# RESEARCH AND INNOVATION

Faculty of Medicine | Research Office ANNUAL REPORT 2019



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### RESEARCH AND INNOVATION, FACULTY OF MEDICINE

# Annual Report 2019

It is with great pleasure that I present the 2019-2020 Faculty of Medicine Research Office Annual Report which highlights some of our major achievements over the past year.

The Faculty of Medicine has shown outstanding research productivity, consistently ranking in the top 2-3 for Research Intensity. Over the past year, we have continued to promote multidisciplinarity and translational research, supporting integration of clinical and basic science research teams through the Translational Research Grant (TRG) Program and also through the 1st Annual Faculty of Medicine Research Day. This event was held on September 25th, 2019 at Roger Guindon Hall and showcased close to 200 posters and 24 oral presentations from learners across a diverse array of research areas and learner programs, including graduate and postdoctoral studies, undergraduate Translational and Molecular Medicine (TMM), medical school, and residency training. With new biomedical and clinical/translational research focused graduate programs and the expansion of the undergraduate TMM program on the horizon, the Faculty is poised to support and play a key role in building Canada's next generation of scientists.

Together with our hospital-affiliated research institutes, the Faculty has successfully recruited world-class basic science and clinical research talent in areas of strategic priority, including in brain and mind, neuromuscular disease, and infection, immunity and inflammation, bringing highly sought expertise and infrastructure to the Faculty. The Faculty also successfully secured two Tier 1 Canada Research Chairs (CRCs) in Rare Disease Precision Medicine and Neuromuscular Genomics and Health. Through the above mentioned and many other successful programs, the Faculty has continued to solidify its enviable position as a leading research-intensive institution in Canada. More recently, we have had the opportunity to embark on a strategic planning exercise orchestrated by our new Dean, Dr. Bernard Jasmin, which identified four strategic goals for the Research Office over the next five years: i) Build on our current strengths; ii) Advance our Emerging Priorities; iii) Enhance our world-class collaborative research environment; iv) Grow our state-of-the-art research infrastructure. Through broad consultation, the Faculty has identified new priority areas, including Indigenous Health Research, Child Health Observatory, Medical Artificial Intelligence, in addition to numerous other emerging initiatives. We are excited to build partnerships with our affiliated research institutes/hospitals and other faculties to support and build these new research directions, solidifying our leadership in these important areas.

Continuing on this upward trajectory, on-going consultation and planning towards the Faculty's expansion into the new building set for the Alta-Vista campus will benefit and provide much needed space for growth, not only in expertise, but also cutting-edge infrastructure and innovation. We look forward to continuing to work with our partners to build our current strengths, advance our emerging priority areas, recruit top talent, and bring state-of-the-art equipment to the Faculty of Medicine and University of Ottawa community.





# Thank you Dr. Ruth Slack

The Faculty of Medicine Research Office would like to thank Dr. Ruth Slack for her outstanding leadership and contributions while serving as Interim Vice-Dean, Research in 2018-19. Throughout her time as Vice-Dean, Dr. Slack was instrumental in promoting translational research through the restructuring and expansion of the Faculty of Medicine Translational Research Grant (TRG) Program, which has awarded close to \$800K to 17 scientist-clinician teams across the Faculty and affiliated hospital research institutes through the 2018 and 2019 competitions. She also coordinated the Faculty's response to the 2019 Canada Foundation for Innovation call for major research infrastructure proposals, successfully spearheading key multi-faculty brainstorming sessions. This initiative led to the development of 3 Faculty-led infrastructure proposals for a total funding envelope of over \$30 million. Sincere thanks and congratulations to Dr. Ruth Slack on her appointment as Director of the University of Ottawa Brain and Mind Research Institute!



Goals ofthe Research Office



#### BUILD ON OUR CURRENT STRENGTHS

- 1.1 Recruit, integrate, mentor and retain world-class researchers, learners and staff in areas of strategic priority
- 1.2 Expand joint recruitment initiatives with affiliated research institutes and other faculties
- 1.3 Develop major team and infrastructure grants aligned with these priorities
- 1.4 Coordinate research prize and award nominations for a diverse pool of candidates

#### 2 ADVANCE OUR EMERGING RESEARCH PRIORITIES

- 2.1 Advance emerging research areas identified as top priorities in our broad consultation, including medical artificial intelligence and Indigenous health
- 2.2 Identify additional areas of importance to human health and prioritize them based on available resources, national/international standing in the field, critical mass of expertise/ leadership, access to unique resources/infrastructure and available funding programs (community, provincial, federal, global)

# 3 ENHANCE OUR WORLD-CLASS COLLABORATIVE RESEARCH ENVIRONMENT

- 3.1 Support research programs/initiatives that foster interdisciplinary and inter-institutional collaborations
- 3.2 Integrate and align strategic priorities, resource allocation and process optimization across basic science departments, clinical departments and affiliated hospital research institutes
- 3.3 Expand our dynamic, inclusive and enriching research environment for students, faculty and staff
- 3.4 Enhance research development and administrative support through optimization and harmonization of processes and elimination of barriers to research progress
- 4 GROW OUR STATE-OF-THE-ART RESEARCH INFRASTRUCTURE
  - 4.1 Develop cutting-edge and sustainable new research space to support the growth and expansion of our diverse research programs and initiatives
  - 4.2 Optimize and retrofit existing research space and infrastructure
  - 4.3 Expand support for core facilities to ensure access to state-of-the-art equipment, technology and expertise
  - 4.4 Lead the expansion of city-wide core facilities and linking of infrastructure through virtual cores for optimal usage and accessibility

#### OUR DEPARTMENTS AND PARTNERS

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#### **BASIC SCIENCE DEPARTMENTS**

- Biochemistry, Microbiology and Immunology
- Cellular and Molecular Medicine
- Innovation in Medical Education
- School of Epidemiology and Public Health

### AFFILIATED HOSPITAL-BASED RESEARCH

- Children's Hospital of Eastern
   Ontario Research Institute
- Bruyère Research Institute
- Institut du savoir Montfort
- Ottawa Hospital Research Institute
- The Royal`s Institute of Mental Health Research
- University of Ottawa Heart Institute

#### CLINICAL DEPARTMENTS

- Anesthesiology
- Emergency Medicine
- Family Medicine
- Medicine
- Obstetrics and Gynecology
- Ophthalmology
- Otolaryngology
- Pathology and Laboratory Medicine
- Pediatrics
- Psychiatry
- Radiology
- Surgery

#### **RESEARCH CENTRES AND INSTITUTES**

- Canadian Partnership for Stroke Recovery
- Centre for Neural Dynamics
- The Eric Poulin Centre for Neuromuscular Disease
- Kidney Research Centre
- Medical Devices Innovation
  Institute
- The Ottawa Institute of Systems Biology
- University of Ottawa Brain and Mind Research Institute
- University of Ottawa Centre for Infection, Immunity and Inflammation
- University of Ottawa Skills and Simulation Centre

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# Research Priorities of the Faculty

#### STRATEGIC, BROAD-BASED RESEARCH INITIATIVES

The Faculty of Medicine has a number of major research initiatives that are completely aligned with the University's strategic plan, Destination 2020. Building on our demonstrated track-record of research excellence, the Faculty and our affiliated Hospital-based Research Institute partners will focus our efforts during the coming decade on the following integrated strategic areas. Our experimental approach to these strategic research areas includes Genetics, Systems Biology, Regenerative Medicine as well as Innovative Therapeutics.



#### THE UNIVERSITY OF OTTAWA BRAIN AND MIND RESEARCH INSTITUTE

The University of Ottawa Brain and Mind Research Institute (uOBMRI) has sustained major growth and development. In the past several years, we have recruited 22 exceptional investigators in brain related research. The Institute brings 256 basic and clinical investigators from a broad spectrum of disciplines under a unifying umbrella to provide leadership and focus for the enhancement of neuroscientific and behavioral research. The Institute's initial programs focused on development of exceptional clinical care and research of brainrelated illnesses in stroke, Parkinson's disease, mental health, multiple sclerosis, and neuromuscular disease. These initiatives cut across basic, clinical and human population studies, emphasizing translation of research into practice, particularly in the development of novel therapeutics and diagnostics. In the past year, we have also initiated efforts in emerging areas: understanding concussion injury, cognitive memory processes and neural networks.



#### **CARDIOVASCULAR AND VASCULAR BIOLOGY**

The Faculty of Medicine, together with the University of Ottawa Heart Institute (UOHI) and Ottawa Hospital Research Institute (OHRI), has a strong track record of research excellence in cardiovascular disease and vascular biology. In recent years there has been a concerted effort to develop a multi-disciplinary and inter-institutional initiative. The Ottawa Region for Advanced Cardiovascular Research Excellence (ORACLE) strategy, which was updated in 2018, is led by the UOHI, in collaboration with the Faculty of Medicine, and regional partners. The strategy includes the formation of regional teams of multi-disciplinary researchers known as Innovation Hubs that are focusing research in Atherosclerosis and Cardiometabolic Diseases, Arrhythmias, Heart Failure, Brain-Heart Linkages, and Valvular Heart Disease. The Brain-Heart Linkages Innovation Hub represents a collaboration between researchers at UOHI, the uOttawa Brain and Mind Research Institute and the Royal's Institute of Mental Health Research and examines the biological and clinical linkages between brain and heart disorders. Collaborative successes in 2019 include the partnered funding of 4 Faculty of Medicine Translational Research Grants in ORACLE priority areas that are currently in progress.



#### SCHOOL OF EPIDEMIOLOGY AND PUBLIC HEALTH

The School of Epidemiology and Public Health aims to bring together applied health researchers in the areas of epidemiology, clinical sciences, public health, health policy and systems, global health, risk assessment, and implementation science to create an interdisciplinary and inclusive research platform that will be a significant impact on the health of populations and patients. These goals will be achieved through collaborations with the research institutes and community partners and research enabling platforms such as large administrative databases and method centers these goals will be achieved.

The vision of the School is to be recognized as a leading contributor to research, teaching and professional training. At the local level, it aims to improve patient and population health outcomes in the population laboratory of the Champlain Local Health Integration Network (LHIN). More broadly, it carries out research on the determinants of health and disease etiology and on the development, implementation and evaluation of practices, programs and policies aimed at optimizing health and social services.



#### **CENTRE FOR INFECTION, IMMUNITY AND INFLAMMATION (CI<sup>3</sup>)**

Chronic infectious and inflammatory diseases are highly complex, involving multi-faceted gene-environment interactions and substantial crosstalk between different biological systems such as the cardiovascular, immune, neurological and endocrine systems. Unravelling this complexity requires a systems biology approach and must encompass the expertise of scientists from diverse disciplines working together on a given disease. The uOttawa Centre for Infection, Immunity and Inflammation (CI3) was created with the objective of bringing together basic and clinical scientists from across the fields of Immunology, Microbiology, Virology, Biochemistry, Neurobiology, Cardiovascular Biology, Metabolism and Pathology, who have diverse expertise, experimental models and approaches, and are interested in the development of effective solutions for infectious and inflammatory diseases. The overarching goal of CI3 is to foster multidisciplinary research across the field of infectious and inflammatory disease in order to accelerate understanding of the common principles and help establish the mechanisms that underpin chronic inflammatory states, and therefore lead us towards development of intervention strategies. The objectives of the centre are to: 1) develop new collaborative, innovative and multi-disciplinary research projects that are aimed at understanding the mechanisms of inflammation that underline various chronic diseases, 2) to develop collaborative projects that are aimed at knowledge translation and dissemination, and 3) to train next the generation of scientists in multidisciplinary research in infection, immunity and inflammation.

# Outstanding Research Accomplishments

Students in the Translational and Molecular Medicine (TMM) undergraduate program taking the Science Communications course (TMM 4950) have been invited to contribute to this section.



#### PROTECTION FROM THE COLD: NOVEL INSIGHTS INTO THE PROCESS OF BROWN FAT THERMOGENESIS

Mammalian bio-energetics expert Dr. Mary-Ellen Harper is conducting ground-breaking research that will help to better understand the control of cellular energy transduction processes in health and disease. A recent study led by her team focused on improving our understanding of brown adipose tissue (BAT) thermogenesis, an essential process responsible for maintaining body temperature in mammals in cold environments. BAT thermogenesis can be stimulated by cold exposure or by pharmacological administration of adrenergic receptor agonists and is dependent on the activity of the

uncoupling protein 1 (UCP1). In BAT, UCP1 is an abundant protein in the mitochondrial inner membrane responsible for inducing proton leakmediated respiration.

This study, published in Molecular Metabolism, by Dr. Mary-Ellen Harper together with Dr. Michael Downey, PhD candidate Rajaa Sebaa, and colleagues, sought to examine the deacetylation control of BAT and to determine whether a functional link exists between UCP1 and the master mitochondrial lysine deacetylase, sirtuin 3 (SIRT3). To this aim, physiological, molecular, and proteomic analyses of BAT from both wild-type and Sirt3KO mice were performed when BAT is activated. Mice were either exposed to cold temperatures for two days or injected with a  $\beta$ 3-adrenergic agonist. To assess the impact of the acetylation of lysine sites on UCP1 function, the authors conducted mutagenesis studies in a cellular model. Metabolomic analyses were done on blood acylcarnitines and mechanistic analyses examined oxidative phosphorylation (OXPHOS) proteins. This body of work showed that the absence of SIRT3 in mice causes impaired BAT lipid use, whole body thermoregulation, and respiration in BAT mitochondria, without impacting UCP1 expression.

Proteomic analyses revealed that SIRT3 regulates acetylation status of numerous BAT mitochondrial proteins, including UCP1. Further functional analyses showed that UCP1 activity is independent of direct SIRT3-regulated lysine acetylation. SIRT3 was shown to impact BAT mitochondrial protein activities of acylcarnitine metabolism and specific electron transport chain complexes, CI and CII. This work demonstrates for the first time that SIRT3 plays a fundamental role in BAT thermogenesis by targeting pathways upstream of UCP1. Importantly, these proteomics findings provide an extensive resource and set the stage for future investigations into the mechanisms involved in this important 'cold protection' process.

Dr. Harper is a Professor in the Department of Biochemistry, Microbiology and Immunology (BMI), University Chair in Mitochondrial Bioenergetics, and Interim Director of the Ottawa Institute of Systems Biology (OISB). Dr. Downey is an Associate Professor in the Department of Cellular and Molecular Medicine.



#### HOW DO VIRUSES ENTER CELLS? INVESTIGATIONS INTO THE MECHANISM OF FILOVIRUS INTERNALIZATION

Unpredictable outbreaks of severe hemorrhagic fevers in humans and non-human primates can be caused by filoviruses. The Filoviridae family contains three distinct genera: Ebolavirus, which comprises five viruses, including Ebola virus (EBOV), Marburgvirus, and Cuevavirus. Although most outbreaks have occurred in Central and West Africa, recent studies have highlighted a high diversity and large geographical distribution of filoviruses. For the process of infection, filoviral particles need to be internalized and subsequently delivered to intracellular vesicles containing enzymes capable of degrading proteins (cathepsin proteases) and a specific viral receptor (Niemann-Pick C1). Although previous studies have provided important insights into a potential mechanism for virus entry into cells, including that EBOV triggers macropinocytosis of viral particles in a glycoprotein (GP)dependent manner, the molecular mechanisms and processes involved in filovirus internalization remain elusive.

A study, published in Viruses by Dr. Marceline Côté with Dr. Morgan Fullerton, PhD candidate Corina M. Stewart, and colleagues, investigated a novel mechanism for filovirus entry into cells. Here, the team investigated the potential role of diacylglycerol kinase (DGK) activity in filovirus entry using a specific inhibitor of DGKs, R-59-022. The authors reported that this inhibitor blocks EBOV GP-mediated entry into cells, including Vero cells and bonemarrow derived macrophages. The mechanism of action was determined to be through blockage of the internalization of the viral particles via macropinocytosis, an early step in the entry process. The team demonstrated that treatment of cells with R-59-022 led to inhibition of viral entry mediated by a panel of pathogenic filovirus GPs and, importantly, inhibited growth of replicative Ebola virus. This body of work provides evidence for the use of DGK inhibitors as a tool to explore the mechanism of filoviral particle uptake and could importantly lead to the development of pan-filoviral inhibitors and therapeutics.

Dr. Marceline Côte is an Associate Professor in the Department of Biochemistry, Microbiology and Immunology (BMI) and Tier 2 Canada Research Chair in Molecular Virology and Antiviral Therapeutics. Dr. Morgan Fullerton is an Associate Professor in the Department of BMI.



#### FROM MECHANISMS TO MONITORING – INSIGHTS INTO AUTOPHAGY

Dr. Ryan Russell and his team aim to expand our knowledge of the regulatory mechanisms of mammalian autophagy. Autophagy is a natural process where the body's cells 'clean out' any damaged or unnecessary components. The autophagy pathway is an essential part of the innate immune response, which is used by host cells to cope with invading pathogenic bacteria. The upstream signalling pathways that ultimately regulate autophagy induction in response to pathogens remain elusive. A study, published in Cell Reports, by **Dr. Ryan Russell** and his team, in collaboration with **Drs. Morgan Fullerton, Derrick Gibbings, Subash Sad,** PhD candidate **Truc T. Losier**, and colleagues, sought to gain insight into this poorly understood autophagy activation mechanism.

Here, the authors reported that upon pathogenic bacteria detection an upstream activator of autophagy, known as AMPK (AMP-activated kinase), is stimulated. It was noted that this bacterial recognition occurs through outer membrane vesicles and precedes bacterial invasion. In response to infection, AMPK signalling relieves mTORC1-mediated repression of the autophagy pathway. The authors revealed that activation of AMPK and inhibition of mTORC1 in response to bacteria does not cause bulk autophagy, but rather leads to selective targeting of bacteria-containing vesicles through the activation of pro-autophagic kinase complexes. This body of work provides evidence that AMPK signalling has a key role in initiating and regulating the autophagic response to bacteria. This work has critical implications for the study of and development of potential therapies for immune diseases, such as Crohn's disease. Furthering our understanding of autophagy dysfunction in Crohn's Disease graduate students Reham

Alsaadi and Truc. T Losier identified a new signalling pathway, which when coupled with a specific mutation associated with Crohn's disease leads to autophagy defects as described in EMBO Reports. Importantly, Dr. Russell and his team, together with **Dr. Diane** Lagace, Dr. Baptiste Lacoste, and graduate student Wensheng Tian, have also recently developed a new way to monitor autophagy. Researchers can now detect a vital step in the autophagy process with a phospho-antibody, as described in Nature Methods.

Dr. Ryan Russell is an Associate Professor in the Department of Cellular and Molecular Medicine (CMM). Dr. Morgan Fullerton is an Associate Professor in the Department of Biochemistry, Microbiology and Immunology (BMI). Dr. Derrick Gibbings is an Associate Professor in the Department of CMM. Dr. Subash Sad is a Professor in the Department of BMI and Director of the Centre for Infection, Immunity and Inflammation (CI3).

Dr. Diane Lagace is an Assistant Professor in the Department of CMM. Dr. Baptiste Lacoste is also an Assistant Professor in the Department of CMM and a Scientist at the Ottawa Hospital Research Institute (OHRI).



#### THE ASSOCIATION BETWEEN OVERNUTRITION AND OBESITY: USING ALTERNATIVE STATISTICAL METHODS TO IDENTIFY GENE-GENE AND GENE-ENVIRONMENT INTERACTIONS

Dr. Marie-Hélène Roy-Gagnon and her team are conducting research focused on the development and optimal use of statistical methods for genetic epidemiological data, with a key interest in facing challenges in uncovering the genetic causes of complex diseases. Previous work in the field has demonstrated an involvement of genes, specifically NFKB1, IKBKB, and SOCS3, in the association between overnutrition and obesity. In a study, published in Frontiers in Genetics, Dr. Marie-Hélène Roy-Gagnon together with François Tessier, past MSc student under Dr. Roy-Gagnon's supervision, and colleagues, sought to investigate

interactions involving these genes and macronutrient intakes affecting obesityrelated phenotypes.

In this study traditional statistical methods were used, including logistic regression, and compared to two alternative statistical methods, multifactor dimensionality reduction (MDR) and penalized logistic regression (PLR), to enable better detection of genes/environment interactions in the Toronto Nutrigenomics and Health Study using dichotomized body mass index (BMI) and waist circumference (WC) as obesity-related phenotypes. Exposure variables included genotypes on 54 single nucleotide polymorphisms (NFKB1: 18, IKBKB; 9, SOCS3: 27), macronutrient (carbohydrates, protein, fat), and alcohol intakes and ethnocultural background. After correction for multiple testing, no interaction was found using logistic regression. MDR identified interactions between SOCS3 rs6501199 and rs496172, and IKBKB rs3747811 affecting BMI in the Caucasian population; SOCS3 rs6501199 and NFKB1 rs1609798 affecting WC in the Caucasian population; and SOCS3 rs4436839 and IKBKB rs3747811 affecting WC in the South Asian population. PLR found a main effect of SOCS3 rs12944581 on BMI among the South Asian population. Although contrasting results were obtained from MDR and PLR, some models did support results published in previous studies. These findings demonstrate the need to utilize alternative statistical methods when investigating high-order interactions and provide evidence that variants in nutrient-responsive hypothalamic signalling pathways may have key roles in obesity pathogenesis.

Dr. Marie-Hélène Roy-Gagnon is an Associate Professor in the School of Epidemiology and Public Health (SEPH).



#### HUMBLE BEGINNINGS-UNCOVERING THE HISTORY OF UOTTAWA'S FACULTY OF MEDICINE

#### Story credit: Jacob Cuthbert (TMM 4950)

For decades, the Faculty of Medicine has been training medical professionals and making advancements in research and healthcare delivery. It is common knowledge that the medical school was established in 1945, in barracks leftover from World War II. However, there is still much we do not know about the school's foundation, and how it became a leader in medical education. With the Faculty approaching its 75th anniversary in 2020, staff and community members are looking to celebrate the school's accomplishments and milestones.

Dr. Susan Lamb is researching the entire history of the faculty for this milestone to shed some light on our rich history. Dr. Lamb is approaching the challenge by studying archival documents and interviewing living alumni. She is looking for patterns across these various resources, not unlike how a pathologist might characterize a disease. Lamb has already made some fascinating discoveries. While the school did emerge from humble beginnings, the founders were able to attract an illustrious and diverse faculty. Scientists from across Europe relocated to Ottawa, pushing the school to become an innovator in biomedical research. Dr. Lamb notes that while there was a focus on scientific exploration, the core of the school's vision was the advancement of bilingualism and the training of Frenchspeaking physicians. She describes the obvious heart, dedication, and determination possessed by the school's founders, and how they ultimately wanted to improve the community's health. Lamb's work will be unveiled in early 2020.

Dr. Susan Lamb is an Assistant Professor in the Department of Innovation in Medical Education (DIME) and the Jason A. Hannah Chair in the History of Medicine at uOttawa's Faculty of Medicine.



#### CAN SMARTPHONES BE USED IN THERAPY? AN INNOVATIVE SOLUTION TO INCREASING ACCESS TO MENTAL HEALTH CARE

#### Story credit: Amaal Abdi (TMM4950)

Access to mental health services is a growing public health concern and it can take patients several weeks to months to receive the care that they need. In response to this, **Dr. Simon** Hatcher proposes using smartphones and computers as a solution. "If a computer can do what a human can do, why bother employing a human?", he asks. Of course, he explains, it is not quite that simple. Face to face therapies with a clinician provide an invaluable connection that is necessary for motivating patients to complete therapy. There are aspects of these therapy sessions that can't realistically be replaced by computerized therapies. But how well could they be blended together?

This is exactly what Dr. Hatcher's team plans to uncover in their upcoming clinical trials where an app is incorporated into the treatment of patients receiving services at

the General Hospital. Preliminary results describe the overall positive experiences of both participants and clinicians and the app was found to enhance aspects of the therapy sessions. Dr. Hatcher and his team are currently arranging for larger scale studies with more participants to further assess the effectiveness of integrating the use of computerized therapies into clinical practice. He also hopes to look at how similar apps can be personalized to specific patient populations. Dr. Hatcher's innovative work has the potential to transform mental health care in Canada, allowing for personalized care to be at the fingertips of patients.

Dr. Simon Hatcher is a Psychiatrist at the Ottawa Hospital Research Institute's, Clinical Epidemiology Program and Professor and Vice-Chair at uOttawa's Department of Psychiatry.



DECIDING FATE: A NEW TECHNIQUE SHEDS LIGHT ON THE IMPORTANCE OF TRANSCRIPTION FACTORS FOR HEMATOPOIETIC STEM CELL DIFFERENTIATION

Story credit: Olivier Brandts-Longtin (TMM4950) and Daniel Jacobsen (TMM4950)

In her recent Cell Stem Cell publication, Dr. Marjorie Brand and her team at the Ottawa Hospital Research Institute (OHRI) reveal the transcription factor (TF) levels involved in hematopoietic stem cell differentiation. Past research has investigated cell populations or single cell RNA, but there is a controversy around the importance of transcription factors in differentiation. Using time of flight cytometry (CyTOF), a new technique that allows for single cell protein expression analysis at specific time points, Dr. Brand has demonstrated the importance of TFs. In bipotential progenitors, TFs from competing hematopoietic lineages are co-expressed. The levels of these TFs are seen to change gradually along the erythroid trajectory, where quantitative changes of lineage-specific TFs control cell fate decisions. As a proof of concept, Dr. Brand demonstrated these fate decisions can be manipulated: upregulation of a megakaryocytic transcription factor in early progenitor cells was enough to change cells from an erythroid to megakaryocytic trajectory.

This work has important implications not only for the basic understanding of processes determining cell fate, but also for clinical applications. In clinical treatments requiring stem cell transplants, like for leukemia, the stem cell population can be expanded, or more cells transplanted, but this has little use unless the stem cells differentiate into the desired cell types. Leukemia patients are at high risk for dying from infection before their hematopoietic stem cell transplant rebuilds their immune system. By understanding the processes guiding cell fate decisions, Dr. Brand's discoveries build the framework for being able to control stem cell differentiation in vivo, allowing to push cell types faster down certain lineages. This would ultimately lead to more effective treatments and quicker recovery.

Dr. Marjorie Brand is a Professor in the Departments of Cellular and Molecular Medicine (CMM) and Medicine, and Senior Scientist at the OHRI.



THE CANADIAN SYNCOPE RISK SCORE: A FUNCTIONAL TOOL USED TO GUIDE PATIENT MONITORING AFTER FAINTING

Story Credit: Jasmine Bhatti (TMM 4950) and Meghan Heer (TMM 4950)

Approximately 30-35 percent of people will faint at least once in their lives. Although fainting—or syncope—is often harmless, it can also present as a symptom of a potentially lethal medical condition: arrhythmia, or irregular heartbeat. As a result, patients can spend up to 12 hours in the emergency department for observation following syncope. On average, 1 in 20 patients experience adverse events including

#### OUTSTANDING RESEARCH ACCOMPLISHMENTS

heart attack or death within 30 days of their hospital visit, making it critical for physicians to accurately identify and treat patients for the underlying causes of syncope.

#### **Dr. Venkatesh**

Thiruganasambandamoorthy is an

internationally recognized researcher in syncope and presyncope and developed the Canadian Syncope Risk Score to predict which patients will experience adverse events following syncope. Recently, Thiruganasambandamoorthy's research group used the risk score in an observational study of 5,581 patients categorized as low, medium or high risk of experiencing arrhythmia within 30 days following syncope. Their findings, published in Circulation, suggest only two hours of clinical observation for low-risk patients and six hours for medium and high-risk patients before safe discharge. This practice provides adequate diagnosis of serious conditions causing syncope and guick discharge of low-risk patients to reduce wait times and free up crucial resources. Dr. Thiruganasambandamoorthy and his team will continue to investigate the accuracy of the risk score outside of Canada to optimize care practices for syncope patients.

#### Dr. Venkatesh

Thiruganasambandamoorthy is an Emergency Physician and Scientist at the Ottawa Hospital and Ottawa Hospital Research Institute (OHRI). He is also an Associate Professor in the Department of Emergency Medicine and a founding member of the Canadian Syncope Alliance, a national collaboration aiming to improve syncope care.



#### INJECTABLE HUMAN COLLAGEN MATRICES DECREASE ADVERSE CARDIAC TISSUE REPAIR AND IMPROVE CARDIAC FUNCTION AFTER MYOCARDIAL INFARCTION

Story Credit: Hussein Said (TMM4950) and Khadeeja Tariq (TMM 4950)

Cardiovascular diseases are amongst the leading causes of death and account for an alarming morbidity rate worldwide. Although therapies exist for the treatment of myocardial infarctions (MI), these solutions are sometimes not preventative of future heart disease or failure. Drs. Emilio Alarcon and Erik Suuronen's teams at the Heart Institute of the University of Ottawa (UOHI) developed an injectable human collagen-based biomaterial that improved the heart function after heart attack. This material was designed to help address the significant mortality rates (50% in the 5 years following a heart attack) amongst MI patients.

To test their biomaterial, the scientists performed intramyocardial injections of recombinant human

collagen type 1 and 3 (rHC1 or rHC3) one-week post-MI in mice and cardiac function was determined by echocardiography 28 days following treatment. Their observations were based on the assessment of cardiac morphology, ventricular remodeling, and inflammation following the injection of collagen. In addition, they performed in vitro tests to determine how macrophages will interact with the human recombinant collagen. Their current findings, published in Nature Communications, led by Sarah McLaughlin, Ph.D. student, together with Drs. Marc Ruel, Katey Rayner, Wenbin Liang, and colleagues demonstrate the recovery of the heart's function following MI using recombinant human collagen type 1 by promoting healing and survival of cardiac tissue. This project is currently awaiting Health Canada approval to proceed to test in larger animals and they hope to enter human clinical trials within the next 2 years.

Dr. Emilio Alarcon is an Associate Professor in the Department of Biochemistry, Microbiology and Immunology (BMI) and Scientist at the UOHI. Dr. Erik Suuronen is an Associate Professor in the Department of Cellular and Molecular Medicine (CMM) and Scientist at UOHI. Mark Ruel is Full Professor in the Department of Surgery and the Head of the Division of Cardiac Surgery at the UOHI. Katey Rayner is *Associate Professor in the Department* of BMI and Scientist at the UOHI. Wenbin Liana is Assistant Professor in the Department of CMM and Scientist at the UOHI.



#### THE DEVELOPMENT OF A TABLET-BASED AUDIOMETER INCREASES ACCESSIBILITY TO HEARING TESTS

Story Credit: Estephanie Jémus-Gonzalez (TMM 4950) and Caroline Mallity (TMM4950)

Across the globe, approximately 466 million people live with disabling hearing loss, including 34 million children. The timely diagnosis of this condition in children is of particular importance as it can negatively impact both their social and cognitive development. However, early diagnosis is not always possible as hearing loss in young children often remains unnoticed. As such, they are at increased risk of delayed speech acquisition often leading to social isolation and poor self-regard. Early identification and intervention of hearing loss is essential to restore normal speech development and encourage a favourable long-term outcome. Unfortunately, standard clinical audiometry tests aren't always accessible, particularly in developing countries where hearing loss is more prevalent.

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#### Recently, Dr. Matthew Bromwich,

the cofounder of SHOEBOX, has won the Manning Innovation Award in recognition for his portable tabletbased audiometry device. The novel paradigm assesses the patients' hearing threshold through an interactive hearing test, allowing them to control the pace and presentation of sound stimuli. As tones of varying intensities and frequencies are presented, the patient can indicate when they are able to hear a sound. The device compensates for the manual adjustments an audiologist would make during a test through REACT, a patent-pending technology that ensures test accuracy by monitoring patient response behaviour and environmental conditions. Altogether, SHOEBOX capitalizes on the advantages of automation by making hearing tests more accessible, while also maintaining clinical validity. While much progress has been done thus far, there is still a lot of work yet to be accomplished in the field of audiology. Dr. Bromwich hopes that one day we may be able to cure hearing loss, and he is working on achieving this goal - step by step.

Dr. Matthew Bromwich is an Associate Professor in the Department of Otolaryngology – Head and Neck Surgery, Investigator at the Children's Hospital of Eastern Ontario (CHEO) Research Institute (RI), and Physician in CHEO's Department of Surgery, Division of Pediatric Otolaryngology.



#### SURGERY-INDUCED IMMUNOSUPPRESSION OF NATURAL KILLER CELLS IS MORE SEVERE THAN PREVIOUSLY REPORTED

#### Story Credit: Alex Rigney (TMM4950) and Amin Zahrai (TMM4950)

Cancer, caused by abnormal cell division, is the leading cause of death in Canada. Eighty percent of patients will need surgery to remove their tumours, with surgeons relying on adjuvant chemotherapy to eliminate remaining cancer cells, which can lead to recurrences. A new paradigm for cancer treatment, known as immunotherapy, relies on harnessing the anti-tumour potential of the body's own immune system and has shown promise in the clinic. Natural Killer (NK) cells are the cytotoxic lymphocytes of the innate immune system, responsible for immunosurveillance and removal of malignant cells from the body. In addition to their cytotoxic function, these cells can secrete the cytokine, interferon-gamma (IFN-y), to coordinate the immune response. IFN-γ acts as a chemical messenger to facilitate tumour clearance and is correlated with tumour stage and cancer prognosis. While it is

well documented that NK cytotoxicity (NKC) is severely reduced after surgery, few reports have assessed the effects of surgery on NK cell IFN-γ secretion (NKA).

In a recent study published in Annals of Surgical Oncology, Dr. Rebecca Auer, together with Dr. Natasha Kekre and colleagues, investigated the effect of surgical stress on NKA and NKC in colorectal cancer patients. They report that NKA was essentially undetectable in all 42 patients immediately after surgery, remaining significantly suppressed in 66% of patients even after 1 month. This far surpassed the length of NKC suppression and was not due to the number or distribution of NK cells, as they remained constant throughout the perioperative period. This study revealed that the degree of surgery-induced immunosuppression is much more severe than previously reported and may be a major contributor to postoperative metastasis. The team hypothesizes that preventing surgery-induced NKA suppression will drastically improve postoperative immunosurveillance, leading to reduced metastatic recurrence. They are now investigating using a common treatment for erectile dysfunction, tadalafil, combined with the flu vaccine, to prevent postoperative NK cells dysfunction in cancer surgery patients at The Ottawa Hospital (NCT02998736).

Dr. Rebecca Auer is a Senior Scientist and the Director of the Cancer Therapeutics Program at the Ottawa Hospital Research Institute (OHRI), and an Associate Professor in the Department of Surgery and Department of Biochemistry, Microbiology and Immunology (BMI). Dr. Natasha Kekre is an Associate Scientist at the OHRI and an Assistant Professor in the Department of Medicine.



#### **TOBACCO MATTERS**

Story Credit: Melanie Ratnayake (TMM4950)

As a respirologist, Dr. Smita Pakhale has witnessed the significant impact that smoking tobacco has on the lungs and overall guality of life of people. Dr. Pakhale is very passionate about tobacco inequity, and it is this passion that led her to become an active member of the Tobacco Action Committee of the American Thoracic Society. Here, she witnessed the significant role tobacco continues to play in the health of individuals locally and globally. Along with the committee members, she developed clinical guidelines to manage tobacco dependence, which will be published soon. This passion translated to her research, which found approximately 96% of Ottawa's vulnerable population (homeless, at-risk of homelessness, self-identify as a racialized minority, including Indigenous people, and face mental health challenges) smoke tobacco. This stark inequity motivated the community and herself to create The Bridge Engagement Center (a community-based research centre located in the Vanier region of Ottawa).

#### OUTSTANDING RESEARCH ACCOMPLISHMENTS

In partnership with individuals of lived experience (community peer researchers), her team has co-created projects, such as PROMPT, which allowed individuals to receive on-site counseling and peer support in order to help them reduce tobacco smoking. Dr. Pakhale and her team have published key findings on this unique citizen engagement model, including a recent article in Research Involvement and Engagement. This was important as an earlier study found that the majority of people who use tobacco are unlikely to seek help from hospitals and clinics due to structural inequities impeding access and fear of social stigmatism. As a result, Dr. Pakhale strives to create a safe, low-threshold, community environment and also emphasizes the use of a community-based participatory action research approach to ensure that the community's interests and needs are met. From this project alone she noticed that not only did these individuals reduced or quit smoking tobacco, but they also stopped using other drugs. This positive outcome also inspired them to return to school and find jobs to continue to improve their quality of life. The citizen engagement model co-developed with community peer researchers is now proclaimed internationally, and she hopes to continue to partner with communities around the world in order to help develop comprehensive, peer-led, patient engagement programs that meet the community needs.

Dr. Smita Pakhale is a respirologist at the Ottawa Hospital, Scientist at the Ottawa Hospital Research Institute (OHRI) and Associate Professor in the School of Epidemiology and Public Health (SEPH).



#### BIG DATA USED TO ACCURATELY PREDICT INDIVIDUAL'S RISK OF HEART DISEASE

#### Story Credit: Dan Read (TMM4950)

Cardiovascular disease (CVD) is a public health crisis, representing the second leading cause of death in Canada. Despite this, the impact that non-clinical factors, such as exercise, have on the incidence of CVD is difficult for public health policy makers and physicians to determine, since current predictive models for CVD often omit these variables in favour of clinical measures, such as cholesterol concentration. To overcome this problem, the lab of Dr. Douglas Manuel and colleagues created the Cardiovascular Disease Population Risk Tool (CVDPoRT), reported in the Canadian Medical Association Journal in 2018, which uses Big Data to incorporate non-clinical variables into a predictive model. The group used data collected from Canadian Community Health Surveys, which were completed outside of the clinic and which were calculated to represent 98% of patients in Ontario. They then measured health outcomes in these same patients, such

as death from CVD, to develop the predictive algorithm.

CVDPoRT was shown to discriminate effectively between patients at high and low risk of developing heart disease and had a predictive accuracy that was superior to standard predictive models without the need to incorporate any clinical measures. Another significant advantage of using Big Data is that it allows CVDPoRT to make very personalized predictions since the vast quantity of data collected will include patient profiles that represent only a tiny proportion of the entire population. This model can thus be used by patients and doctors to calculate the risk of heart disease, and by local governments to implement policy changes directed at reducing heart disease risk in their population, potentially eliminating thousands of incidences of preventable deaths. More recently, Dr. Manuel used Big Data to contribute to the fight against hypertension in Canada. This collaborative effort is described in Statistics Canada's Health Reports and is focused on evaluating risk factors for hypertension to help inform prevention efforts. Through this analysis it was revealed that physical activity, diet, body mass index, diabetes, and the presence of kidney disease were strong risk factors for hypertension.

Dr. Douglas Manuel is a Senior Scientist at the Clinical Epidemiology Program at the Ottawa Hospital Research Institute (OHRI), Associate Scientist at the Bruyère Research Institute (BRI), and Distinguished Professor in the Department of Family Medicine and School of Epidemiology and Public Health (SEPH).

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# Prizes and Awards

In uOttawa's bid to increase its research intensity and international recognition, research and teaching prizes and awards are becoming more and more important. Awards such as these promote a culture of research excellence and raises the visibility and profile of the institution and researchers on the national and international scene. Gaining this recognition strengthens the appeal of uOttawa as a first-class institution for study and research and encourages careers in research/ academia. For more information visit: https://med.uottawa.ca/ research-innovation/research-highlights/prizes-awards.

The Faculty of Medicine Research Office staff provides assistance to investigators, research teams, and educators in identifying relevant awards and prizes and preparing applications, as well as coordinating nominations with key stakeholders within and external to the **University**.



Dr. Doug Manuel	University of Ottawa Distinguished University Professor Award		
Dr. Ruth McPherson	University of British Columbia Margolese National Heart Disorders Prize		
Dr. Manon Denis-Leblanc	Association des communautés francophones d'Ottawa Prix Laurier Bernard-Grandmaître de l'Intervenante de l'année		
Dr. David Moher	Canadian Academy of Health Sciences Fellowship		
Dr. Mark Tremblay	Canadian Academy of Health Sciences Fellowship		
Dr. David Grynspan	PARO (Professional Association of Residents of Ontario) Excellence in Clinical Teaching Award		
Dr. Lisa Thurgur	PARO (Professional Association of Residents of Ontario) Lois H. Ross Resident Advocate Award		
Dr. Jean-François Couture	University of Ottawa Excellence in Education Prize		
Dr. Manisha Kulkarni	University of Ottawa Knowledge Mobilization Excellence Award		
Dr. John Bell	European Society for Gene and Cell Therapy Public and Patient Engagement Award		
Dr. Barbara Vanderhyden	Society for the Study of Reproduction Trainee Mentoring Award		
Dr. Smita Pakhale	Social Network of Women Woman of the Year Award		
Dr. Warren Cheung	Resident Doctors of Canada Mikhael Award for Medical Education		

2019

# FNZED AND AWGIC

Dr. Katey Rayner	Journal: Arteriosclerosis, Thrombosis and Vascular Biology - Daniel Steinberg Early Career Investigator Award for Best Article CIHR-Canadian Cardiovascular Society - Distinguished Lecturer Award in Cardiovascular Sciences		
Dr. Rob Beanlands			
Dr. Ruth McPherson	CIHR-Canadian Cardiovascular Society - Research Achievement Award		
Dr. Mireille Khacho	Bickell Foundation		
Dr. Clare Liddy	College of Family Physicians of Canada Researcher of the Year Award		
Dr. Justin Presseau	Canadian Psychological Association Mid-career Investigator Award for Career Excellence in Health Psychology Research		
Dr. Terrence Ruddy	Society of Nuclear Medicine and Molecular Imaging 2019 Blumgart Award		
Dr. Dale Corbett	American Society for Neurorehabilitation Outstanding Clinician Scientist Award		
Dr. Susan Humphrey-Murto	Memorial University Meridith Marks Mentorship Award		
Dr. Ross Davies	Canadian Cardiovascular Society 2019 Dr. Michael Freeman CNCT Annual Acheivement Award		

Dr. Barbara Farrell	CIHR Betty Havens Prize for Knowledge Translation in Aging	
Dr. Bernard Choi	America's Network for Chronic Disease Surveillance Highest Recognition Award	
Dr. Phil Wells	CIHR Distinguished Lecturer/CSATVB Scientific Excellence Award in Blood and Blood Vessel Sciences	
Dr. Erin Mulvihill	Canadian Lipoprotein Conference Amgen Stewart Whitman Young Investigator Award	
Dr. Louise Sun	American Heart Association Fellowship	
Dr. Venkatesh Thiruganasambandamoorthy	CIHR - CAEP (Canadian Association of Emergency Physicians) Mid-Career Lecturer Award in Emergency Medicine	
Dr. Monique Potvin Kent	Health Promotion Canada 2019 Recognition Awards - Academic Award	
Dr. Darlene Kitty	Lieutenant-gouverneur du Québec Médaille Premiers Peuples/First People's Medal	
Dr. Peter Tanuseputro	PSI Award - Graham Farquaharson	
Dr. Tetyana Kendzerska	PSI Award - Graham Farquaharson	
Dr. Venkatesh Thiruganasambandamoorthy	PSI Award – Mid-career Award	
Dr. Innie Chen	PSI Award – Mid-career Award	

Listed above are the awards and prizes that the Faculty Research Office was aware of at time of publishing. Please let us know if we've missed any, as we regularly update our webpage with award recipients.

# Faculty of Medicine Awards of Excellence

In the spirit of recognition of outstanding achievements of our members, the Faculty of Medicine created the Faculty of Medicine Awards of Excellence. These will be granted annually to nominees who have earned distinction for themselves and for the University through their exceptional work in research, education and service. This year's awards were distributed at the Faculty Gala, on October 5, 2019.



Dr. Marc Ruel	Researcher of the Year – Clinical		
Dr. Clare Liddy	Researcher of the Year – Clinical		
Dr. William Stanford	Researcher of the Year – Basic		
Dr. Manisha Kulkarni	Researcher of the Year – Basic		
Dr. Kwadwo Kyeremanteng	Early-Career Researcher of the year – Clinical		
Dr. Deshayne Fell	Early-Career researcher of the Year – Basic		
Dr. Venkatesh Thiruganasambandamoorthy	Publication of the Year		
Dr. Marjorie Brand	Publication of the Year		
Dr. Robert Bell	Educator of the Year – Clinical		
Dr. Christopher Ramnanan	Educator of the Year – Basic		
Dr. Jacqueline Carnegie	Educator of the Year – Basic		
Dr. Marc Rodger	Mentor of the Year – Clinical		
Dr. Rashmi Kothary	Mentor of the Year – Basic		
Dr. Kim Rozon	Outstanding Service Award – Staff		
Dr. Jean-François Couture	Outstanding Service Award – Faculty		
Dr. Diane Lagace	Outstanding Service Award – Faculty		

# Translational Research Initiatives

Translational research coordinates the application of novel discoveries in biological sciences to practical uses in pharmaceutical or clinical settings. The Translational Research Grant (TRG) program promotes such research and collaboration between basic science and clinical researchers throughout the Faculty, providing seed funding to test new, innovative ideas and facilitating future grant support. Basic scientists and clinicians teamed up to submit joint applications as co-PIs on specific research projects. Each grant is made up of matching funds from each partner: the basic science department or research institute, and the clinical department.

#### CONGRATULATIONS TO THE RECIPIENTS OF THE 2019 UNIVERSITY OF OTTAWA, FACULTY OF MEDICINE TRANSLATIONAL RESEARCH GRANTS:

TEAM:	Dr. Michele Ardolino and Dr. Carolyn Nessim	TEAM:	Dr. Mireille Ouimet and Dr. Juan Grau
	Faculty of Medicine Department(s)/Research Institute(s): Department of Biochemistry, Microbiology and Immunology / Department of Surgery		Faculty of Medicine Department(s)/Research Institute(s): Department of Biochemistry, Microbiology and Immunology / Department of Surgery
Title:	Building a cell atlas of human sarcoma through single-cell-RNA-sequencing	Title:	Analysis of Human Tissues to Identify Specific Cellular Resistance to Atherosclerosis: A Translational Research Approach
TEAM:	Dr. Dylan Burger, Dr. Manoj Lalu, and Dr. Darryl Davis		
	Faculty of Medicine Department(s)/Research Institute(s): Ottawa Hospital Research	TEAM:	Dr. Jennifer Reed and Dr. Girish Nair
Institut Institut	nstitute / Department of Anesthesiology and Pain Medicine / University of Ottawa Heart nstitute / Division of Cardiology		Faculty of Medicine Department(s)/Research Institute(s): University of Ottawa Heart Institute / Division of Cardiology / Cardiac Electrophysiology Group
Title:	Mesenchymal stromal cell derived exosomes as a preconditioning therapy for cardiac ischemia-reperfusion injury	Title:	Examining the role of high-intensity interval training on glycemic variability and symptomatology: A novel treatment approach for patients with atrial fibrillation and diabetes?
TEAM:	Dr. Thien-Fah Mah and Dr. Hesham Abdelbary	TEAM:	Dr. Subash Sad and Dr. Catherine Ivory
	Faculty of Medicine Department(s)/Research Institute(s): Department of Biochemistry, Microbiology and Immunology / Division of Orthopaedic Surgery		Faculty of Medicine Department(s)/Research Institute(s): Department of Biochemistry, Microbiology and Immunology / Division of Rheumatology
Title:	Use of a Novel, Clinically Representative Hip Replacement Rat Model to Assess Pseudomonas aeruginosa Biofilm-Based Periprosthetic Joint Infections	Title:	Evaluation of inflammatory cell death in the pathogenesis of Systemic Lupus Erythematosus
		TEAM:	Dr. Jim Sun and Dr. Gonzalo Alvarez
TEAM: Dr. Erin Faculty	Dr. Erin Mulvihill, Dr. Mary-Ann Doyle, and Dr. Erin Kelly		Faculty of Medicine Department(s)/Research Institute(s): Department of Biochemistry,
	Faculty of Medicine Department(s)/Research Institute(s): University of Ottawa Heart		Microbiology and Immunology / Department of Medicine
<b>T</b> 1.1	Institute / Department of Medicine	Title:	Decoding the epigenetic signature of tuberculosis using human lung cells
litle:	SGLI-2 inhibitors, GLP-1 agonists and Hyperglucagonemia in Non-alcoholic Fatty Liver Disease and Type 2 Diabetes		

# International

#### SHANGHAI INSTITUTE OF MATERIA MEDICA, CHINESE ACADEMY OF SCIENCES



The University of Ottawa and Shanghai Institute of Materia Medica (SIMM) established the Joint Centre on Systems and Personalized Medicine in 2017. The Centre works to 1) develop new reagents, drugs and associated biomarkers that can be used for personalized medicine; 2) increase the number of collaborative projects

Piter Research Center

between researchers and research groups from SIMM and the University of Ottawa; and 3) to train students and postdoctoral fellows. In 2019, the Joint Centre successfully developed 5 partnerships between uOttawa and SIMM researchers in the areas of systems and personalized medicine, in addition to two ongoing partnership projects. Many of these teams had the opportunity to attend the Joint Centre's Scientific Symposium in Shanghai in 2018 and Ottawa in May 2019.

#### UNIVERSITY OF OTTAWA/ UNIVERSITÉ CLAUDE BERNARD LYON 1

The University of Ottawa, Université Claude Bernard Lyon 1 and the Hospices Civils de Lyon cooperation agreement continues to support the development of stronger ties for conducting research in the biomedical sciences and to develop new joint

research programs and conferences. In neuromuscular disease research, our joint collaborative research program has now funded 12 joint research groups from the University of Ottawa's The Eric Poulin Centre for Neuromuscular Disease (CNMD) and l'Université Claude Bernard Lyon 1 Institute NeuroMyoGene (INMG). Many of these teams had the opportunity to interact through the CNMD's 5th Ottawa International Conference on Neuromuscular Disease Biology, as well as research symposiums in Lyon and Ottawa in 2018 and 2019. Further, this group expanded on their partnership through the formalization of an International Associated Laboratory Joint Institute for Neuromuscular Research (LIA JIN) aimed at establishing a bi-national program allowing fluid movement of trainees, researchers and principle investigators between the two institutions.



### INTERNATIONAL SEMINARS

• Julien Gondin, Researcher INSERM

Lecture Title: Neuromuscular electrical stimulation training to minimize cancer-induced cachexia

Hélène Puccio, Research Director Inserm

Lecture Title: Recent advances in Friedreich ataxia, from pathophysiological mechanisms to therapeutic approaches

• **Bruno Allard,** Professor, University Claude Bernard Lyon 1 & Researcher, INMG Institute

Lecture title: Aberrant current through resting muscle calcium channels and periodic paralysis

• Isabella Scionti, Researcher

Lecture title: LSD1 regulates muscle stem cell fate during skeletal muscle regeneration

• Edwige Belotti, Postdoctoral fellow

Lecture title: H2A.Z is dispensable for both basal and activated transcription in post-mitotic mouse muscles

Alexis Osseni, Postdoctoral fellow

Lecture title: HDAC6 Regulates Microtubule Stability and Clustering of AChRs at Neuromuscular Junctions

#### UNIVERSITY OF OTTAWA/ UNIVERSITÉ DE LYON 1: INTERNATIONAL SEMINAR



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## Research Opportunities for Medical Students

#### SUMMER STUDENTSHIP PROGRAM 2019

The Faculty of Medicine Research Office Summer Studentship Program is offered to students enrolled in their first or second year of training. We are pleased to offer fifty \$5,000 bursaries to students who are selected to participate. Students then spend the summer working closely with their supervisor on a specific research project followed by a poster presentation of their work in September. This year, the poster presentation was part of the first annual Faculty of Medicine Research Day. The Research Day welcomed over 200 students for poster and research symposium presentations and had 350 participants, either presenting, visiting or assisting in the sessions.

Prizes were handed out at the end of the day and one of our Summer Studentship Program student, Cole Clifford, won for best poster presentation.

#### **PAIRING PROGRAM**

A key goal of the Faculty of Medicine is to promote translational research to facilitate the real-life application of research discoveries to clinical practice. To further expand upon this goal, the Research Office collaborated with the Undergraduate Medical Education Office to develop a "grad-med" pairing opportunity. In this opportunity, medical students were provided the opportunity to work with leading researchers at the Faculty of Medicine based on their field of interest and the type of experience they sought (research electives, volunteer observer, etc.). The students then proceed to work with the researcher on a project or in a laboratory. This program ran for the Fall and Winter terms 2018-2019 and successfully matched 50 medical students to researchers across the Faculty of Medicine. This program is currently being reorganized to better meet the needs of the students and researchers alike.

The Pairing Program was offered in addition to the Faculty's Summer Studentship Program.







# Faculty of Medicine - Core Facilities

The Faculty of Medicine, with support from affiliated hospital-based research institutes and the University of Ottawa, has developed 15 cutting-edge core facilities which bring together state-of-the-art equipment, instrumentation, methodologies and expertise crucial to the success of basic and clinical research activities. These facilities are accessible to all researchers across the University of Ottawa as well as to outside communities on a fee-for-service basis. For each facility, a core Director and user committee has been appointed to ensure accountability and optimal use. Over the past 10 years, our core facilities have done a tremendous job of promoting interdisciplinary collaboration, keeping the research community at the cutting edge of research infrastructure and emerging technologies, and training faculty, students, and staff.

#### ANIMAL BEHAVIOR (BEH): DR. STEPHEN FERGUSON

The Animal Behavior core provides a state-of-the-art facility equipped to service as a time-efficient and costeffective service for researchers in need of mouse behavioral analysis. Located within the Animal Care Vivarium, the core offers a full battery of assays relevant to learning and memory, social behavior, sensory gating, motor function, as well as anxiety and depression. In collaboration with the Animal Care Committee and Veterinary Services, the Behavioral core can provide research teams with assistance in design, execution, analysis, presentation, and interpretation of data resulting from the use of Core services.

#### **BIOINFORMATICS: DR. THEODORE PERKINS**

The Bioinformatics Core provides advice on bioinformatics research design, conducts bioinformatics analysis, provides data warehousing services, and provides support for grant proposals that involve bioinformatics (including conducting pilot studies, support/ collaboration letters, methodological text, etc.)

#### CELL BIOLOGY AND IMAGE ACQUISITION (CBIA): DR. JOHN COPELAND

The Cell Biology and Image Acquisition (CBIA) Core Facility provides state-ofthe-art advanced microscopes, image analysis tools, and technical support to facilitate your microscopy research. The CBIA offers consultations to determine the most appropriate microscope for specific research needs and the proper design of your experimental set-up. Subsequently, CBIA provides comprehensive training and follow-up sessions for all users, ensuring correct and optimal use and understanding of the imaging systems. In addition, CBIA offers support for post-acquisition analysis using the broad range of 2D to 4D Image analysis software packages that are available on our highperformance computers.

#### CONTAINMENT LEVEL 2+ CORE FACILITY (CL2+): DR. MARC-ANDRE LANGLOIS

The Containment Level 2+ facility offers a safe, secure and dedicated laboratory space for research on infectious agents of Risk Group 2 and some Risk Group 3 pathogens under certain conditions. Rigorous standard operating procedures allow for optimal safety of laboratory personnel, the community, and the environment. Divided into three suites, the facility can accommodate several occupants simultaneously. The facility provides all basic laboratory infrastructure for cell based assays and is available to both uOttawa and external research groups.

#### COMMON EQUIPMENT AND TECHNICAL SERVICES (CETS) CORE: DR. LAURA TRINKLE-MULCAHY

The Common Equipment and Technical Services core facility comprises a team of six Research Technicians who are committed to providing quality technical assistance to Faculty members and research personnel. CETS staff maintain a wide array of basic and/ or technologically advanced shared infrastructure in a state of operational readiness and peak performance. Training and research technical assistance is available upon request, and the CETS also provides glasswashing and autoclave services (sterilization and decontamination). This optimization of infrastructure and technical resources benefits laboratories across the Faculty of Medicine.

## FLOW CYTOMETRY & VIROMETRY (FCV): DR. KRISTIN BAETZ

The FCV Core Facility offers high-speed cell sorting services, magnetic cell separation, bench top flow cytometry analysis as well as training, and support to the research community. All new users are provided with training by University of Ottawa FCV Core Facility staff. The FCV Core Facility can now analyze and sort submicron size particles (down to 100nm in diameter) such as viruses, exosomes and extracellular vesicles.

#### GENOMICS (STEMCORE): DR. MICHAEL RUDNICKI

StemCore Laboratories is a highthroughput genomics facility within the Ottawa Hospital Research Institute (OHRI) and is a core facility of the University of Ottawa. StemCore Laboratories is developing a world-class infrastructure for genomics and can facilitate large-scale scientific research and biotechnology projects. Stemcore Laboratories seeks out projects that are challenging, cutting-edge, extend the boundaries of biological knowledge, and will positively impact the state of human health. Stemcore works closely with the Bioinformatics Core (see below) to provide end-toend genomics services. Available services include DNA Sequencing, Next Generation Sequencing (library preparation for multiple applications), Single Cell Analysis, experimental design, statistical calculations, proof of concept studies, grant-writing support, assay development, and manuscript preparation.

### HUMAN PLURIPOTENT STEM CELLS (HPSC): DR. WILLIAM STANFORD

Pluripotent stem cells can differentiate into all the cells of the embryo proper and adult organism. Induced pluripotent stem cells (iPSCs) are created by reprogramming mature adult cells (such as skin cells). They offer a unique opportunity to dissect early human development, generate models

of disease, and develop cellular or drug therapeutics that target a disease or target specific patients with a disease (i.e., personalized medicine). Thus, iPSCs are important tools in Regenerative/ Translational/ Personalized Medicine. The hPSC core facility offers training on how to differentiate iPSCs and embryonic stem cells (ESCs) to support differentiation protocols for smooth muscle cells, vascular smooth muscle cells, chondroprogenitor cells, cardiomyocytes, neural progenitor cells, neurons, neural crest cells. They have also developed robust protocols necessary to perform CRISPR/Cas9 genome editing in pluripotent stem cells to create isogenic models of disease or unravel gene function.

#### LOUISE PELLETIER HISTOLOGY CORE FACILITY (LP-HCF): DR. JOHN VEINOT

The Department of Pathology's LP-HCF is a full-service histology laboratory available to faculty, researchers, clinicians and students within and outside the University of Ottawa. The facility provides efficient, high quality and cost-effective histological services for both animal, plant and human tissues. Services include paraffin processing and embedding, paraffin and frozen sectioning as well as routine and special histological staining, including immunohistochemistry. Samples can also be scanned to digital images ensuring preservation of data and facilitating automated analysis.

#### PRECLINICAL IMAGING (PCI): DR. GREG CRON

The Preclinical Imaging (PCI) Core Facility provides small animal imaging equipment (MRI, ultrasound, optical, laser doppler) and an X-ray irradiator for your research. We provide training for use of these machines, except the MRI. For the latter, a dedicated MRI physicist and MRI animal technician are available to help design and execute your imaging protocol. The PCI Core Facility is in Roger Guindon Hall at the University of Ottawa, within the Animal Care and Veterinary Service.

#### PROTEIN BIOPHYSICS (PB): DR. JEAN-FRANÇOIS COUTURE

This facility contains state-of-the-art infrastructure to study protein structures, including AKTA purification systems combined with size-exclusion columns, a calorimeter for the measurement of protein-ligand thermodynamics and spectrophotomers for the study of protein secondary structures in solution. This facility also includes a crystallization robot to carry out crystallization trials with high throughput capabilities.

#### PROTEOMICS RESOURCE CENTRE (PRC): DR. DANIEL FIGEYS

The Proteomic Resource Centre has a complete series of state-of-the art mass spectrometers. They offer the research community a complete array of proteomic services from protein and post translational modification (PTM) identification to large scale quantitative proteomics. The PRC has continued to develop specific processing protocols and can analyse the metaproteome from isolates. In particular, the PRC has developed specialized metaproteomic databases for protein identification and quantitation from microbiota. The PRC has also developed new software for metaproteomics called MetaLab and iMetaLab (imetalab.ca). The tools have been accessed over 3000 times and are now installed in labs around the world including the USA, Europe, Egypt, Australia and China.

#### TRANSGENIC (TG): DR. DAVID LOHNES

The transgenic mouse core houses all the necessary equipment and expertise for generation of transgenic mice. Services offered include transgenesis, cryopreservation (sperm and embryos), cryorecovery, embryonic stem cell culture and CRISPR-based mutagenesis (ES cells or embryos). The Tg core can also offer consultation for CRISPR, transgenic or targeting vector design, and re-derivation of embryos.

#### METABOLOMICS: DR. JULIE ST-PIERRE

Metabolomics, the latest addition to the 'omics' family, allows global profiling of the metabolites of a cell. It allows the comprehensive exploration of metabolite patterns, revealing distinct metabolic signatures in health vs. disease. Metabolomics holds tremendous potential for precision medicine through the development of better biomarkers, robust predictors of drug response and disease outcome, discovery of new metabolites and pathways typical of disease pathogenesis and progression, and finally, targeted drug development. uOttawa's new Metabolomics Core Facility is built around a suite of cutting edge equipment, including GC/MS, UPLC/QTOF, and UPLC/QQQ mass spectrometers. The integration of these technologies permits a global understanding of the metabolic state of cells and tissues. Indeed, there are numerous metabolic adaptations in disease systems and they are best studied using a systems approach. This requires mass spectrometry analysis for identification of specific metabolites throughout the metabolic network as well as metabolite tracing. These targeted metabolomics approaches are complemented with discovery metabolomics to reveal novel metabolites that are differentially regulated in health and disease. Importantly, the uOttawa Metabolomics Core Facility will be part of the broader **Canadian Metabolomics Innovation** Resource of the Goodman Cancer Research Centre and University of Ottawa (MIRGO), which serves the broader research community by ensuring that these two facilities work synergistically to meet the growing demand for metabolomics services across Canada.

#### TRANSMISSION ELECTRON MICROSCOPY (TEM): DR. BAPTISTE LACOSTE

The new TEM core facility will provide broad access to TEM technology to characterize, with unprecedented resolution (atomic nanometer range), cellular and subcellular features of cells and tissues. These applications are of particular interest to research teams in neuroplasticity, renal, neurodegenerative, neuromuscular, infectious, and metabolic diseases, where TEM can be used to view structures at a molecular resolution in their native cellular context (e.g. mitochondrial, microtubules, sarcomeres, micro-vasculature, synapse dynamics and vesicle organization, host-pathogen interactions, immune deposits, membrane integrity). The Facility will house JEOL JEM-1400Plus system, which delivers unprecedented high-quality and high-resolution, with cryo capability for future hardware improvements and even greater resolution.

For more information, please visit med.uOttawa.ca/core-facilities/

# Research Office Major Events

### **DISTINGUISHED LECTURES**



#### **GAIRDNER LECTURE SERIES**

On Tuesday, October 22nd, 2019, the Faculty of Medicine hosted this year's recipient of the Gairdner awards. The Canada Gairdner Awards are recognized as among the most prestigious awards in biomedical science. This year the event featured the internationally acclaimed researcher: Dr. Vikram Patel, Pershing Square Professor of Global Health and Wellcome Trust Principal Research, a Fellow at the Department of Global Health and Social Medicine at Harvard Medical School, a Professor at Harvard TH Chan School of Public Health, Honorary Professor of Global Mental Health, Centre for Global Mental Health, London School of Hygiene & Tropical Medicine, an Adjunct Professor at the Centre for Chronic Conditions and Injuries at the Public Health Foundation of India, New Delhi and finally the co-founder of Sangath in India.

Dr Patel received the 2019 John Dirks Canada Gairdner Global Health Award for his world-leading research in global mental health, generating knowledge on the burden and determinants of mental health problems in low- and middleincome countries and pioneering approaches for the prevention and treatment of mental health in low-resource settings



#### **FRIESEN INTERNATIONAL PRIZE**

On Wednesday, September 18th, 2019, the University of Ottawa and the friends of CIHR were pleased to host the 2019 Henry G. Friesen International Prize in Health Research Award winner, Prof. Bartha Knoppers who spoke to a full crowd on the topic of "Scientific Breakthroughs: The Prohibition Reflex (From IVF to AI)".

Professor Knoppers is a global leader in the study of legal, social and ethical issues related to biomedical research in human genetics and genomics. Her work has appeared in 38 books, 465 articles and over 100 book chapters and her research is published in the most prestigious journals. Dr. Knoppers has received many high-level honours including Officer of the Order of Canada (2002), Officer of Order of Quebec (2012), Commander of the Order of Montreal in 2017 and 4 Honorary Degrees in Law and Medicine. She is a Fellow of the Canadian Academy of Health Sciences, the Royal Society of Canada and the American Association for the Advancement of Science. The Friesen Prize, established in 2005 by the Friends of Canadian Institutes of Health Research (FCIHR) recognizes exceptional innovation by a visionary health leader of international stature.

# Faculty of Medicine Research Day

On Wednesday, September 25th, 2019, the Faculty of Medicine had it's first faculty-wide Research Day. Research Day attracted over 200 entries from learners in programs including the bachelor's degree in Translational and Molecular Medicine, medical school, residency training, and graduate level research for poster and research symposium presentations. Throughout the day, there was over 350 participants, either presenting, visiting or assisting in the sessions. This was an excellent opportunity for our learners to showcase their outstanding research projects, hone their presentation skills and network with classmates, colleagues and professors.

A scientific committee of evaluators, comprised of faculty members, reviewed all abstracts and oral presentations to select the winners.

#### WINNERS FOR BEST ORAL PRESENTATION:

Yena Oh (Research Symposium A: Cardiovascular Biology and Neuroscience)

Sébastien Denize (Research Symposium B: Innovative Therapeutics & Systems Biology)

Jack Mouhanna (Research Symposium C: Medical Education, Patient Care, and Public Health)

#### WINNERS FOR BEST POSTER PRESENTATIONS:

Dr. Patricia B. de la Tremblaye (postdoctoral fellow) Dr. Kevin Hill (resident) Cole Clifford (medical student) David Cook (graduate student) Jasmine Kaur Bhatti (Honours in Translational and Molecular Medicine student)



# Research Office Events

## **NEW PROFESSOR SEMINAR SERIES**



#### **Dr. Kin Chan**

Dr. Kin Chan (BMI) described his research in a talk titled "Fundamental Research on DNA Damage, with Applications to Cancer Genomics and Synthetic Biology". Dr. Chan's research program focuses on the study of molecular origins of cancer and the molecular basis of mutations. His research combines techniques in molecular biology, genetics, and bioinformatics to elucidate the mutation signatures created by high priority known or suspected carcinogens. His team is interested in characterizing genetic perturbations that significantly affect these mutation signatures and quantifying the presence of these mutation signatures in cancer genomic and exomic mutation data sets.



#### **Dr. Pierre Mattar**

Dr. Pierre Mattar (CMM) gave a presentation entitled "Control of Neural Progenitor Multipotency by Chromatin Remodelling Complexes". Research in the Mattar lab is focused on evaluating how retinal cell death plays a role in all the main causes of blindness. Deciphering how retinal neurons are produced during development might assist in the regeneration of retinal tissue artificially. Here, cells could be generated in the lab and then transplanted into individuals to replace the cells that were lost. Overall, understanding the degenerative process will provide novel approaches that could help prevent or mitigate degeneration.



#### Dr. JianLi Wang

Dr. JianLi Wang (SEPH) described his research in a talk titled "Advanced tools and programs for preventing depression". Dr. Wang's research program focuses on workplace mental health and risk prediction analytics. His team is leading a national project on early identification and prevention of major depression in male workers and has developed and validated the first sexspecific prediction algorithms for the risk of developing major depression in the general population.





#### Dr. Mathieu Lavallée-Adam

Dr. Mathieu Lavallée-Adam (BMI) gave a talk entitled "Getting more out of a mass spectrometry-based proteomics using machine learning". The Lavallée-Adam lab is focused on developing algorithms for the integration of quantitative proteomics datasets into protein-protein interaction networks to obtain a more comprehensive understanding of cellular mechanisms. His lab aims to design computational approaches for the identification of proteins and posttranslational modifications in complex biological samples using mass spectrometry. The Lavallée-Adam lab builds software packages that identify high quality biomarker signatures and allow the discovery of novel drug targets for complex diseases through the integration of large-scale datasets and biological networks.



#### Dr. Yannick D. Benoit

Dr. Yannick Benoit (CMM) gave a presentation entitled "Identification of new small molecules selectively targeting human colon cancer stem cells". Dr. Benoit's research program is focused on gaining a better understanding of fundamental epigenetic phenomenon governing stem cell identity in the human epithelium and colorectal tumors. His lab strives to develop novel, anticancer agents targeting key epigenetic features of colorectal cancer stem cells. Further, Dr. Benoit's team aims to unravel the physiological role of chromatin organization in human intestinal stem cell identity and dynamic plasticity.



#### **Dr. Alice Zwerling**

Dr. Alice Anne Zwerling (SEPH) illustrated her most recent work in a presentation titled "How health economics can help reach Tuberculosis elimination goals: At home and abroad". Dr. Zwerling is an infectious disease epidemiologist and her research program is focused on health economics with a special interest in tuberculosis (TB). Her research addresses key questions around cost-effectiveness analyses to guide implementation of communitywide screening approaches and active case finding, novel tools, and treatment regimens for TB. Dr. Zwerling has advocated for the improvement of housing conditions and other social determinants of health in a holistic approach which facilitates sustainable TB reduction. Early treatment could avoid future transmission throughout the community, breaking the 'transmission cycle' and providing a proactive approach to TB elimination.

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# The Faculty of Medicine Networking Series

The Faculty of Medicine hosted its first MED PUB event, a new networking series to interact with different learning groups, professors and the leadership in the Faculty of Medicine.

This series is organized by the different group of learners. The first MED PUB was organized by the TMM students and took place on Thursday December 12, 2019, at Dooly's where students and professors across the entire Faculty got the chance to socialize over some competitive pool!

# **MED PUB**









# Current Research Chair Holders

#### **CANADA RESEARCH CHAIRS**



Dr. Michael Rudnicki (2001) Chair in Molecular Genetics

Dr. Peter Tugwell (2002) Chair in Health Equity

Dr. Jeremy Grimshaw (2002) Chair in Health Knowledge Transfer and Uptake

Dr. Julian Little (2005) Chair in Human Genome Epidemiology

Dr. Georg Northoff (2009) Chair in Mind Brain Imaging and Neuroethics

Dr. William Stanford (2011) Chair in Integrative Stem Cell Biology Dr. Stephen Ferguson (2015) Chair in Brain and Mind

Dr. Damien D'Amours (2017) Chair in Chromatin Dynamics and Genome Architecture

Dr. Julie St-Pierre (2018) Chair in Cancer Metabolism

Dr. Hanns Lochmüller (2018) Chair in Neuromuscular Genomics and Health

Dr. Kym Boycott (2019) Chair in Rare Disease Precision Medicine

Dr. Marc-André Langlois (2010) Chair in Molecular Virology and Intrinsic Immunity

Dr. Ian Colman (2011) Chair in Mental Health Epidemiology

Dr. Marceline Côté (2015) Chair in Molecular Virology and Antiviral Therapeutics

Dr. Patrick Giguère (2015) Chair in Molecular Pharmacology and **Drug Discovery** 

Dr. Simon Chen (2016) Chair in Neural Circuits and Behaviour

Dr. Mireille Ouimet (2017) Chair in Cardiovascular Metabolism

**Dr. Kin Chan (2017)** Chair in Molecular Basis of Cancer Mutagenesis

Dr. Mireille Khacho (2018) Chair in Mitochondrial Dynamics and **Regenerative Medicine** 

Dr. Maxime Rousseaux (2018) Chair in Personalized Genomics of Neurodegeneration

and Cell Biology

# Endowed and Sponsored Chairs

#### **Dr. Benjamin Chow**

Saul & Edna Goldfarb Chair in Cardiac Imaging Research

#### Dr. Barbara Vanderhyden

Corinne Boyer Research Chair Ovarian Cancer

#### Dr. Amy Hsu

University of Ottawa Brain and Mind – Bruyère Research Institute Chair in Primary Health Care Dementia Research

#### **Dr. Catherine Tsilfidis**

Donald and Joy MacLaren Chair for Vision Research

**Dr. Ciarán Duffy** Endowed Chair Pediatrics

Dr. Daniel Krewski NSERC/SSHRC/McLaughlin Chair

**Dr. David Birnie** Endowed Chair in Electrophysiology

#### **Dr. Dean Fergusson**

OHRI/uOttawa Clinical Epidemiology Program Endowed Chair

#### **Dr. Duncan Stewart**

Evelyn and Rowell Laishley Chair for the OHRI CEO and Scientific Director

#### Dr. Eve Tsai

Suruchi Bhargava Brain & Cord Regeneration

#### **Dr. Eric Dionne**

ISM Research Chair in Medical Pedagogy – Francophone Affairs of the Faculty of Medicine at the University of Ottawa and Faculty of Education at the University of Ottawa

**Dr. Frans Leenen** Pfizer Research Chair Hypertension

**Dr. Ian Lorimer** A.&E. Leger Memorial Fund for Oncology Research Chair

#### Dr. Ian Stiell Emergency Medicine

#### Dr. Lyall Higginson

Donald S Beanlands Chair Cardiology Education

**Dr. Marc Ruel** Chair Cardiac Surgery Research

Dr. Marc Ruel Michael Pitfield Chair Cardiac Surgery

**Dr. Marino Labinaz** Chair Interventional Cardiology Leadership

**Dr. Michael Schlossmacher** Bhargava Research Chair for Neurodegenerative Diseases

**Dr. Pierre Blier** Endowed Chair of Research Mood and Anxiety Disorders

**Dr. Robert Beanlands** Vered Chair of Cardiology

**Dr. Robert Beanlands** Saul and Edna Goldfarb Chair in Cardiac Imaging Research **Dr. Rodney Breau** Urology Oncology Research Chair

**Dr. Ruth McPherson** Merck Frosst Canada Chair Atherosclerosis

**Dr. Sood Manish** Siv L. Jindal Chair for Kidney Disease Prevention Research

**Dr. Steven Gilberg** Chair of the Eye Institute

**Dr. Sudhir Sundaresan** Wilbert J. Keon Chair of the Department of Surgery

**Dr. Susan Lamb** Jason Hannah Chair for the History of Medicine

**Dr. Thierry Mesana** Gordon F. Henderson Chair Leadership

**Dr. Thierry Mesana** Chair Cardiac Surgery Valve Research

# University Research Chairs

**Dr. Steffany Bennett (2011)** University Research Chair Chair in Neurolipidomics

**Dr. Mary-Ellen Harper (2016)** University Research Chair Mitochondrial Bioenergetics **Dr. David Moher (2006)** University Research Chair Chair in Systematic Reviews **Dr. Beth Potter (2016)** University Research Chair Health Services for Children with Rare Diseases **Dr. Philip Wells (2019)** University Research Chair Thrombosis Research

# Challs

# Clinical Research Chairs



**Dr. Shawn Aaron** Department of Medicine Tier 1 Chair in Obstructive Lung Disease

**Dr. Rob Beanlands** Department of Medicine Tier 1 Chair in Cardiovascular Imaging Research

#### **Dr. David Birnie** Department of Medicine Tier 1 Chair in Cardiac Arrhythmia Research

**Dr. Gregory Knoll** Department of Medicine Tier 1 Chair in Clinical Transplantation Research

**Dr. Alex MacKenzie** Department of Paediatrics Tier 1 Chair in Rare Neurologic Disease Therapeutics

#### Dr. Marc Alan Rodger

Department of Medicine Tier 1 Chair in Venous Thrombosis and Thrombophilia

#### Dr. Ian Stiell

Research

Department of Emergency Medicine Tier 1 Chair in Acute Cardiac Conditions

**Dr. Jeffrey Perry** Department of Emergency Medicine Tier 1 Chair in Emergency Neurological

**Dr. Grégoire Le Gal** Department of Medicine Tier 1 Chair in Diagnosis of VTE



#### **Dr. Gonzalo Alvarez**

Department of Medicine Tier 2 Chair in Tuberculosis in Canadian Aboriginal Communities

**Dr. Rebecca Auer** Department of Surgery Tier 2 Chair in Perioperative Cancer Therapeutics

**Dr. Kym Boycott** Department of Paediatrics Tier 2 Chair in Neurogenetics

**Dr. Marc Carrier** Department of Medicine Tier 2 Chair in Cancer and Venous Thromboembolism

**Dr. Darryl Davis** Department of Medicine Tier 2 Chair in Cardiac Regeneration

**Dr. David Dyment** Department of Paediatrics Tier 2 Chair in Translational Epilepsy Research

#### Dr. Clare Liddy

Department of Family Medicine Tier 2 Chair in Family Medicine

#### Dr. Kusum Menon

Department of Paediatrics Tier 2 Chair in Paediatric Shock

#### Dr. Lisa Mielniczuk

Department of Medicine Cardiology Tier 2 Chair in Heart Failure and Pulmonary Hypertension Research

#### **Dr. Amy Plint**

Department of Paediatrics Tier 2 Chair in Paediatric Emergency Medicine

#### **Dr. Christian Vaillancourt**

Department of Emergency Medicine Tier 2 Chair in Emergency Medicine

**Dr. Leanne Marie Ward** 

Department of Paediatrics Tier 2 Chair in Pediatric Bone Health

#### Dr. Roger Zemek

Department of Paediatrics and Emergency Medicine Tier 2 Chair in Pediatric Concussion

# Junior Clinical Research Chairs

#### Dr. Angel Arnaout

Department of Surgery Junior Clinical Research Chair in "Window of Opportunity" Clinical Trials in Surgical Oncology

#### Dr. Lise Bjerre

Department of Family Medicine Junior Clinical Research Chair in Pharmacoepidemiology and Medication Appropriateness

#### **Dr. James Bonaparte**

Department of Otolaryngology Junior Clinical Research Chair in Otolaryngology

#### **Dr. Innie Chen** Department of Obstetrics and Gynecology Junior Clinical Research Chair in Reproductive Population Health and Health Services

#### Dr. Warren Cheung

Department of Emergency Medicine Junior Clinical Research Chair in Medical Education with the Department of Emergency Medicine

#### Dr. Girish Dwivedi

Department of Medicine Junior Clinical Research Chair in Vascular Inflammation and Atherosclerosis Research

**Dr. Rustum Karanjia** Department of Ophthalmology Junior Clinical Research Chair in Neuro-ophthalmology

**Dr. Matthew Lines** Department of Paediatrics Junior Clinical Research Chair in Mitochondrial Disorders

#### Dr. Daniel McIsaac

Department of Anesthesiology Junior Research Chair in Perioperative Health Systems and Outcomes Research

#### Dr. Abigail Ortiz

Department of Psychiatry Junior Clinical Research Chair in Mood Disorders

**Dr. Nicola Schieda** Department of Radiology Junior Clinical Research Chair in Radiology

**Dr. Jodi Warman Chardon** Department of Medicine Junior Clinical Research Chair in Novel Gene Discovery in Neuromuscular Disease

# Distinguished Research Chairs

#### Dr. Daniel Figeys (2018)

Distinguished Research Chair in Proteomics and Systems Biology

**Dr. Ronald Labonté (2018)** Distinguished Research Chair in Globalization and Health Equity

#### **Dr. Julian Little (2019)** Distinguished Research Chair in Chronic Disease Epidemiology and Control

# Research Funding

### UNIVERSITY OF OTTAWA | FACULTY OF MEDICINE | 2018-2019



# RANKINGS AND PERFORMANCE 2020 The Faculty of Medicine, University of Ottawa is proud to be among the world's top 150 Universities (QS World University Rankings 2020 (Medicine). In addition: #2.2 Consistently Research intensity

- **#2-3** Consistently Research intensity Medical/Science grants (MacLean's 2019)
- #4 Not-for-profit Research Partnerships (2018 Research InfoSource)
- #5 Impact in Canada (2018 CWTS Leiden Rankings)
- **#47** Impact in North America (2018 CWTS Leiden Rankings)
- **#78** Worldwide for Clinical Medicine (NTU Ranking 2018, up 17 places since 2014)
- #102 Impact in the World (2018 CWTS Leiden Rankings)



### med.uOttawa.ca/research-innovation

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