completed: 9

Ongoing

1. Jacob Melamed
2. Sina Halvaei
3. Kendal Ruzicki
4. Esther Afolayan
5. Rui Shang
6. Chae Syng Lee
7. Vignesh Krishnamoorthy
8. Kristen Gibson
9. Kheireddin Mufti
10. Spencer Anderson
11. Edward Jimmy Raack
12. Belal Tafech
13. Tessa Morin
14. Alexandra Birkenshaw
15. Michael Doerksen
16. Sahithi Thotakura
17. Yilin Liu
18. Maria Beletsky
19. Chad Hou
20. Mina Khoshnoodi
21. Stuart Knight
22. Sneha Singh
23. Maomao Tan
24. Khady Thiombane
25. Chloe White
26. Natalie Stewart

Completed

1. Karan Khanna
2. Sumreen Javed
3. Jafar Hasbullah
4. Alice Yue
5. Erika Scott
6. Tulio Esposito
7. Jason Lee
8. Tiffany Carlaw
9. Sepideh Soukhtehzari

MSc Students

Ongoing: 12 Completed: 6

Ongoing

1. Banafsheh Tighsazzadeh
2. Yajie Zhai
3. Hualin Wang
4. Tyler Thomson
5. Caroline Liang
6. Akash Panjabi
7. Renessa Gomes
8. Yerin Kim
9. Effat Habibi
10. Tom Bui
11. Andy Kim
12. Khanh Nguyen

Completed

1. Tessa Morin
2. Sandy Morrison
3. Kathryn Nguyen
4. Nitasha Nair
5. Olivia Drummond Guy
6. Austin Zimmer

Postdocs

1. Lina Abou Zeid
2. Merlyn Emmanuel
3. Ritu Gupta
4. Zhen Jin
5. Zongmin Liu
6. Amber Louwagie
7. Nikki Salmond
8. Luke Saville
9. Tegan Williams

FUNDING

*Format: **Source**, Project title, **PI**

Canadian Institutes of Health Research (CIHR)
Design of Next Generation ALS Drugs – Project Grant
PI A. Collier

Canadian Institutes of Health Research (CIHR)
DRUG SAFETY and EFFECTIVENESS NETWORK (DSEN) SEARCH & PREVENT
PI A. Collier

GENENTECH
Improved PBPK Scaling from Preclinical Models to First-in-Human Trials
PI A. Collier

Natural Sciences and Engineering Research Council (NSERC)
Post Translational Mechanisms of UGT Function – Discovery Grant
PI A. Collier

NSERC (Natural Sciences and Engineering Research Council of Canada) ARD (Alliance Research Development)/MITACS
Designing and engineering scalable lipid-based drug delivery systems to improve the delivery and bioactivity of cannabinoid
PI J. Kalra

SoTL (Scholarship of Teaching and Learning) Seed
Enhancing Transformative Learning in Team-Based Learning (TBL) Environments: Addressing cognitive discomfort through faculty Interventions
PI J. Kalra

Michael Smith Health Research BC Scholar Award
Development of an ex-vivo-in-silico framework to inform medication use decisions for breastfeeding women
PI A. Maharaj

National Institute of Health
Pharmacokinetics and Safety Profile of Digoxin in Infants With Single Ventricle Congenital Heart Disease
PI A. Maharaj

Natural Sciences and Engineering Research Council (NSERC) Discovery
Development of an ex-vivo-in-silico framework for predicting maternal and breastfed-infant toxicokinetics
PI A. Maharaj

Pediatric Trials Network/National Institute of Health
Best Pharmaceuticals for Children Act (BPCA) Innovative Trial Designs for Dosing and Safety
PI A. Maharaj

The National Research Council of Canada (NRC) – Ideation Fund
Development of a Physiologically-Based Pharmacokinetic (PBPK) framework to predict central nervous system (CNS) disposition of novel biotherapeutic candidates
PI A. Maharaj

Canadian Institutes of Health Research (CIHR)
Development and evaluation of novel nanoparticle formulations for therapeutic genome editing
PI B. Rodrigues

Canadian Institutes of Health Research (CIHR)
Role of cardiac lipoprotein lipase in diabetic heart disease
PI B. Rodrigues

Canadian Institutes of Health Research (CIHR)
Role of VEGFB in the cardiovascular complications of diabetes
PI B. Rodrigues

Diabetes Canada
The cardiovascular effects of VEGFB during diabetic cardiomyopathy
PI B. Rodrigues

Faculty of Pharmaceutical Sciences
Role of VEGFB in the cardiovascular complications of diabetes
PI B. Rodrigues

Heart and Stroke Foundation of Canada (HSFC)
Role of cardiac lipoprotein lipase in diabetic heart disease
PI B. Rodrigues

Natural Sciences and Engineering Research Council (NSERC)
Developing tools for stable-isotope tracing lipidomics that will investigate cardiac lipid metabolism
PI B. Rodrigues

UBC Research Excellence Cluster Funding
BC Diabetes Research Network Established Cluster
PI B. Rodrigues

Bridge Award
Uncovering patient-specific genetic factors that can be used to optimize morphine-based pain relief while avoiding harm
PI C. Ross

B.C. Children's Hospital Foundation
Enabling CRISPR-Based therapies for children
PI C. Ross

Canadian Cancer Society
Reducing the burden of pain for childhood cancer patients through pharmacogenomics-based precision medicine approaches
PI C. Ross

Canadian Institutes of Health Research (CIHR) Project Grant
AAV Gene Therapy for the Treatment of Lipoprotein Lipase Deficiency – Cell and Gene Therapy Challenge Program
PI C. Ross

Canadian Institutes of Health Research (CIHR) Project Grant (co-I)
Assessing the role of adolescent hormonal contraceptive use on risk for depression
PI C. Ross

Canadian Institutes of Health Research (CIHR) Project Grant
Development and evaluation of novel nanoparticle formulations for therapeutic genome editing: Focus on delivery to muscle for the treatment of LPL Deficiency
PI C. Ross

Canadian Institutes of Health Research (CIHR) Project Grant
Discovery, validation, and pre-clinical development of targeted cardio-protectants for the prevention of anthracycline-induced cardiotoxicity
PI C. Ross

Canadian Institutes of Health Research (CIHR) Team Grant
DSEN-SEARCH & PREVENT: (active Surveillance and Evaluation of Adverse Reactions in Canadian Healthcare) & (Pharmacogenomics of Adverse Reaction EVEnts National Team)
PI C. Ross

Evidence to Innovation Research Theme, BC Children's Hospital (BCCH)
Development of a pharmacokinetic-pharmacogenomic model to enhance morphine-based pain management in children
PI C. Ross

Genome Canada (Major co-funders include: CIHR, BCCH Foundation; Genome BC)
Large-scale Applied Research Project (LSARP): Go-PGx: Genomic and Outcomes Databank for Pharmacogenomic and Implementation Studies
PI C. Ross

Genome Canada
Renewal: Large-scale Applied Research Project (LSARP): Go-PGx: Genomic and Outcomes Databank for Pharmacogenomic and Implementation Studies
PI C. Ross

National Centres of Excellence (NCE)
Development and evaluation of novel nanoparticle formulations for therapeutic genome editing: Focus on delivery to muscle for the treatment of LPL Deficiency
PI C. Ross

National Centres of Excellence (NCE): Nanomedicines Innovation Network (NMIN)
Development and utilization of in vivo systems to optimize lipid nanoparticles for therapeutic genome editing
PI C. Ross

National Centres of Excellence (NCE): Nanomedicines Innovation Network (NMIN)
Gene Therapy Grand Challenge award: Development, optimization and evaluation of novel nanoparticle formulations for extra-hepatic targeted gene therapy
PI C. Ross

National Research Council of Canada (NCE funded)
Renewal: AAV Gene Therapy for the Treatment of Lipoprotein Lipase Deficiency – Cell and Gene Therapy Challenge Program
PI C. Ross

UBC Faculty of Medicine 2021/2022 Precision Health Catalyst Grant
Uncovering patient-specific genetic factors that can be used to optimize morphine-based pain relief while avoiding harm
PI C. Ross

UBC Faculty of Medicine Precision Health Catalyst Grant
Large-scale Applied Research Project (LSARP): Go-PGx: Genomic and Outcomes Databank for Pharmacogenomic and Implementation Studies
PI C. Ross

SoTL Seed Funding
Supporting student wellbeing in the Faculty of Pharmaceutical Sciences through exploring faculty and staff motivation to implement wellbeing practices
PI A. Smith

B.C. Knowledge Development Fund (BCKDF)
Pharmacometabolomics for precision cancer treatment
PI T. Velenosi

Canada Foundation for Innovation – John R. Evans Leaders Fund (CFI-JELF)
Pharmacometabolomics for precision cancer treatment
PI T. Velenosi

Canadian Institutes of Health Research (CIHR)
Characterizing and validating diacetylspermine as a metabolic biomarker of drug response and precision treatment in triple-negative breast cancer
PI T. Velenosi

Canadian Institutes of Health Research (CIHR)
Development and evaluation of novel nanoparticle formulations for therapeutic genome editing
PI T. Velenosi

SickKids
Indomethacin PharmacoMetabolomics for PDA Closure
PI T. Velenosi

UBC Support for Teams to Advance Interdisciplinary Research (STAIR)
Impact of loss of commensal bacteria on host-accessible metabolites
PI T. Velenosi

American Society of Hematology (ASH)
Uncovering the Role of CNOT poly(A) deadenylation in Acute Myeloid Leukemia (AML)
PI L. Vu

B.C. Knowledge Development Fund (BCKDF)
A Comprehensive Experimental Laboratory for RNA biology in Hematology Research
PI L. Vu

Canada Foundation for Innovation (CFI)
A Comprehensive Experimental Laboratory for RNA biology in Hematology Research
PI L. Vu

Canadian Institutes of Health Research (CIHR) Project Grant
A synthetic biology approach to unlocking the role of the ribosome in cell competition
PI L. Vu

Canadian Institutes of Health Research (CIHR) Project Grant
A systems glycobiology platform for revealing new immunotherapy targets in acute myeloid leukemia
PI L. Vu

Canadian Institutes of Health Research (CIHR) Project Grant
mRNA decay and translational regulation by RNA deadenylation in myeloid leukemia
PI L. Vu

Canadian Institutes of Health Research (CIHR) and The Japan Agency for Medical Research and Development (AMED)
Characterization of the integrative epigenetic and epitranscriptomic landscape of AML
PI L. Vu

Canada Research Chair
RNA biology in Hematological Malignancies
PI L. Vu

Early Career Researcher Jump Start Awards
Modulating activity of RNA regulating proteins to preserve long-term regenerative potential of Hematopoietic Stem Cells
PI L. Vu

Leukemia Lymphoma Society Canada (LLSC)
Directing extracellular vesicles (EV) biogenesis by RNA binding proteins in leukemia
PI L. Vu

Michael Smith Foundation for Health Research Scholar Award
Post-transcriptional regulation of hematopoietic stem cell function during normal and malignant hematopoiesis
PI L. Vu

Natural Sciences and Engineering Research Council (NSERC) Discovery Grant
Post-transcriptional regulation of hematopoietic stem cell function and cell fate determination during hematopoiesis
PI L. Vu

Stem Cell Network: Early Career Researcher Jump Start Awards
Modulating activity of RNA regulating proteins to preserve long-term regenerative potential of Hematopoietic Stem Cells
PI L. Vu

Terry Fox Research Institute New Investigator Award
Uncovering the role of long noncoding RNAs in myeloid leukemia
PI L. Vu

V Foundation: Women Scientists Innovation Award for Cancer Research – V Scholar
Defining a high-resolution and functional map of m6A RNA epitranscriptome in normal and malignant blood stem cells
PI L. Vu

Andira Pharmaceuticals
Anti-metastatic drug testing using the chick embryo model
PI K. Williams

Canada Research Chairs (CRC)
CRC in Oncology
PI K. Williams

Canadian Institutes of Health Research (CIHR) Project Grant
Characterization of invadopodia formation in response to local cues and their role in orchestrating metastasis
PI K. Williams

Canadian Institutes of Health Research (CIHR) Project Grant
Influence of breast cancer-derived extracellular vesicles on lung metastasis of triple negative breast cancer
PI K. Williams

Canadian Institutes of Health Research (CIHR) Project Grant
Materials and technologies for highly sensitive biomarker analysis of extracellular vesicles toward cancer diagnostics
PI K. Williams

Canadian Institutes of Health Research (CIHR) Project Grant
Overcoming DHFR Inhibitor Resistance in Cancer
PI K. Williams

Canadian Institutes of Health Research (CIHR) Project Grant
Targeting metastatic breast cancer
PI K. Williams

Cancer Research Society – Operating Grant
Development of a Liquid Biopsy for Early Breast Cancer Detection
PI K. Williams

GlycoNet Team Grant
Development of antagonists targeting immunomodulatory Siglecs
PI K. Williams

Nanomedicines Innovation Network (NMIN) Initiatives Project
Immunotherapy of inoperable and locally advanced hepatocellular carcinoma
PI K. Williams

Natural Sciences and Engineering Research Council (NSERC) Discovery Grant
Extracellular vesicles: biogenesis, composition, and biological function
PI K. Williams

New Frontiers in Research Fund (NFRF) Exploration Grant
Detection and Categorization of Cancers using Nanoaperture Optical Trapping of Single Extracellular Vesicles
PI K. Williams

Susan G. Komen
Targeting breast cancer dissemination and developing novel prognostic methods
PI K. Williams

Women's Health Research Institute Catalyst Grant
Extracellular vesicle loading of siRNA p53 lipoplexes for the treatment of triple negative breast cancer
PI K. Williams

Natural Sciences and Engineering Research Council (NSERC) Discovery Grant
Development of genetic screening methods for functional characterization of cell-surface glycans
PI S. Wisnovsky

Canada Foundation for Innovation/B.C. Knowledge Development Fund (CFI/BCKDF) JELF
A Functional Genetics Platform for Analysis of Cancer-Associated Glycosylation
PI S. Wisnovsky

Canadian Arthritis Society
Characterizing aberrant autoantibody glycosylation as a driver of inflammatory arthritis pathogenesis
PI S. Wisnovsky

Canadian Institutes of Health Research (CIHR)
Systematic Characterization of Glyco-Immune Signaling Networks with High-Throughput Functional Genomics
PI S. Wisnovsky

Cancer Research Society Operating Grant
Defining New Glyco-Immune Checkpoint Ligands as Next-Generation Targets for Leukemia Immunotherapy
PI S. Wisnovsky

Cancer Research Society Operating Grant
Regulation and Function of CD44 in Tumor Metastasis to the Lung
PI S. Wisnovsky

GlycoNet Collaborative Team Grant
A Chemo-Genomic Screening Platform for Immune Checkpoint Target Discovery
PI S. Wisnovsky

GlycoNet Collaborative Team Grant
Dissecting regulation of the CD44-hyaluronan axis in cancer metastasis
PI S. Wisnovsky

GlycoNet Clinical Partnership Grants
Identification of immune-regulatory glyco-antigens as biomarkers for immunotherapy in melanoma
PI S. Wisnovsky

Canadian Institutes of Health Research (CIHR)
Identification of therapeutically relevant targets in telomerase overexpressing prostate cancers
PI J. Wong

Canadian Institutes of Health Research (CIHR)
Molecular and Functional Genomic Characterization of G-quadruplexes in Cancer with the Alternate Lengthening of Telomere (ALT) Mechanism
PI J. Wong

Cancer Research Society (CRS)
Applying Synthetic Dosage Lethality to Develop Therapeutic Strategies for Ovarian Clear Cell Carcinoma
PI J. Wong

Natural Sciences and Engineering Research Council (NSERC)
Structure-Function Relationship Study of Telomerase Reverse Transcriptase's Non-Canonical Activities
PI J. Wong

University of Pennsylvania Orphan Disease Center
Characterization of Telomere Maintenance in Tumor Models of Dyskeratosis Congenita
PI J. Wong

PUBLICATIONS

Price HR, Jalabert C, Seib DR, Ma C#; Lai, D#; Soma KK; and **Collier AC**. Measurement of Steroids in the Placenta, Maternal Serum, and Fetal Serum in Humans, Rats, and Mice: A Technical Note. *Separations* (2023) 10(4), 221.

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Azar P, Wong JSH, Mathew N, Vogel M, Perrone J, Herring AA, Krausz RM, Montaner JSG, Greenwald MK, **Maharaj AR**. 48-hour Induction of Transdermal Buprenorphine to Sublingual Buprenorphine/Naloxone: The IPPAS Method. Journal of addiction medicine 2023;17(2):233–6.

Hornik CP, Zimmerman K, **Maharaj A**, Balevic SJ, Anand R, Chen L. Pharmacokinetics of Anti-Epileptic Drugs in Obese Children - Levetiracetam. National Institute of Child Health and Human Development (US); 2022.

Azar P, Wong JSH, Mathew N, Ignaszewski MJ, Partovi N, Krausz RM, Ajidahun A, Thotakura S, Harris M, Barrios R, Montaner JSG, **Maharaj AR**. *48-hour Induction of Transdermal Buprenorphine to Extended-release Buprenorphine*. Journal of addiction medicine 2024;18(1):82–5.

Zimmerman KO, Wu H, **Maharaj A**, Turner A, Chen JY, Hornik CD, Arnold S, Muller W, Al-Uzri A, Meyer M, Shiloh-Malawsky Y, Taravath S, Lakhotia A, Joshi C, Jackman J, Hornik CP. Pharmacokinetics and Proposed *Dosing of Levetiracetam in Children With Obesity*. The journal of pediatric pharmacology and therapeutics : JPPT: the official journal of PPAG 2023;28(8):693–703.

Lee C.S., Zhai Y., and **Rodrigues B**. *Changes in lipoprotein lipase in the heart following diabetes*. Engineering 20:19–25, 2023.

Lee, C.S., Zhai, Y., Shang, R., Wong, T., Mattison, A., Cen, H., Johnson, J.D., Vlodavsky, I., Hussein, B., and **Rodrigues, B**. *Flow-induced secretion of endothelial heparanase regulates cardiac lipoprotein lipase. J Am Heart Assoc*. 11:23, 2022.

Cen, H. H., Hussein, B., Botezelli, J. D., Wang. S., Zhang, A. J., Noursadeghi, N., Jessen, **Rodrigues, B.**, Timmons, J. A., and Johnson, J. D. *Human and mouse transcriptomic analyses identify insulin receptor mRNA downregulation in hyperinsulinemia-associated insulin resistance. FASEB J*. 2022; 36:e22088.

Lee, C. S., Shang, R., Wang, F., Khayambashi, P., Wang, H., Karanjit, P., Vlodavsky, I., Hussein, B., and **Rodrigues, B**. *Heparanase stimulates physiological cardiac hypertrophy: Influence of chronic diabetes on cardiometabolic dysregulation and pathological remodeling*. Diabetes. 2024 May 21:db240217.

Huang, Y., Chen, L., Li, L., Qi, Y., Tong, H., Wu, H., Xu, J., Leng, L., Cheema, S., Sun, G., McGuire, J., **Rodrigues, B.**, Young, L., Bucala, R., and Qi. *LPL regulated by PAR2 in adipose tissue contributes to the development of hypertriglyceridemia.* JCI Insight. 2024;9(13):e173240.

Shang, R., Lee, C. S., Wang, H., Dyer, R., Noll, C., Carpentier, A. C., Alitalo, K., Boushel, R. C., Hussein, B., and **Rodrigues, B**. *Reduction in insulin uncovers a novel effect of VEGFB on cardiac substrate utilization*. Arterioscler Thromb Vasc Biol., 44:177–191, 2024.

Shang, R. and **Rodrigues, B**. *Lipoprotein lipase as a target for obesity/diabetes related cardiovascular disease*. J. Pharm. Pharm. Sci. Editor, Dr. John Ussher.

Hasbullah, JS, Scott, EN, Bhavsar, AP, Gunaretnam, EP, Miao, FM, Soliman, H, Carleton, BC, **Ross, CJ**. All-trans retinoic acid (ATRA) regulates key genes in the RARG-TOP2B pathway and reduces anthracycline-induced cardiotoxicity. *PLoS ONE* 17(11), Nov. 4, 2022.

Yu, SY, Carlaw, T, Thomson, T, Birkenshaw, A, Basha, G, Kurek, D, Huang, C, Kulkarni, J, Zhang, LH, **Ross, CJ**. A luciferase reporter mouse model to optimize *in vivo* gene editing validated by lipid nanoparticle delivery of adenine base editors. *Molecular Therapy*. 2023 Feb 15:S1525-0016(23)00072-2.

Yu, S.A., Birkenshaw, A., Thomson, T., Carlaw, T., Zhang, L, **Ross, CJ**. Increasing the Targeting Scope of CRISPR Base Editing System Beyond NGG. *CRISPR Journal*. 2022 Apr;5(2):187–202.

Hippman C, Slomp C, Morris E, Batallones R, Inglis A, Carrion P, Brain U, Higginson M, Wright GEB, Balneaves LG, Ryan D, Nislow C, **Ross CJ**, Gaedigk A, Oberlander TF, Austin J. A cross-sectional study of the relationship between *CYP2D6* and *CYP2C19* variations and depression symptoms, for women taking SSRIs during pregnancy. *Arch Womens Ment Health*. 25(2), 355–365, 2022/4.

Vargas-Neria, JL., Carleton, BC., **Ross, CJ**, Medeiros, M., Castañeda-Hernándeze, G., Clarka, P., Rivas-Ruizl, R., Pharmacogenomic study of anthracycline-induced cardiotoxicity in Mexican pediatric patients. *Pharmacogenomics*. 2022 Apr;23(5):291–301.

Loucks, CM, Lin, JJ, Trueman, JN, Drögemöller, BI, Wright, GEB, Chang, W, Li, KH, Yoshida, EM, Ford, J, Lee, SS, Crotty, P, Kim, RB, Al-Judaibi, B, Schwarz, UI, Ramji, A, Farivar, JF, Tam, E, Walston, LL, **Ross, CJ**, Carleton, BC. Patient-specific genetic factors predict treatment failure in sofosbuvir-treated patients with chronic hepatitis C. *Liver International*. 2022 Apr;42(4):796–808.

Drögemöller, BI, Wright, GEB, Trueman, J, Shaw, K, Staub, M, Chaudhry, S, Miao, F, Higginson, M, Groeneweg, GSS, Brown, J, Magee, LA, Whyte, SD, West, N, Brodie, SM, Jong, G, Israels, S, Berger, H, Ito, S, Rassekh, SR, Sanatani, S, **Ross, CJ**, Carleton, BC. A pharmacogenomic investigation of the cardiac safety profile of ondansetron in children and pregnant women. *Biomed Pharmacother*, 148, 112684. 2022 Apr;148:112684.

Siemens, A., Anderson, S.J., Rassekh, S.R., **Ross, CJ**, Carleton, B.C. A systematic review of polygenic models for predicting drug outcomes. *J Pers Med*. 2022 Aug 27;12(9):1394.

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SEMINARS

MSP Seminar

Movement as a treatment for poor health and wellbeing in adults with adversity

Eli Puterman, PhD
Associate Professor, Faculty of Education | School of Kinesiology, UBC
Canada Research Chair in Physical Activity and Health

Host: Judy Wong
Friday, March 24, 2023 at 12:00 noon; Join Zoom Meeting

Across the globe, individuals are living longer, but not necessarily healthier. Top identified burdens of disease and early mortality include a wide variety of health conditions, with mental health disorders ranking near the top of the list. While genetics and biological factors no doubt impact mental health, so do stressful life experiences and health behaviours. In this presentation, I will present information about the wide scope of stressful experiences that impact our health and wellbeing, the pathways through which these occur, and what we can do about it. Specifically, I will present findings from a set of studies showing how movement-based activities can promote health and wellbeing, even deep into our cells, in adults undergoing adversity across the lifecourse.

RNA binding proteins and the control of "stemness"

Ly P Vu, PhD
Assistant Professor, Faculty of Pharmaceutical Sciences, UBC
Scientist, BC Cancer Research Centre

Host: Judy Wong
Wednesday, September 20, 2023 at 12:00 noon

In recent years, translational regulation has emerged as a major regulatory mechanism of stem cells during development and in diseases such as cancer. RNA regulating proteins (RRPs), i.e., RNA binding proteins (RBPs) and associating proteins, are master regulators of RNA biogenesis, which could play a major role in controlling the gene expression programs. Despite their relevant function in normal development and diseases, only a handful of RBPs have been studied. In addition, the molecular mechanism for how RBPs contribute to maintain "stemness" remains largely elusive. I will discuss our recent work on the role of RNA binding protein SYNCRIP in hematopoietic stem cells during normal and malignant hematopoiesis. The study is an example of our work toward understanding how RNA regulating proteins impact pathogenesis of leukemia to ultimately identify novel targets and develop treatment for these diseases.

Telomere Maintenance in X-linked Dyskeratosis congenita: the first identified telomere biology disorder

Judy Wong, PhD
Professor, Molecular and Systems Pharmacology Group, Faculty of Pharmaceutical Sciences and Department of Medical Genetics, Faculty of Medicine, University of British Columbia

Wednesday, November 8, 2023 at 12:00 noon

During this seminar, I will review the structure and function of telomeres, including their role in genome protection and mitotic countdown. Using X-linked Dyskeratosis congenita (X-DC), the first telomere maintenance deficiency syndrome, as a paradigm, I will discuss telomerase-mediated telomere repair and the regulation of this repair activity in normal and pathological states. I will summarize the current understanding of the disease etiology of X-DC and how genetic pleiotropy of the DKC-1 gene may influence the allele-heterogeneity presentation of the disease. I will present published and new data from our laboratory demonstrating that genetic variability of telomere-maintenance capacity can affect clinical presentations of complex disorders. Our discovery encourages an adjustment of the clinical management for tissue-regenerative disorders in diagnosis and beyond.

Do Your Food Choices Really Matter? The Evidence, the Numbers, Your Values, Your Preferences

James McCormack, BSc, BSc (Pharm), PharmD
Professor, Faculty of Pharmaceutical Sciences, University of British Columbia

Wednesday, January 31, 2024 at 12:00 noon

MSP & NCB Joint Seminars

Understanding and targeting R-loop response pathways in myeloid neoplasms

Hai Dang Nguyen, PhD
Assistant Professor, Department of Pharmacology, Masonic Cancer Center
University of Minnesota

Host: Ly Vu
Friday, March 17, 2023 at 12:00 noon

Genomic instability, a hallmark of many cancers, arises from a variety of cellular processes in the genome including DNA replication and transcription. R loop is a transcription intermediate resulting from the formation of stable RNA:DNA hybrids and a displaced single-stranded DNA (ssDNA). R loops are a major source of replication stress, and their dysregulations are associated with different human diseases such as neurological disorders and cancers. My laboratory focuses on determining how cancer cells sense and resolve R loops to provide mechanistic insight to develop novel targeted cancer therapies. Specifically, we previously identified that accumulated R loops is a unifying mechanism across myeloid neoplasms such as MDS/sAML carrying spliceosome gene mutations. Our lab is building tools and techniques to further characterize R-loop regulatory networks in MDS/sAML to develop biomarkers and therapeutic strategies where targeted therapies are needed in MDS.

DDX41 helicase in innate immunity and genome instability

Yuliang Wu, PhD
Associate Professor, Department of Biochemistry, Microbiology and Immunology
University of Saskatchewan, Canada

Host: Ujendra Kumar
Friday, January 27, 2023 at 12:00 noon

Mutations in DDX41 are associated with myelodysplastic syndromes (MDS) and acute myeloid leukemia (AML), and R525H is the most frequent mutation. However, the molecular pathogenesis remains unknown. We found that DDX41 utilizes its unwinding and annealing activities to regulate the homeostasis of dsDNA and ssDNA, which in turn modulates the cGAS-STING pathway (Singh et al, Cell Reports, 2022). In addition, we found that DDX41 is an R-loop resolvase upon DNA damage, and the absence/mutations of DDX41 results in R-loop accumulation that induces genome instability (Aggarwal et al, unpublished). Collectively, our results demonstrate that DDX41 functions at the intersection of innate immune response and R-loop-induced genome instability; dysregulating these two pathways may lead to MDS/AML.

MSP NCB Trainee Seminar Series

Over the past two years, we hosted a successful seminar series featuring presentations by trainee members from both the MSP and NCB research labs. Each session included one presenter from the MSP and one from NCB, who shared their ongoing research. This initiative provided a platform for knowledge exchange between the two research groups and offered valuable training opportunities for the trainees. The series fostered cross-disciplinary learning, contributing to the professional development of all participants.

Date of Session	Presenting MSP Lab	Speakers	Presenting NCB Lab	Speakers
Sept 27, 2023	Velenosi	Chloe	Frankel	Mike
Oct 25, 2023	Maharaj	Sahithi Thotakura	Wisnovsky	Natalie Stewart
Nov 29, 2023	Rodrigues	Jason	Wong, H	Lisa Cheng
Dec 15, 2023	***Winter break***	***Winter break***	***Winter break***	***Winter break***
Jan 10, 2024	Wong, J	Chad Hau	Ross	Alex
Feb 7, 2024	Collier & Coughtrie	Austin Zimmer	Li	Vanessa Chan
Mar 20, 2024	Williams	Olivia Drummond	Page	Ujjwala Karmacharya

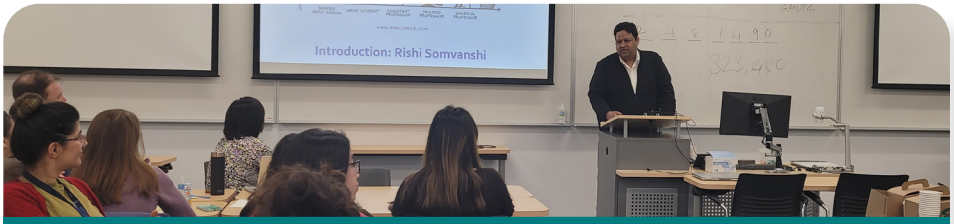
EVENTS

MSP-NCB Movie Night

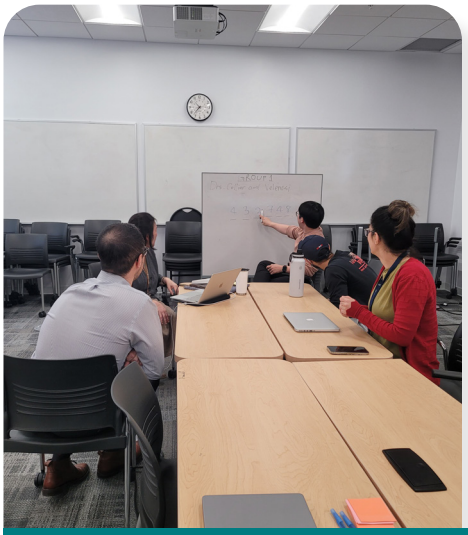
On February 24, 2023, the MSP-NCB members organized a movie night at the Faculty of Pharmaceutical Sciences. The faculty and trainees interacted with each other and discussed research prior to the movie screening. The movie *Annihilation*, a 2018 science fiction movie, was screened.

MSP Retreat

The MSP retreat was hosted in April 2023 at the Faculty of Pharmaceutical Sciences. MSP faculty and students discussed future directions of the MSP group and enjoyed talks from incoming PI Dr. Rishi Somavanshi.



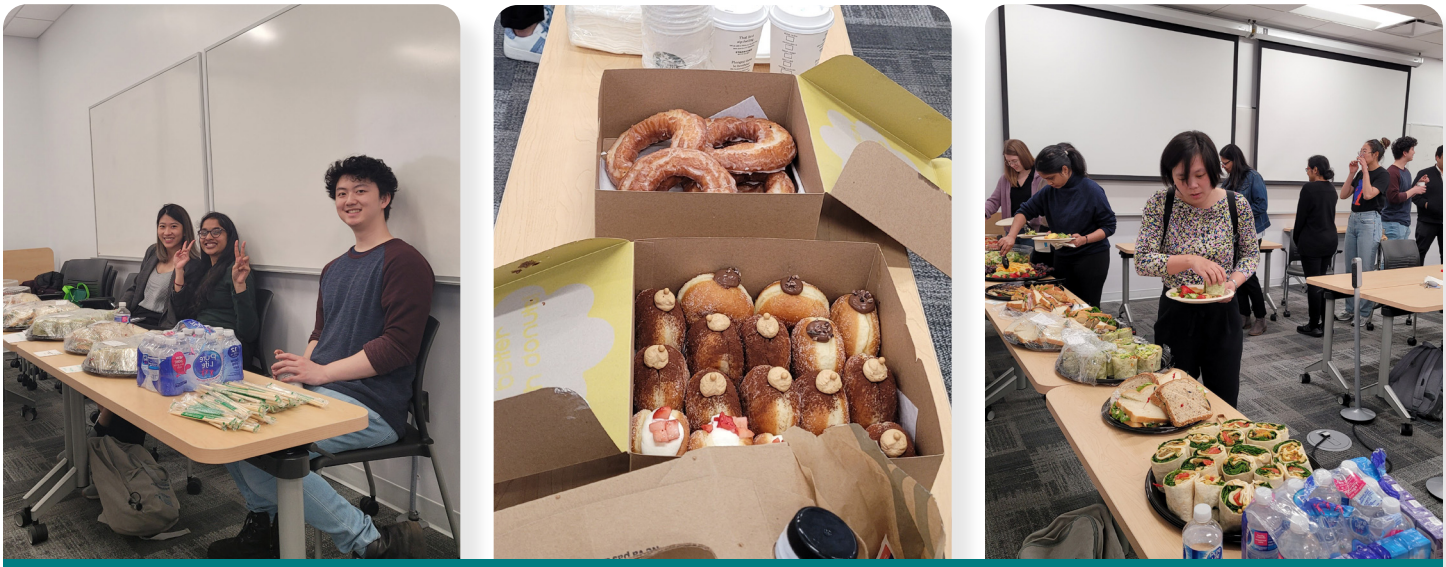
Dr. Rishi Somavanshi's introduction to the MSP research group.



Group discussions with faculty and trainees on future steps to be taken to enhance the impact of ongoing research by MSP members.

Trainee students (Chad and Sahithi) present "Price is Right" to the MSP members.

Presentations by each group member summarizing the individual group discussions.



MSP trainee students (Chad, Rui and Sahithi) with lunch arrangements.

Interactive session during the introduction of new equipment purchased by MSP in 2022–23 with the game "Guess the Price / Price is Right."

MSP-NCB Beach Day Event

In August 2023, the MSP and NCB enjoyed a research meet-and-greet event at the Spanish Banks Beach in Vancouver. Students and colleagues discussed research themes and had fun playing volleyball and frisbee on the beach!

Sushi and Bingo Night

In an effort to promote networking and strengthen relationships between members of the MSP and NCB groups, a Sushi and Bingo Night was organized. The event provided a fun and informal setting where participants could engage with colleagues outside of the research environment. The evening featured a variety of sushi dishes and lively bingo games, encouraging interaction between trainees and faculty from both groups. This event not only fostered a sense of community but also helped build stronger connections among members, enhancing collaboration across research teams.

MSP Retreat 2023–2024

In April 2024, we hosted our annual retreat, which served as a platform for reflection on the past academic year and planning for future advancements. The retreat commenced with a presentation by Dr. Judy Wong, highlighting the acquisition of new research equipment and celebrating key faculty achievements. This was followed by a trivia game, fostering engagement and teamwork among trainees and faculty. The event concluded with focused discussions addressing necessary changes in the program, covering topics such as mandatory coursework, teaching assistant assignments, and strategies to enhance career development and mentorship opportunities.

MSP-NCB Event

What was planned as a beach day with a good sunset turned into an indoor meetup between the MSP-NCB group faculty and trainees due to an unforeseen weather event (if you haven't guessed already, the Vancouver rain got us).

ACKNOWLEDGEMENTS

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