

RESEARCH AND INNOVATION

2020 ANNUAL REPORT



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MESSAGE FROM THE VICE-DEAN

It is with great pride that I present the 2020 Faculty of Medicine Research Office Annual Report which highlights some of our major achievements over the past year. As the Faculty of Medicine celebrated its 75th anniversary, we continued to show outstanding research productivity, ranking third in Canada for research intensity with over \$143 million in research funding.

Over the past year the Faculty of Medicine has shown incredible resilience, strength, and dedication in our coordinated response to the COVID-19 pandemic. We have continued to promote multidisciplinary and translational research, supporting integration of clinical and basic science research teams through initiatives such as the Translational Research Grant (TRG) Program, Clinical Research Chairs Program, and Medical Summer Student research program. To support COVID-19 research initiatives, the Faculty developed the COVID-19 Pandemic Response Funding Program which supported a wide variety of approaches to tackling the spread of the coronavirus and mitigating its negative consequences.

Together with hospital-affiliated research institute partners, the Faculty has continued to recruit world-class basic science and clinical research talent in areas of strategic priority, including in infection, immunity and inflammation, brain and mind health, cardiovascular and vascular health, applied artificial intelligence (AI), and public health, bringing highly sought expertise and associated infrastructures to the Faculty. Through these and many other successful programs, the Faculty has continued to solidify its enviable position as a leading research-intensive institution in Canada.

The Faculty also embarked on a strategic planning exercise and through broad consultation, our Dean, Dr. Bernard Jasmin, and the executive leadership team developed the Faculty of Medicine's 2020-2025 Strategic Plan, 'Leading Innovation for a Healthier World'. In 2020, the Faculty's major accomplishments in five priority areas, including Education, Research, Engagement, Francophonie, and Internationalization and Global Health, were highlighted in a broadly circulated annual report. In alignment with our



emerging priorities in Medical AI and Indigenous Health Research, the Faculty launched the inaugural AI Seed Funding program and initiated a broad consultation to develop a Centre for Indigenous Health Research and Education. In line with the strategic goal to grow our state-of-the-art research infrastructure, we established several new core facilities and are continuing to build our inventory of leading-edge equipment. Finally, considerable planning of the forthcoming Advanced Medical Research Centre (AMRC) and the Health Network Innovation Hub throughout 2020 led to significant and exciting progress towards our future expansion.

We look forward to continuing to work with our partners to build upon our current strengths, advance our emerging priority areas, enhance our world-class collaborative research environment, and bring state-of-the-art infrastructure and talent to the Faculty of Medicine and University of Ottawa community.

STRATEGIC RESEARCH GOALS



1 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

BASIC SCIENCE DEPARTMENTS

- Biochemistry, Microbiology and Immunology (BMI)
- Cellular and Molecular Medicine (CMM)
- Innovation in Medical Education (DIME)
- School of Epidemiology and Public Health (SEPH)

CLINICAL DEPARTMENTS

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

AFFILIATED HOSPITAL-BASED RESEARCH INSTITUTES

- Children's Hospital of Eastern Ontario Research Institute (CHEO-RI)
- Bruyère Research Institute (BRI)
- Institut du savoir Montfort (ISM)
- Ottawa Hospital Research Institute (OHRI)
- The Royal's Institute of Mental Health Research (IMHR)
- University of Ottawa Heart Institute (UOHI)

UOTTAWA RESEARCH CENTRES AND INSTITUTES

- The Eric Poulin Centre for Neuromuscular Disease
- The Ottawa Institute of Systems Biology
- University of Ottawa Brain and Mind Research Institute
- University of Ottawa Centre for Infection, Immunity and Inflammation



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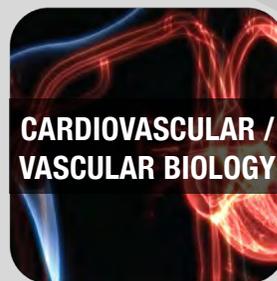
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RESEARCH PRIORITIES OF THE FACULTY

CURRENT STRENGTHS



CROSS-CUTTING INITIATIVES

**Clinical and Translational Research
Systems Biology, Genetics and Mechanisms of Disease
Regenerative Medicine and Innovative Therapeutics**

EMERGING PRIORITIES



STRATEGIC, BROAD- BASED RESEARCH INITIATIVES

The Faculty of Medicine has identified several major research priorities that are completely aligned with the University's strategic plan, Transformation 2030. Building on our demonstrated track-record of research excellence, the Faculty and affiliated Hospital-based Research Institute partners will focus efforts during the coming years on the following integrated strategic areas. Our cross-cutting experimental approaches to these strategic research areas include Genetics, Systems Biology, Regenerative Medicine as well as Innovative Therapeutics.

BRAIN AND MIND HEALTH

The University of Ottawa Brain and Mind Research Institute (uOBMRI) has sustained major growth and development over the past several years, recruiting 22 exceptional investigators in brain related research. In total, the Institute brings together over 250 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 brain related 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: brain-heart interactions, brain-gut axis, neuroethics, law and society, and neural networks.

CARDIOVASCULAR AND VASCULAR HEALTH

The Faculty of Medicine and affiliated hospital research institutes, in particular 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, the partnered organizations have implemented a multi-disciplinary and inter-institutional research strategy. The Ottawa Region for Advanced Cardiovascular Research Excellence (ORACLE) strategy is led by the UOHI and 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. For example, 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 2020 include funding for a pre-clinical PET/CT from the Canada Foundation for Innovation and Ontario Research fund to form a regional core facility in pre-clinical imaging for brain and heart research. In addition, our regional cardiovascular researchers have made significant strides in 2020 undertaking research to address the impacts of the COVID-19 pandemic and effect of the virus on heart disease patients.

EPIDEMIOLOGY, PUBLIC HEALTH, INNOVATIVE MEDICAL EDUCATION AND PRACTICE CHANGING RESEARCH

The Faculty of Medicine promotes patient-oriented research that will translate to new evidence-based practices. At the local level, we aim to improve patient and population health outcomes in the population laboratory of Ottawa and surrounding regions. More broadly, our research teams examine the determinants of health and disease etiology and the development, implementation and evaluation of practices, programs and policies aimed at optimizing health and social services, including innovations in medical education to train the next generation of highly qualified personnel. The Faculty's School of Epidemiology and Public Health, Department of Innovation in Medical Education, and School of Medicine work together to support this important pillar. Together, educational, applied health researchers in the areas of epidemiology, clinical sciences, public health, health policy and systems, global health, risk assessment, and implementation science research teams are working to develop and implement research and educational innovations to meet the health care needs of a global population through the creation of an interdisciplinary and inclusive research platform that will significantly 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 as well as dissemination of best practices and innovations in clinical care and in medical education. Importantly, a new Institute in Medical Education is under development to support and enhance educational scholarship in clinical medicine locally, nationally and internationally.



INFECTION, IMMUNITY AND INFLAMMATION

Chronic inflammatory diseases are highly complex and involve extensive gene environment interactions. The overarching goal of CI3 is to foster multidisciplinary research across the field of 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 underlie various chronic diseases, 2) to develop collaborative projects that are aimed at knowledge translation and dissemination, and 3) to train the next generation of scientists in multidisciplinary research in infection, immunity and inflammation. During the last year CI3 recruited new members working in inflammation and immunotherapy, provided competitive scholarships to graduate students, and supported members through research funding program. In 2020 CI3 members secured more than 10 million dollars in external grant funding and were instrumental in responding to the COVID-19 pandemic.



2021
2020
2019
2018
2017

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.



SCIENTISTS PINPOINT MOLECULAR CAUSE FOR SEVERE DISORDER IN CHILDREN

DAMIEN D'AMOURS (CMM/OISB)

After three years of research, Dr. Damien D'Amours and his team at the Ottawa Institute of Systems Biology have discovered the molecular defects associated with LIC Syndrome, a serious genetic disorder that affects young children and results in acute respiratory distress, immune deficiency and abnormal chromosomes. This research represents one of the most important milestones in developing treatments to improve the lives of LIC syndrome patients.

Onset of symptoms occurs in the first few months after birth in infants suffering from Lung disease Immunodeficiency and Chromosome breakage (LIC).

Typically, patients experience failure to thrive and immune deficiency, which can eventually progress to fatal pediatric pulmonary disease in early childhood. The disease is caused by small inactivating mutations in NSMCE3, a gene encoding an essential factor found in the nucleus of human cells.

Dr. Damien D'Amours is a Full Professor in the Department of Cellular & Molecular Medicine of the Faculty of Medicine whose lab is focused on understanding the mechanisms used by cells to promote efficient cell division and proliferation. He provided further insights into the study's findings.

WHAT EXACTLY HAVE YOU DISCOVERED?

"We discovered how defects in a "DNA compaction machine" within our cells can cause a rare genetic disorder that kills young children (i.e., the LIC syndrome). We found the molecular cause by using an exciting mix of biophysics, advanced genetics and classical biochemistry to demonstrate that an enzyme has the rare ability to compact DNA within our cells."

HOW DID YOU DO IT?

"We developed a completely novel system to purify a human enzyme that nobody in the world has ever successfully purified – the "Smc5/6 complex." The Smc5/6 complex is a crucial effector of chromosome integrity, and our breakthrough allowed us to reveal the structure of the enzyme and its powerful ability to compact DNA structure in space. We then modelled the mutations causing the LIC syndrome in our system and showed that the mutations affect ability of the Smc5/6 complex to repair chromosomes in cells, thus explaining how LIC mutations affect the ability of cells to maintain healthy genomes."

YOU USED THE "SYSTEMS BIOLOGY" APPROACH TO REACH YOUR CONCLUSIONS; PLEASE EXPLAIN THIS.

"The advent of systems biology has revolutionized biomedical research in recent years. This approach relies on the use of integrative "omics" technologies and model organisms to provide a systems-level understanding of human diseases. (Omics is a general term to describe "large-scale genomics, proteomics, and metabolomics technologies.") The University of Ottawa has been at the forefront of this revolution in research with the creation of the Ottawa Institute of Systems Biology (OISB). We took advantage of the

systems biology approach to develop completely new systems to purify an enzyme never purified before. Then we used innovative mix of biophysics, proteomics and classical biochemistry to reveal the mode of action of the Smc5/6 complex and how mutations in this complex can cause severe defects in DNA repair.”

WHY IS THIS AN IMPORTANT FIND?

“My research team and our collaborators are performing research at the absolute cutting-edge of our field and, as the leading laboratory on this project, we feel our research represents one of the most important milestones on the way to devise treatments for LIC syndrome patients. Prior to our work, nobody knew the biochemical cause for the LIC syndrome and how the enzyme mutated in this disease might affect the cells of patients/children; we provided answers to these fundamental questions.”

The study, **The Smc5/6 Core Complex Is a Structure-Specific DNA Binding and Compacting Machine**, was published in the December issue of Molecular Cell.



EBOLA IS A MASTER OF DISGUISE

MARCELINE CÔTÉ (BMI/CI3)

Dr. Marceline Côté and her team have discovered a druggable pathway the virus uses to trick its way into our organs

It was once thought that Ebola and related filoviruses were more or less contained to Central Africa. After a West African outbreak and the discovery of Reston ebolavirus in the Philippines, cuevavirus in Spain and various bat filoviruses in China, researchers now understand that this viral family—causing hemorrhagic fevers with up to 90% case fatality rates—has been widespread around the world for millions of years.

Our defenses against it are more embryonic, and though we have a vaccine against one species of Ebola and some therapeutic antibodies on the horizon, both have production or distribution issues. What doctors have been hoping for is a regular drug that can treat Ebola as soon as it rears its terrifying head. A study published in the journal *PLOS Pathogens*, identifies a pathway that all filoviruses use to gain entry into our cells—and shows how they can be stopped in their tracks by at least one FDA-approved drug.

Ebola is so pernicious because it pulls a fast one on the body, disguising itself as a dying cell.

“It’s cloaking itself in a lipid that is normally not exposed at the surface of a cell. It’s only exposed when the cell is undergoing apoptosis,” says Dr. Marceline Côté, an associate professor in the department of Biochemistry, Microbiology and Immunology in the Faculty of Medicine, Canada Research Chair in Molecular Virology and Antiviral Therapeutics and the primary investigator on this study. Dr. Côté is a leading global expert on how viruses get into us, an understanding that is key to any effort to keep them out.

The malingering virus is then taken up by immune system cells that unwittingly carry the virus to other

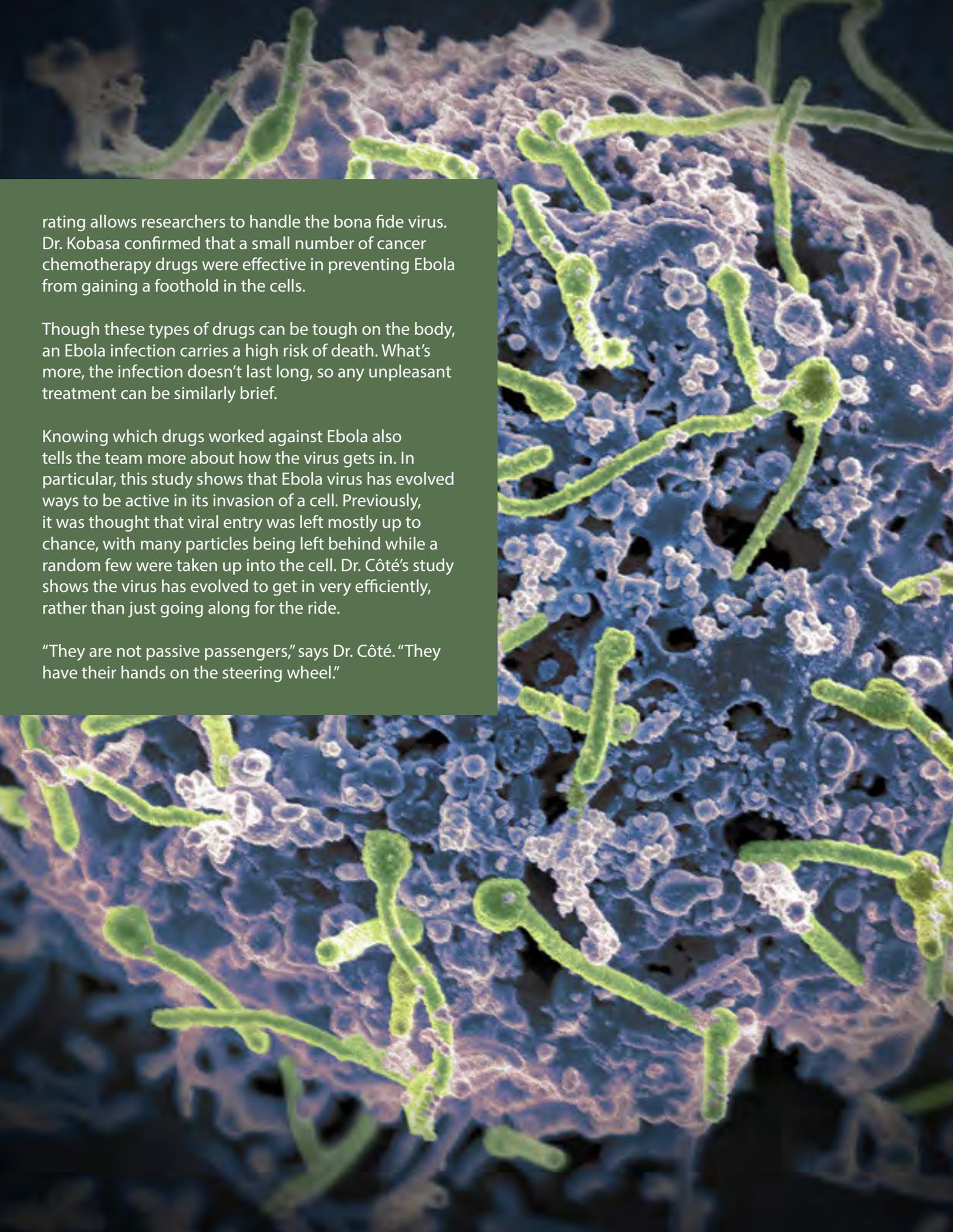


parts of the body, disseminating the infection. Virtually all organs become active sites of replication, and the result is a vicious, multi-system disease. Once it tricks its way into the cell, the virus needs to find a specific receptor that serves as the lock for its glycoprotein key, kicking off the process that will allow it to multiply. A drug that prevents it from any one step in turning that key could defeat the disease.

Dr. Côté’s team, in particular PhD student Corina Stewart, tested a library of drugs against a virus in cell cultures. It’s not safe to work with a replicating Ebola virus in a regular lab, so the uOttawa team used a surrogate system.

“We use a safe virus disguised as an Ebola virus. They will enter just the same way as an Ebola virus, but actually the inside core when they uncoat is all safe stuff,” says Dr. Côté. “It’s murine leukemia virus or engineered retroviruses, so nothing to worry about.”

Once they found a collection of drugs that seemed to work, they passed the data to collaborator Dr. Darwyn Kobasa at the National Microbiology Laboratory in Winnipeg, where a biosafety level 4



rating allows researchers to handle the bona fide virus. Dr. Kobasa confirmed that a small number of cancer chemotherapy drugs were effective in preventing Ebola from gaining a foothold in the cells.

Though these types of drugs can be tough on the body, an Ebola infection carries a high risk of death. What's more, the infection doesn't last long, so any unpleasant treatment can be similarly brief.

Knowing which drugs worked against Ebola also tells the team more about how the virus gets in. In particular, this study shows that Ebola virus has evolved ways to be active in its invasion of a cell. Previously, it was thought that viral entry was left mostly up to chance, with many particles being left behind while a random few were taken up into the cell. Dr. Côté's study shows the virus has evolved to get in very efficiently, rather than just going along for the ride.

"They are not passive passengers," says Dr. Côté. "They have their hands on the steering wheel."



ATTACK ON PLAQUE

MIREILLE OUIMET (HEART INSTITUTE/BMI)

We all have some degree of atherosclerosis, the narrowing of arteries caused by the buildup of plaque. When Drs. Michael Brown and Joseph Goldstein picked up the Nobel Prize in Physiology or Medicine in 1985, they paved the way for the widespread use of statin drugs that can slow this progression. Now uOttawa researcher Dr. Mireille Ouimet is looking for ways we could take this further and actually turn back the clock on atherosclerosis.

It all revolves around cholesterol—both the “bad” low-density lipoprotein (LDL) cholesterol that accumulates in the vascular wall and the “good” high-density lipoprotein (HDL) cholesterol that circulates in the blood and can remove excess cholesterol from the wall and eliminate it from the body.

“Cholesterol is an essential molecule. It’s required for life, and it’s in every single one of our cells as a central

component of cell membranes,” says Dr. Ouimet, an assistant professor in uOttawa’s Department of Biochemistry, Microbiology and Immunology and a scientist and director of the Cardiovascular Metabolism and Cell Biology Laboratory at the University of Ottawa Heart Institute.

“But too much cholesterol will be toxic to the cell. Then this cell will take it out of their membranes and store it in organelles called lipid droplets. Those are the organelles that I am interested in.”

We get plenty of cholesterol from a modern Western diet, and when that is combined with cholesterol manufactured in our cells, it makes for more supply than we need. While statins halt the internal production of cholesterol, the plaques full of lipid droplets that have already built up on the arterial walls are still there, threatening to rupture and cause a heart attack or stroke. Dr. Ouimet’s work is zeroing in on how lipid droplets exit these plaques. If she can identify the mechanism, it will bring us that much closer to shrinking plaques that have already formed—effectively turning back time on cardiovascular disease. Her search has led her to look at the brain, which

contains one-quarter of the body's cholesterol while only comprising 10% of its mass. The brain generally does not let unaltered cholesterol from the rest of the body in, or its own out. A protein called ORP-6 is expressed in the brain more than anywhere and is believed to be important in maintaining cholesterol homeostasis there. A variation in the genetic sequence for ORP-6 is associated with Alzheimer's disease, which suggests a role in cognitive function. Dr. Ouimet and her team are looking at how cholesterol can build up in cells of the brain.

"We give our mice high-fat "McDonald's" diets to induce the plaques, but until now we haven't been looking at their brains," says Dr. Ouimet.

With the help of Drs. Diane Lagace, Baptiste Lacoste and Steffany Bennett, Dr. Ouimet hopes to venture outside of her more familiar research territory and incorporate new techniques in neuroscience and lipidomics into her work to see a more complete picture of the body's internal cholesterol economy.

"It's a deviation away from heart disease," says Dr. Ouimet. "But you have to go where your research takes you."



VASCULAR DEVELOPMENT MAY BE AT RISK IN AUTISM

BAPTISTE LACOSTE (OHRI/CMM)

A Canadian collaboration led by Dr. Baptiste Lacoste has undertaken the first ever in-depth study of vasculature in the autistic brain. The product of four years of work, a paper published in *Nature Neuroscience* lays out several lines of novel evidence that strongly implicate defects in endothelial cells—the lining of blood vessels—in autism.

Dr. Lacoste, an assistant professor in the University of Ottawa's Faculty of Medicine and Brain and Mind Research Institute and a scientist at the Ottawa Hospital Research Institute, heads a lab that specializes in neurovascular interactions in health and disease. In collaboration with researchers at McGill University, Laval University, and the National Research Council of Canada, Dr. Lacoste's team used a mouse model with one of the most common genetic mutations found in autism spectrum disorder—16p11.2 deletion, or "16p" for short.

The team, in which Dr. Lacoste's graduate student Julie Ouellette and research associate Dr. Xavier Toussay played prominent roles, also used cells derived from the tissue of human autistic adults who carry the 16p mutation.

NERVES AND BLOOD VESSELS NOT IN SYNCH

"If you imagine you have a luxury car—a Ferrari—and it's beautiful, sitting in your garage. But if you don't put gas in the tank, the car won't drive," says Dr. Lacoste. "It's exactly the same with the brain. It's the most complex organ, but if you don't have blood supply, the brain just doesn't work properly."

Normally, when brain cells light up, blood rushes to the active brain region, a phenomenon called 'neurovascular coupling'. But when neurons of mice with the 16p deletion are stimulated, this study found that vascular responses in those brain regions were delayed and weaker.



This disconnect—or 'neurovascular uncoupling'—was shown to originate in the blood vessels themselves: Arteries isolated from these mice and kept alive in a medium also showed a weak and sluggish response to chemicals that induce dilation of blood vessels. The team further isolated the source of the deficit in the endothelium, as opposed to the other cell types, such as muscle cells, that surround blood vessels.

DIFFICULTIES IN DEVELOPMENT

Dr. Lacoste's work further shows that problems with blood vessels begin very early in life for those who carry the 16p deletion. In a petri dish, both human-derived and mouse endothelial cells with the mutation were unable to sprout the extensions that normally connect blood vessels to each other, allowing the vascular network to expand and grow. Endothelial cells in the brains of newborn autistic mice had the same problem.

By adolescence, the mice still showed reduced vascular density in their brains. Interestingly, in contrast to the problems in the circulatory system, the researchers found that the neurons in the brains of these young mice appeared to be surprisingly well organized. As the mice grew, other cells in the brain compensated

for their dysfunctional endothelial cells, so that by adulthood they had developed a full network of blood vessels. However, as the researchers' previous experiments showed, these blood vessels remained dysfunctional in adult mice.

"It's a bit like if a plumber comes to your house and does a bad job installing the pipes," says Dr. Lacoste. "You will have trouble getting the right water pressure in your sink from then on."

BLOOD VESSELS AND AUTISTIC BEHAVIOR

When a person or mouse carries a 16p mutation, that genetic difference is replicated in every cell in their body. This makes it harder to pin down the cause of systemic developmental differences.

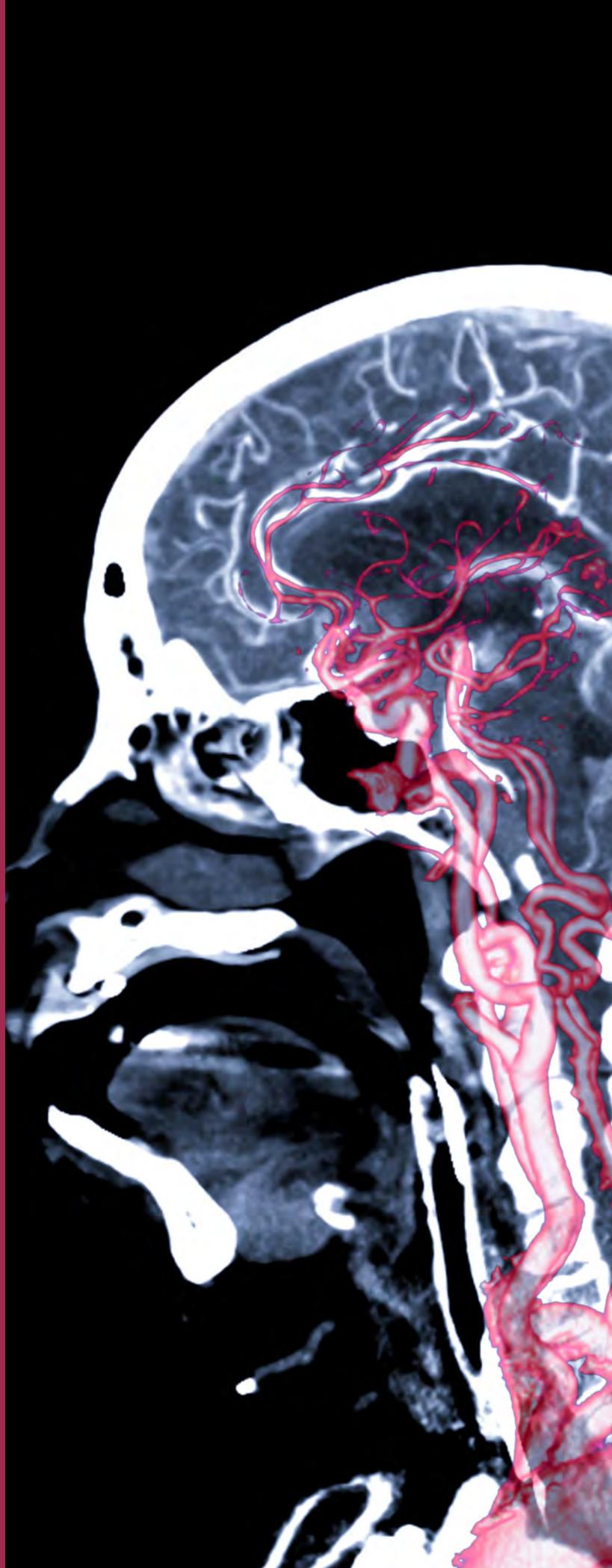
To address this difficulty, Dr. Lacoste's team generated mice that only expressed the mutation in their endothelial cells—so-called "conditional mutants". These mice showed similar deficits in their vascular development as whole-body mutants.

Remarkably, although every other cell in their brain and body was genetically normal, these conditional mutants displayed some behavioural signs of autism: hyperactivity, stereotypic movements, and motor learning impairment.

This indicated that the problems in the blood vessels contributed to neuronal dysfunction, which in turn led to the outward signs and symptoms of autism.

FURTHER AVENUES OF INQUIRY

The researchers used an equal number of male and female mice and found more pronounced effects in male mice, suggesting that females may have other tools, such as estrogen, that either compensate or mask the deficits. They suggest this as an avenue of inquiry, as well as the role of blood vessels in a broader range of neurodevelopmental disorders, which could lead to novel diagnostics and therapeutics.





STUDYING THE MENTAL WELL-BEING OF CANADIAN HOSPITAL STAFF AMID COVID-19

MARIE-HELENE CHOMIENNE (DFM/MONTFORT)

At Hôpital Montfort, the first workers to fall ill of COVID-19 weren't doctors or nurses. They were members of the cleaning staff.

"That's what made me sit up and take notice," says Dr. Marie-Hélène Chomienne, an assistant professor of family medicine at the University of Ottawa, who is leading multi-disciplinary team studying the psychological well-being of Canadian hospital cleaning staff during the COVID-19 pandemic.

"This made me appreciate how much these workers are truly on the front lines. They go unnoticed yet they have such an important role in keeping us safe in this pandemic and fighting the infection. We should be examining how they are coping with the added stress COVID-19 has brought."

Dr. Chomienne, a practicing clinician at Montfort, expects to poll 10,000 front-line workers in an initiative which is receiving a grant just under \$200,000 from the Canadian Institutes of Health Research (CIHR) to study the psychological well-being of Canadian hospital cleaning staff during the COVID-19 pandemic.

The study will be conducted via online questionnaires (originally developed during the SARS epidemic) that will be sent to cleaning staff at hospitals across Canada to assess feelings of anxiety, depression, distress and insomnia. Cleaning staff will be asked to rate their sense of risk of contracting the virus. Dozens of in-person, physically distanced, discussion groups to add nuance to the quantitative results are also planned.

"Research should provoke transformative change," says Dr. Chomienne, who is also a researcher at Institut du Savoir Montfort and CT Lamont Primary Health Care Research Centre. "You can do lots of research and write lots of articles, but if nothing changes on the ground, I think that the investment hasn't done much good."

Dr. Chomienne is one of six scientists at uOttawa and its associated research institutes receiving over \$1 million in funding from the Government of Canada's Knowledge Synthesis Grant: COVID-19 Rapid Research Funding Opportunity in Mental Health and Substance Use.



STUDY SHOWS DRUGS CAN OFTEN RESTORE HEART RHYTHM WITHOUT SHOCKS OR SEDATION

IAN STIELL (EM/OHRI)

In the emergency room, patients with acute atrial fibrillations need rapid relief.

In Canada, that relief is often provided by a mild electric shock that restores normal heart rhythm, or with intravenous drugs. But no clinical study had ever compared the safety and effectiveness of the two methods.

Now, a clinical trial led by Dr. Ian Stiell, uOttawa distinguished professor and senior scientist at The Ottawa Hospital, has found that intravenous drugs can restore heart rhythm in more than 50 percent of patients without the need for electric shocks — saving both time and resources.

"If I have a patient on a drug infusion, I can see other patients at the same time," said study co-author Dr. Jeffrey Perry, senior scientist at The Ottawa Hospital and professor at the University of Ottawa. "To do an electrical cardioversion, I need to find another doctor, a nurse and a respiratory therapist, and it takes time to assemble those people."

Given the study's results, the researchers recommend that physicians try the drug treatment first, to avoid unnecessary sedation.

"While we believe that there are advantages to trying the drug infusion before the shock, the treatment choice is ultimately a shared decision between the patient and physician," said Dr. Perry.

Acute atrial fibrillation is a rapid, irregular heartbeat that must be treated within 48 hours to avoid complications like stroke and heart failure. The study team estimates that acute atrial fibrillation accounts for 430,000 emergency department visits every year in Canada and the United States.

In Canada, acute atrial fibrillation is commonly treated by cardioversion, a medical procedure that quickly brings heart rhythm back to normal. Cardioversion can be done with a mild electric shock while the patient is under sedation, or with fast-acting drugs delivered through an IV, with no sedation required.

The randomized controlled trial led by Dr. Stiell is the first study to compare the two different kinds of cardioversion for safety and effectiveness.

The researchers recruited 396 patients with acute atrial fibrillation from 11 Canadian emergency departments. Patients were randomly assigned to one of two groups. The first group received only electrical cardioversion. The second group received a drug called procainamide through an IV. If the drug did not reset the patient's heart rhythm within 30 minutes, the patient then received electrical cardioversion.



IN THE SHOCK-ONLY GROUP (192 PATIENTS):

- 92 percent returned to their normal heart rhythm (176)
- 95 percent were discharged home (183)

IN THE DRUG-THEN-SHOCK GROUP (204 PATIENTS):

- 96 percent returned to their normal heart rhythm (196) 97 percent were discharged home (198)
- 52 percent recovered their normal heart rhythm with the drug alone (106)

Overall, the study showed that both forms of cardioversion are safe and effective. None of the patients experienced serious side-effects

“These methods allow us to quickly get patients back to their normal heart rate, and send them home after

four to six hours in the emergency department,” said Dr. Stiell.

While cardioversion is common in Canada, it isn’t as well known in other parts of the world.

“In some countries, patients with acute atrial fibrillation are sent home with pills to slow their heart rate, while others are admitted to hospital,” said Dr. Stiell. “Our study showed that cardioversion in the emergency department is safe and effective. We hope our results convince more physicians around the world to adopt these methods.”

ANESTHESIA CHOICE MAY HAVE VITAL CONSEQUENCES

DANIEL MCISAAC & DEREK ROBERTS
(ANESTHESIOLOGY/OHRI)

A new study published in The BMJ shows that people who had surgery to improve blood flow in their legs under spinal or epidural anesthesia were less likely to die than those who were given general anesthesia. "We estimate that this finding could save at least 100 of the patients' lives who undergo leg artery bypass surgeries every year both in Canada and the United States," said lead author Dr. Derek Roberts, an incoming assistant professor at the University of Ottawa and vascular and endovascular surgeon at The Ottawa Hospital. "We hope to conduct a randomized controlled trial to confirm these results, but in the meantime our findings suggest that we should increasingly perform more of these types of surgeries using spinal or epidural anesthesia techniques."

General anesthesia involves using drugs to make a patient unconscious and inserting a tube into their windpipe to help with breathing. Spinal and epidural anesthesia directly freeze the nerves to the legs and can be combined with lighter forms of sedation which do not involve a breathing tube.

This study, the largest of its kind, looked at medical records of 20,988 people who had leg artery bypass surgery in Ontario, Canada, between 2002 and 2015. Approximately two thirds of these surgeries used general anesthesia and a third used spinal or epidural anesthesia.

The researchers found that 646 of the patients who had general anesthesia (4.4 percent) died within 30 days of their surgery compared to 204 of the patients who had spinal or epidural anesthesia (3.2 per cent). The results remained the same after the researchers adjusted for differences between the groups, such as how sick the patients were before surgery.

"We were surprised to find that some hospitals did these types of surgeries under spinal or epidural



anesthesia more than 90 per cent of the time, while in others it was less than one per cent," said senior author Dr. Daniel McIsaac, associate professor at the University of Ottawa, associate scientist and anesthesiologist at The Ottawa Hospital, and adjunct scientist at ICES. "We hope this study will help patients and physicians make more informed decisions about what type of anesthetic is best for each patient."

The study also found that patients who had spinal or epidural anesthesia were able to leave the hospital half a day earlier than those who had general anesthesia. The researchers estimate that if all leg artery bypass surgeries were done with spinal or epidural anesthesia, it could save \$50 million in health care costs each year in Canada. In Ontario, the vast majority of these surgeries are done in specialty centres that can easily perform spinal or epidural anesthesia.

Close to 20,000 people have leg artery bypass surgery in Canada and the United States every year.

Reference: Association between neuraxial anaesthesia or general anaesthesia for lower limb revascularisation surgery in adults and clinical outcomes: population based comparative effectiveness study. Derek J Roberts, Sudhir K Nagpal, Dalibor Kubelik, Timothy Brandys, Henry T Stelfox, Manoj M Lalu, Alan J Forster, Colin JL McCartney, Daniel I McIsaac. The BMJ. November 25, 2020. <https://www.bmj.com/content/371/bmj.m4104>

EXPLORING BIAS TO IMPROVE EVALUATION OF PHYSICIANS IN TRAINING

SUSAN HUMPHREY-MURTO (OHRI/DIME)

The path to becoming a physician is long and arduous, requiring many years of training. Rigorous evaluation of medical students and residents is essential to ensuring our graduating physicians have the skills, knowledge and attitudes to serve their patients and society.

Medical Education is an active field of research with the goal of improving training and evaluation of physicians. Dr. Susan Humphrey-Murto, Associate Professor and Interim Director of the Research Support Unit within the Department of Innovation in Medical Education, Faculty of Medicine, uOttawa, is a passionate Medical Education researcher studying performance-based assessment.

Medical education is undergoing a paradigm shift from time-based to competency-based education. In this new model, each learner has their own trajectory towards competence and assessment should be continuous. However, because the current system of education in medicine involves discrete rotations, each involving different faculty supervisors, longitudinal assessment is difficult. A potential solution to this challenge is to share information about the learner across rotations and supervisors, a practice called learner handover. Despite potential benefits of information sharing the topic remains controversial, with concerns this practice might cause stigmatization of learners and bias future assessment.

Dr. Humphrey-Murto has studied this concern from multiple perspectives. In two reviews published in *Academic Medicine* and *Advances in Health Sciences Education*, she has explored this topic across multiple disciplines and demonstrated that prior information does impact subsequent ratings, a phenomenon labelled as assimilation. In an experimental study, she demonstrated this also occurs in the medical education setting. Evaluators provided with negative information



about a resident physician provided subsequent ratings that were lower, compared to evaluators who received positive, or no prior information even after having viewed the same performances. This occurred despite using experienced evaluators who were aware of the potential for bias. She also explored faculty perceptions regarding the real-world practice of learner handover. This practice served multiple purposes including assisting struggling learners by directing teaching and feedback and ensuring the appropriate level of supervision to safeguard patient safety. A surprising finding was how this practice was used to benefit faculty. Faculty used learner handover to save time, to manage their insecurities surrounding assessment of the resident, and to quell their anxiety surrounding entrustment of patients to learners. Faculty also described using informal learner handover for social or therapeutic purposes, for example to vent. This led to tensions arising from wanting to act professionally while sharing stressful and frustrating experiences.

This research underlies the necessity for formal policies, a hot topic as many residency training programs and national organizations are considering adopting learner handover with little evidence to inform decision making.

PRIZES AND AWARDS 2020

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 raise 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.

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.

For more information visit: <https://med.uottawa.ca/research-innovation/research-highlights/prizes-awards>.

Dr. Robert Beanlands - University of Ottawa Alumni Association Award - Alumnus of the Year

Dr. John Bell - Canadian Society for Clinical Investigation Distinguished Scientist Award

Dr. Robert Bell - AFMC Clinical Teacher Award

Dr. Thais Coutinho - Women as One Escalator Awards - Research Award

Dr. Robert deKemp - Cardiovascular Council of the Society of Nuclear Medicine and Molecular Imaging - 2021 Hermann Blumgart Award

Dr. Ciaran Duffy - American College of Rheumatology - Master (Designation)

Dr. Dean Fergusson – Fellow of the Canadian Academy of Health Sciences

Dr. Daniel Figeys - Canadian Society for Chemistry's 2021 Ricardo Aroca Award

Dr. Alireza Jalali - APUO/University of Ottawa Award for Excellence in Teaching

Dr. Alireza Jalali - AFMC John Ruedy Innovation in Medical Education Award

Dr. Claire Kendall – Canadian Association of HIV Researchers CANFAR Award of Excellence for Research (Epidemiology/ Public Health)

Dr. Tetyana Kendzerska - American Thoracic Society Assembly on Sleep and Respiratory Neurobiology - James B. Skatrud New Investigator Award

Dr. Tetyana Kendzerska - The Sleep Research Society's 2020 Outstanding Early Investigator Award

Dr. Chris Kennedy - Kidney Foundation of Canada 2020 John Dosseter Research Award

Dr. Robert Korneluk - University of Ottawa Alumni Association Award - Honorary Member

Dr. Jason Leclair - PARO Clinical Teaching Award

Dr. Lynne Leonard - University of Ottawa Knowledge Mobilization Excellence Award

Dr. Clare Liddy - Change Foundation Future Innovator Award

Dr. Peter Liu - Order of Ontario

Dr. Lyne Pitre - Order of Ontario

Dr. Terrence Ruddy - Master of the American Society of Nuclear Cardiology (MASNC)

Dr. Terrence Ruddy - Fellow of the Society of Nuclear Medicine and Molecular Imaging (SNMMI)

Dr. Michael Rudnicki – Fellow of the Royal Society (UK)

Dr. Eve Tsai - Nano Ontario - 2020 Outstanding Achievement Award (for nano-related research and development)

Dr. Peter Tugwell - CIHR Barer-Flood Prize for Health Services and Policy Research

Dr. Christian Vaillancourt - Canadian Association of Emergency Physicians - Ian Stiell Researcher of the Year National Award

Dr. Barbara Vanderhyden - APUO/University of Ottawa Award for Excellence in Research

Dr. Barbara Vanderhyden – Fellow of the Canadian Academy of Health Sciences

Listed above are the awards and prizes that the Faculty of Medicine Research Office was aware of at the time of publication.

Please let us know if we have missed any, as we regularly update our webpage with award recipients.



FACULTY OF MEDICINE AWARDS OF EXCELLENCE

In the spirit of recognizing the 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 virtual Faculty Gala, on December 15, 2020.

2020

Dr. Katey Rayner

Researcher of the year- Biomedical

Dr. Rebecca Auer

Researcher of the year - Clinical

Dr. Melissa Brouwers

Researcher of the Year - Epidemiology and Public Health

Dr. Doug Archibald

Researcher of the Year - Innovation and Education

Dr. Susan Humphrey-Murto

Researcher of the Year - Innovation and Education

Dr. Carolina Ilkow

Early Career Researcher of the Year -Biomedical

Dr. Luke Lavallée

Early Career Researcher of the Year - Clinical

Dr. Jodi Edwards

Early Career Researcher of the Year - Epidemiology and Public Health

Dr. Kori LaDonna

Early Career Researcher of the Year - Innovation and Education

Dr. Baptiste Lacoste

Publication of the Year - Biomedical

Dr. Ian Stiell

Publication of the Year - Clinical

Dr. Peter Tanuseputro

Publication of the Year - Epidemiology and Public Health

Dr. Sylvain Boet

Publication of the Year - Innovation and Education

Dr. Christopher Tran

Educator of the Year - Preclerkship

Dr. James Watterson

Educator of the Year - Clerkship/Residency/Fellowship/ Continuing Education

Dr. Lisa D'Ambrosio

Educator of the Year - Basic Sciences

Dr. DarDowlatshahi

Mentor of the Year - Clinical

Dr. Bernard Thébaud

Mentor of the Year - Basic Sciences

Dr. Phil Wells

Outstanding Service Award

Dr. Kay Anne Haykal

Leadership in Wellness Award

Dr. Nedra Lander

Leadership in EDI Award

Dr. Simone Dahrouge

Social Accountability Award

Dr. Alykhan Abdulla

Professionalism Award

Dr. Nicole Rouvinez-Bouali

Internationalisation and Global Health Award

Dr. Marie-Hélène Chomienne

Award for the promotion of francophonie



STRATEGIC INITIATIVES

The Faculty of Medicine has developed several internal programs to support current and emerging areas of strategic priority. These programs are designed to support the growth and development of our research enterprise and to attract and retain world-class researchers and scholars.

TRANSLATIONAL RESEARCH GRANT PROGRAM

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 of up to \$25,000 per partner: 1) the basic science department or research institute, and 2) the clinical department.

Congratulations to the recipients of the 2020 University of Ottawa, Faculty of Medicine Translational Research Grants:

Michele Ardolino (BMI/OHRI) and **Arleigh McCurdy** (Medicine/OHRI): Trogocytosis: A New Immune Escape Mechanism in Multiple Myeloma

Mark Campbell (CMM/Medicine/BRI/OHRI), **Jeffrey Dilworth** (CMM/Medicine/OHRI), and **Sasha Carsen** (Surgery/CHEO RI): Determining the cartilage regeneration potential of novel stem cell populations to repair cartilage defects

Mireille Khacho (BMI) and **Jodi Warman-Chardon** (Medicine/OHRI): Unlocking Myotonic Dystrophy: Characterization of mitochondrial and muscle stem cell dysfunctions in DMI1 patients

Kyoung-Han Kim (CMM/UOHI), Erin Mulvihill (BMI/UOHI), and **Louise Sun** (Anesthesiology & Pain Medicine/UOHI): Chasing heart failure patients susceptible to a wasting syndrome, cardiac cachexia

Wenbin Liang (CMM/UOHI) and **Darryl Davis** (Cardiology/CMM/UOHI): iPSC modelling of postoperative atrial fibrillation

Gergely Silasi (CMM) and **Richard Aviv** (Radiology/OHRI): Hemorrhagic transformation of microinfarcts

Alain Stintzi (BMI), **Angela Crawley** (BMI/OHRI), and **Angela Cheung** (Medicine/OHRI): Defining pathogenic mechanisms involved in primary sclerosing cholangitis through the multiomic evaluation of the gut microbiota and immunophenotypes of extreme phenotypes



ARTIFICIAL INTELLIGENCE (AI) SEED FUNDING PROGRAM

Having identified Artificial Intelligence (AI) as an emerging area of strategic priority in its 2020-2025 Strategic Plan, the Faculty of Medicine developed the AI Seed Funding Program to support research and training initiatives in this burgeoning field. The purpose of the program is to provide seed funding to Faculty of Medicine research teams working to develop and apply AI in health and medicine.

The program was highly competitive in terms of the quality and number of applications received. The Faculty awarded a total of \$50,000 to support the top five teams working to develop innovative, multidisciplinary AI applications in health and medicine.

Congratulations to the recipients of the inaugural AI Seed Funding Program competition:

Hesham Abdelbary (Surgery/OHRI) and **Hanan Anis** (Electrical and Computer Engineering): Integrated Machine Learning with Raman Biosensing Technology to Enhance Bacterial Detection and Diagnosis of Implant Associated Infections

Lise Bjerre (Family Medicine/ISM): Getting Ahead of the Curve: Predictive COVID-19 Case Identification Using an Iterative Propensity Score Modelling and AI Approach

Peter Tanuseputro (Medicine/OHRI/BRI): Predicting Survival of Long-Term Care Residents with COVID-19 Infection

Gergely Silasi (CMM) and **Diane Lagace** (CMM): Markerless Limb Tracking: Creating a Pipeline for Preclinical Behavioral Studies Using Artificial Intelligence

Mathieu Lavallee-Adam (BMI): RealMetaPro: A Machine Learning Approach for Real-Time Analysis of Microbiomes Using Mass Spectrometry



COVID-19 PANDEMIC RESPONSE FUNDING PROGRAM

To support new COVID-19 initiatives and contribute to the urgent efforts to accelerate the development, testing and implementation of medical, social, and/or policy countermeasures to mitigate the rapid spread of the SARS CoV-2 virus and/or its negative consequences on Canadians and globally, the Faculty of Medicine developed the COVID-19 Pandemic Response Funding Program.

The Faculty of Medicine's COVID-19 Pandemic Response Funding Program selected eleven projects for a grant of up to \$50,000 each. They were chosen on the basis of being highly feasible with immediately achievable and important results, and providing evidence to inform clinical and public health responses or decision-making about the pandemic.

Congratulations to the recipients of the COVID-19 Pandemic Response Funding Program competition:

David Allan (Medicine/OHRI), **Manoj Lulu** (Anesthesiology & Pain Medicine/OHRI), **Dean Fergusson** (Medicine/OHRI), and **Alan Tinmouth** (OHRI): A Framework for Accelerated Synthesis of Trial Evidence – FAST Evidence - to assess efficacy of Mesenchymal Stromal Cells and Convalescent Plasma for COVID-19

Simone Dahrouge (Family Medicine/BRI): Supporting Primary Care Practices Re-Open Post-Covid19

James Downar (Medicine/Palliative Care/BRI): Supporting family members with severe grief reactions during the COVID-19 pandemic: a mixed methods study

Daniel Figeys (BMI), **Alex Mackenzie** (Pediatrics/CHEO RI) and **Robert Delatolla** (Engineering): Measuring COVID19 proteins in wastewater

Wenbin Liang (CMM/UOHI) and **Darryl Davis** (Cardiology/CMM/UOHI): Fundamental mechanisms underlying COVID-19 associated cardiac arrhythmias
Matthew DF McInnes (Radiology/OHRI): Imaging Tests for the Diagnosis of COVID 19: A 'Living' Systematic Review & Meta-Analysis

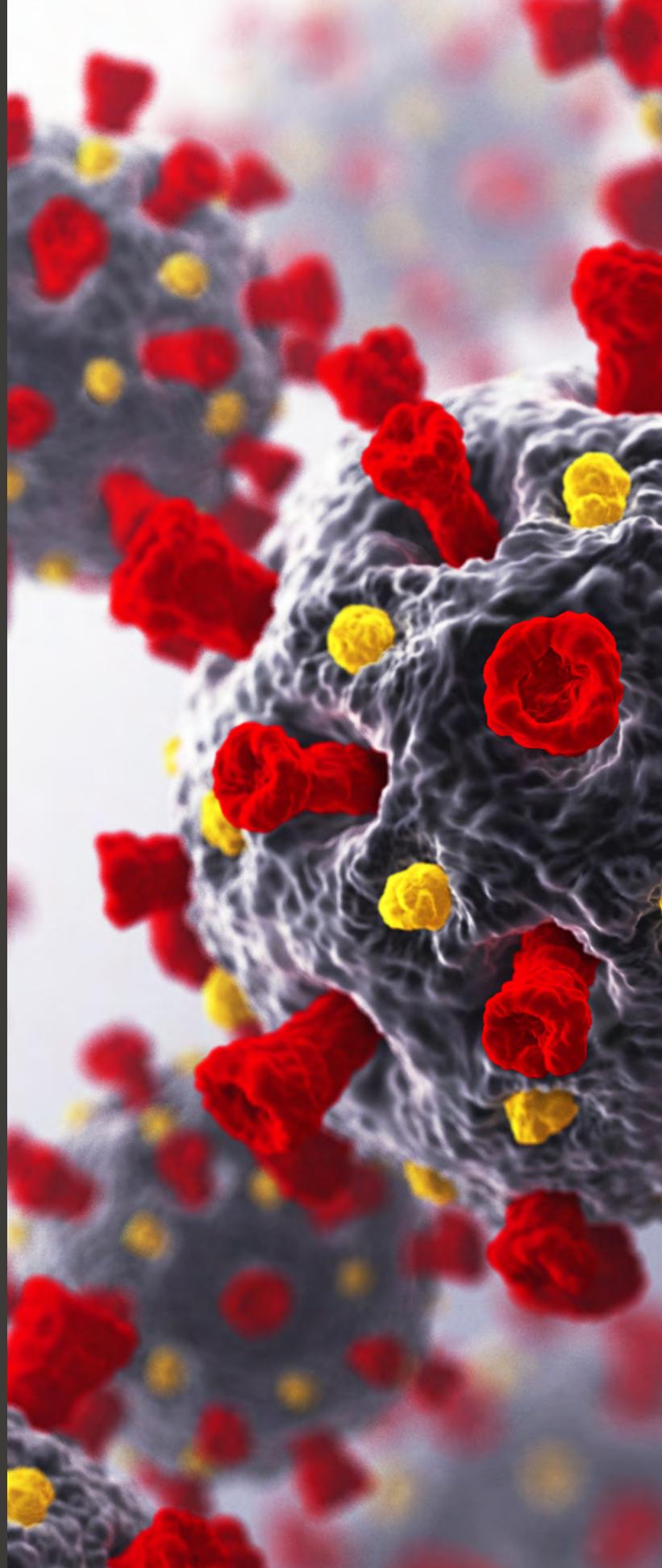
Amy Hsu (Family Medicine/BRI), **Heidi Sveistrup** (BRI) and **Timon LeDain** (Macadamian Technologies Inc.): Predicting COVID-19 risk in long-term care workers using routinely-collected healthcare data

Glenn Posner (Obstetrics & Gynecology/DIME/OHRI), **Kaitlin Endres** (DIME), and **Michael O'Brien** (Emergency Medicine/OHRI): Pandemic-Proofing Simulation-based Education: Development and Evaluation of Interactive Virtual Educational Content for Medical Trainees

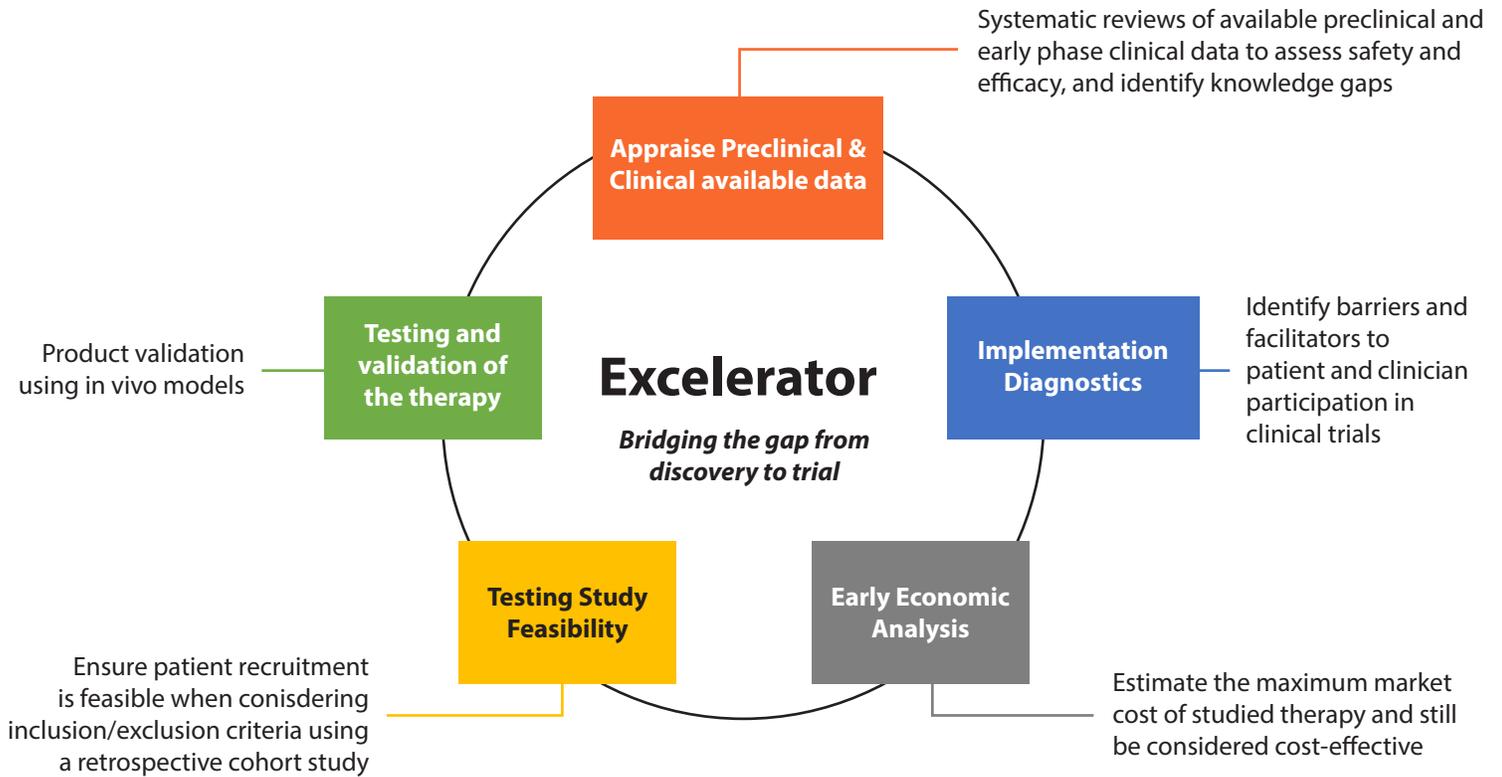
Louise Sun (Anesthesiology & Pain Medicine/UOHI), **Marc Ruel** (Surgery/UOHI), **Sean van Diepen** (University of Alberta): Cardiac surgery triaging tools to reduce mortality while maximizing intensive care resources during the COVID-19 crisis

Venkatesh Thiruganasambandamoorthy (Emergency Medicine/OHRI): Virtual monitoring of COVID positive patients in the community

Roger Zemek (Pediatrics/CHEO RI) and **Sharon Johnston** (Family Medicine/BRI): Development, validation and implementation of an innovative, evidence-based virtual concussion exam



EXCELERATOR PROGRAM



The Blueprint Translational Research Group, established in 2016 at the Ottawa Hospital Research Institute, developed an innovative research model called the Excelsator program to enhance and enable efficient clinical translation through rigorous methods and approaches. In 2019, Blueprint partnered with the Faculty of Medicine to extend the Excelsator program to the broader Faculty and affiliated institutes to help rapidly develop promising therapies from bench to early-phase trials.

The Excelsator program allows research teams to address many common challenges in translational research a priori with a set of focused studies, and therefore helps researchers and clinical investigators deliver optimized clinical trial protocols with the best possible chance of success.

In 2020, the Excelsator Funding Program was launched to support new and on-going translational research initiatives across the Faculty of Medicine and affiliated research institutes.

Congratulations to the recipients of the Excelsator Funding Program competition:

Mark Freedman (Medicine/OHRI), **Ronald Booth** (Pathology & Laboratory Medicine/OHRI), **Vincent Tabard-Cossa** (Faculty of Science/Physics), **Rob Ben** (Faculty of Science/Chemistry & Biomolecular Sciences), and **Simon Thebault** (Neurology): Use of an advanced serum derived biomarker to assess prognosis and response to treatment in progressive multiple sclerosis

Guy Trudel (Medicine/OHRI), **Hakim Louati** (Medicine/OHRI), **Julie Shaw** (Pathology & Laboratory Medicine/OHRI), **Mark Campbell** (CMM/Medicine/BRI/OHRI), and **Nibras Shahin** (OHRI): Develop a hemolysis diagnostic test in human from bench to early-phase clinical trials

Catherine Tsilfidis (CMM/Ophthalmology/OHRI), **Brian Leonard** (Ophthalmology/OHRI), **Bernard Hurley** (Ophthalmology/OHRI), and **Michael Dollin** (Ophthalmology/OHRI): XIAP gene therapy for retinitis pigmentosa: developing a path to the clinic

KNOWLEDGE TRANSLATION/ KNOWLEDGE MOBILIZATION

BEATS RESEARCH RADIO – SCIENCE IS OUR TEMPO

BEaTS

Since joining the University of Ottawa in 2015, **Dr. Emilio Alarcon** (BMI, UOHI) has been a tour de force. Not only is he a successful early-career researcher, but Dr. Alarcon has also created, and been producing and delivering, a live-streamed, interactive radio program, BEaTS Research Radio, to bring science to all.

With a passion and talent for promoting science to the public, Dr. Alarcon is spearheading an innovative, much talked about, science talk radio program, known as BEaTS Research Radio – the name deriving from the research program he is part of, BioEngineering and Therapeutics Solutions (www.beatsresearch.com). They are an interdisciplinary team of scientists working together to develop novel therapies and materials for improving the healing capacity of tissues and organs; their research interests span from fundamental science to translational technologies to cardiac surgery. The idea for the show came to Dr. Alarcon in early 2019 when he was training for the Ottawa marathon all the while raising funds for the Heart Institute. Many of his sponsors were curious to hear more about the fascinating heart research being done right in their city. BEaTS Radio was born!

This radio program dives deep into the ever-changing, rapidly evolving world of sciences and humanities in one-on-one conversations with some of the world's most brilliant masterminds. Importantly, BEaTS Research Radio breaks down science and humanities into terms that all – including those outside of science – can understand and appreciate. Dr. Alarcon accomplishes this by inviting young scientists and early career researchers to interview established investigators. BEaTS Radio is one of a kind - a science radio program made by scientists, not media professionals, for the enjoyment of all.

BEaTS Radio debuted on September 12, 2019 and in its beginning was streamed-live from Dr. Alarcon's own laboratory based at the Heart Institute and made available free of charge on several platforms (<https://beatsresearchradio.buzzsprout.com> and www.youtube.com/BeatsResearchRadio): YouTube, Spotify, Apple and Google Podcasts. As of 2020, the show has moved to remote interviewing format, and streamed weekly on its platforms. The show taps into the roster of international, Canadian and local scientists.

To date, BEaTS Research Radio has live streamed interviews with more than 75 scientists from over 25 universities/institutions world-wide, covering over 25 scientific sub-disciplines. This represents more than 1600 minutes of interviews! Additionally, interviews are often done in multiple languages, including English, French, Portuguese, Spanish, Mandarin, and Arabic, and has more than 2,000 views. This success is due to Dr. Alarcon's and his diverse team's (+80% women in STEM) hard work, creativity, resourcefulness and dedication.

The benefits of Dr. Alarcon's endeavor are many. The show has been a new way for world-class research to be shared with the public is it serving. It communicates to Canadians how this research is integrally linked to the high-quality care patients receive, and that in advancing innovative research ideas, we are continuing to improve and provide the best care for our patients and improve the quality of life in Canada and around the globe. BEaTS Radio demonstrates the importance of investing in research to directly impact the health of all Canadians and contributes to the dissemination of science to help the public make informed decisions. Furthermore, the program engages and inspires the next Canadian generation of scientists to become research leaders of tomorrow.

PATIENTS IN RESEARCH: FROM PARTICIPANTS TO PARTNERS

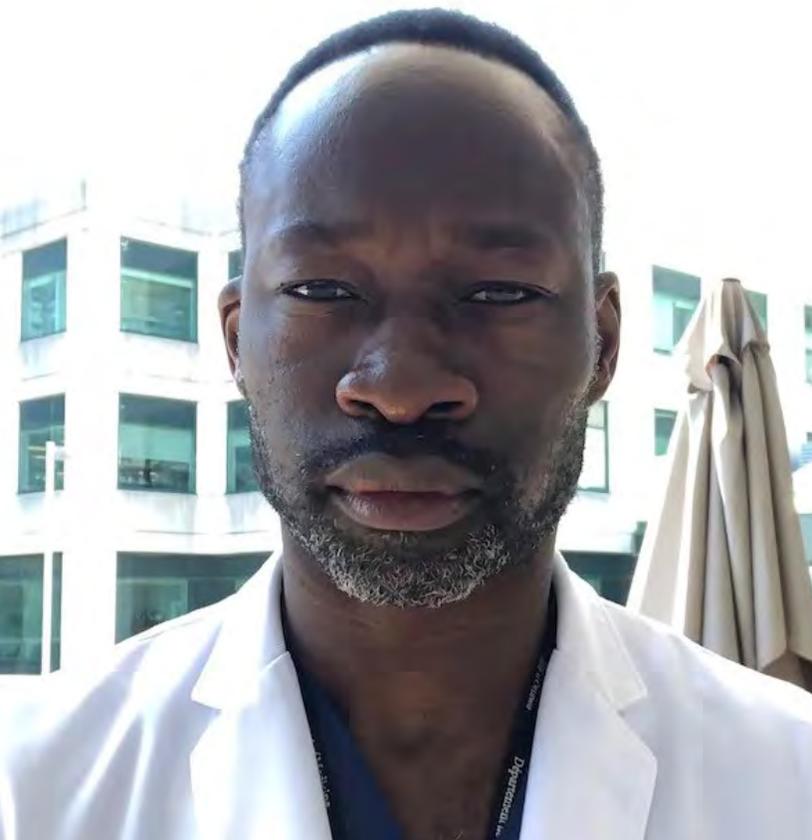
The six-minute walk test is a validated, standardized measure of functional exercise capacity. It measures the distance a patient can walk in a six-minute period and is widely used in everything from heart failure to Duchenne Muscular Dystrophy. But when patients and their families are actually consulted, they may say that walking distance is not the most meaningful thing to measure for a boy with a neuromuscular disorder who expects to spend much of his life in a wheelchair. They may tell researchers that being able to use their arms for longer—to write, to play video games, to drink from a cup—would be a more important outcome for them.

These are the types of revelations **Dr. Beth Potter** (SEPH, CHEO) and **Dr. Pranesh Chakraborty** (Pediatrics, CHEO) say emerge all the time when patients are active partners in clinical research. The two researchers have been working together for about 15 years, having co-created the Canadian Inherited Metabolic Diseases Research Network in 2012. The network now has more than 50 Canadian investigators from 13 sites following a cohort of 800 children with inherited metabolic diseases. Funded by a new CIHR grant, they are embarking on a rare disease research project called INFORM RARE that will allow them to build and improve upon registries of longitudinal clinical and patient-reported data; and to use these registries as the basis for randomized clinical trials. The new INFORM RARE grant expands this network and partners with the Canadian Neuromuscular Disease Registry. The project begins with three patient-oriented clinical trials for children with spinal muscular atrophy (SMA), phenylketonuria (PKU) and mucopolysaccharidoses (MPS). Given the rarity of some of these diseases, it can be difficult to conduct robust clinical trials to determine whether an intervention will actually help. However, these are crucial answers to have, as they determine health policies such as drug reimbursement, physical therapy interventions and newborn screening. The team expects to expand this work to incorporate additional rare diseases in the future.

At the core of the project is the patient engagement program led by co-Principal Investigator Maureen Smith with Dr. Potter. A former teacher and long-time patient advocate with the Canadian Organization for Rare Disorders, Smith creates a bridge between families and researchers to make sure patients have everything they need to participate fully as advisors on the project. Each clinical trial currently has two parent advisors who will provide their perspectives on matters such as engagement with the wider patient communities, outcomes, measurement instruments, and participation in the registries. The investigators expect to bring in up to 20 more advisors as feedback on next stages is required.

Although Smith is a rare disease patient herself, her role is not to share her lived experience—the patient advisors are doing that. However, that lived experience makes her an excellent liaison. She has noticed, for example, that researchers often hold back on requests out of sensitivity especially in challenging times such as this pandemic, when really many patients are extremely motivated to contribute as much as they can to the search for answers. The INFORM RARE network is enthusiastic about its innovative work and thoroughly committed to meaningful patient partnerships that will help to ensure the relevance of this research for children and their families.





SOLVING HEALTHCARE AND COMMUNICATION

As the Ottawa region has moved through the COVID-19 pandemic over the past year, **Dr. Kwadwo Kyeremanteng** (DoM, OHRI) has become a familiar face to many Ottawa residents. As an Intensive Care Unit (ICU) physician and scientist in health services research, Dr. Kyeremanteng has established himself as a beacon of positivity on the front lines of health care. Dr. Kyeremanteng's work has secured his position as a leader in his field of study, particularly as it pertains to resource utilization and costs in the ICU and in Palliative Care. Fortunately, most Ottawa residents won't know him from having been in his care, but rather from his openness to share information from the ICU and the front lines, with the public through the media. Barely a week has gone by in the last year that Dr. Kyeremanteng hasn't been in the media, including interviews on CTV News, sharing updates on the state of hospital resources in order to keep the public well informed and aware of the situation surrounding them. The ICU is sometimes seen as a mysterious or intimidating place, but Dr. Kyeremanteng is breaking

down that silo and letting the public in on what really goes on in an ICU: he has given virtual tours of the ICU, showing viewers what a critical care bed looks like, what ventilators – a precious commodity during the pandemic – look like, but also given an inside look on the health and perspective of our own regional healthcare workers during the pandemic. While COVID-19 cases and restrictions have made life difficult in the last year, Dr. Kyeremanteng has done all he can to keep up the positive energy, while bringing honesty and openness to the science of critical care in Ottawa.

This drive to communicate science to the public is not a new commitment for Dr. Kyeremanteng. While the relevance of ICU capacity has been front and centre during the pandemic, he also created a podcast, named Solving Healthcare, in 2019, in an effort to communicate healthcare needs to a more general audience. The podcast series features interviews and discussions on the topics of improving individual level health, improving healthcare delivery, personal experiences in healthcare, current events in the industry, and new innovations. Each episode is underpinned by the values of cost-effectiveness, dignity, and justice. Leaving no stone unturned, each episode challenges the status quo as he and his guests explore gaps, assumptions, and different perspectives in the pursuit of finding solutions to problems in Canada's healthcare system. Episodes over the last year have included segments on staying fit during lockdown, talking to your kids about the pandemic, lessons learned from Italy, cancer care, the opioid crisis, as well as expert interviews with people such as Dr. Isaac Bogoch, Dr. Gigi Osler, and Dr. Karen Cohen, CEO of the Canadian Psychological Association.

In 2018, Dr. Kyeremanteng founded the Resource Optimization Network, which is a multidisciplinary network of physicians, nurses, allied health professionals, health economists, and researchers dedicated to optimizing the use of healthcare resources while improving the quality of care provided to patients. Their research generates evidence to inform hospital care decision-making and resource allocation towards greater sustainability, and improvement of healthcare in Canada while maintaining quality of care.

STEM FOR EVERYONE – “SCIENTIA POTENTIAL EST”

In 2009, **Dr. Diane Lagace** (CMM) founded the University of Ottawa Preclinical Behavioral Core to allow her team – and now over 70 other research groups – to measure improvements in brain function through preclinical animal behavioral assessments. She knew well that research with animals was not openly discussed outside of academia, however she is part of a growing number of scientists that are passionate about helping everyone understand the value and limitations of preclinical research. She thus developed a number of outreach initiatives that encourage discussions about the humane use of animals in biomedical research.

Being a champion of public outreach is not new to Dr. Lagace. She became involved in the Let’s Talk Science program as a graduate student herself, dedicated to helping Canadian youth build the skills they need for their future success, particularly in STEM. In this role, she collaborated with local schools and youth groups to provide workshops where youth can observe the animals in research and discover career opportunities.

Since that time, Dr. Lagace has continually increased her involvement in educational and outreach activities for primary and secondary school students and has worked to encourage other laboratories to join her quest to break down barriers associated with preclinical research and address the inequalities in STEM. These have been successfully offered to a wide range of local students each year during events such as the Faculty “Take Your Kids to Work Day”, Let’s Talk Science “Stem Cells Talks” programs, as well as night programs for local community groups such as Scouts Canada, and the West End Learning Unlimited group. She has been a lecturer in the Faculty of Medicine Mini Medical School and as part of the week-long Brain Health Awareness Week. Since 2014, she has partnered with local elementary schools to get them involved in the Jump Rope for Heart Initiative, an annual 2-week event that includes hands-on activities and an outdoor skipping event. This event reaches over 500 students and 50 parent volunteers, raising money for the Heart and Stroke Foundation.



Due to her passion for outreach, Dr. Lagace has increased her leadership role in education and research promotion within the University of Ottawa. Since 2017, she has led the Faculty’s involvement in the Doors Open Ottawa event which offers tours of our facilities and hands-on demonstrations for the general public. In 2019, this event hosted over 350 visitors, showing us just how curious and interested our visitors – from toddlers to seniors – are in the work of the Faculty. She has also led the Faculty to host Discovery Day Program in collaboration with the Canadian Medical Hall of Fame and the local Kiwanis association, offering hundreds of high school students the opportunity to engage in research and discover potential careers in a wide variety of areas in medicine and biomedical research. The size of our program and number of students made it one of the largest in Canada and the only University to offer two programs – one day in French and one day in English – which has attracted over 80 schools to sign up. Despite COVID-19, this event was again successful this year with a sold-out half-day virtual program. Based on interest garnered at these events, Dr. Lagace has hosted over 30 volunteer high school students in her lab, allowing them hands-on research experience.

Over the years she has also extended her efforts to reach youth all over Canada. In 2014, she coordinated graduate trainees from all over Canada in the Stroke Program in Neurorecovery (SPiN) 2-day workshop in Ottawa, in collaboration with the Canadian Partnership for Stroke Recovery. Since 2013, she has hosted workshops with the national “Encounters with Canada” program that has provided over 113,000 youth with future career opportunities. In the last two years alone, it is estimated that more than 1500 students benefited directly from her programs.

Dr. Lagace’s keen dedication to engaging people of all ages in learning and understanding science showcases the contagious enthusiasm she has about her research and her passion to create an evidence-based informed society.



INTERNATIONAL

CANADA-JAPAN BILATERAL PROGRAM ON REPRODUCTIVE BIOLOGY AND HUMAN REPRODUCTION

Originating from a collaboration between the Departments of Obstetrics and Gynecology, the partnership between the University of Fukui and the University of Ottawa is centered on academic and research programs on human reproduction and reproductive biology. Created in 1999, the program resulted in numerous workshops and collaborative research projects, over 50 publications and joint presentations at national and international meetings, faculty and student mobility and the development of new funding opportunities. This successful initiative led to the Canada-Japan Science and Technology Joint Commission, a partnership of 9 Japanese and 6 Canadian universities supported by the universities involved, MRC/CIHR, Monbusho (the Japanese Ministry of Education, Culture, Sports, Science and Technology), Japan Society for the Promotion of Science (JSPS), Canada's Department of Foreign Affairs and International Trade (DFAIT), Embassy of both countries and various industrial partners.

SHANGHAI INSTITUTE OF MATERIA MEDICA, CHINESE ACADEMY OF SCIENCES

Collaboration between the Chinese Academy of Sciences (CAS) and the University of Ottawa dates back to 2005 and has led to joint research initiatives in the field of Medicine on women's health (ovarian cancer chemoresistance, polycystic ovarian syndrome) and proteomics, as well as the creation of the Ottawa-

Shanghai Joint School of Medicine (OSJSM) that promotes joint research and medical education initiatives. In 2017, the University of Ottawa and the Shanghai Institute of Materia Medica (member of CAS) funded the Joint Research Centre for Systems and Personalized Pharmacology to provide new research and training opportunities and develop new products for personalized medicine. The Centre's scientific symposia - organized either in Shanghai or Ottawa - are great opportunities for networking and developing new projects.

UNIVERSITÉ CLAUDE BERNARD LYON 1

The framework agreement between Université Claude Bernard Lyon 1 and the University of Ottawa signed in 2014 aimed to promote collaborative research, increase visibility for both institutions and train the next generation of basic and clinical researchers through an international environment. Teams from the Eric Poulin Centre for Neuromuscular Disease (CNMD, uOttawa) and Institut NeuroMyoGene (INMG, uLyon) have a long history of collaboration and to date, the cooperation agreement has supported 16 collaborative research projects funded jointly by both universities. In 2019, both Universities formalized the creation of a joint laboratory for neuromuscular research through their respective institutes, CNMD and INMG. The new Associated Laboratory Joint Institute for Neuromuscular Research facilitates collaboration and scientific exchange between France and Canada and joint research symposia offer opportunities to interact and develop new projects.

FACULTY OF MEDICINE RESEARCH DAY

The annual Faculty of Medicine Research Day was held online this year on September 25th, 2020, attracting over 350 attendees from across the Faculty. This event showcased over 250 posters and 18 oral presentations from learners across a diverse array of research areas and learner programs, including graduate and postdoctoral studies, undergraduate Translational Molecular Medicine (TMM), medical school, and residency training.

The event presented an opportunity for learners to showcase their outstanding research projects, hone their presentation skills and network virtually with classmates, colleagues and professors. A scientific committee of evaluators, comprised of faculty members, reviewed all abstracts and oral presentations to select the winners.

Congratulations to this year's winners in the following categories:

WINNERS FOR BEST ORAL PRESENTATION

RESEARCH SYMPOSIUM A

Heidi Li (Undergraduate Medical Student)
"Predictors of false negative sentinel lymph node biopsy in melanoma"

RESEARCH SYMPOSIUM B

Chisom Okwor (Graduate Student)
"Immunoprofiling of Inhibitory Receptor Expression to Understand NK and Bulk T cell Dysfunction in Chronic HCV patients with Advanced Liver Fibrosis"



WINNERS FOR BEST POSTER PRESENTATIONS

POSTDOCTORAL FELLOW

Dr. Chantal Pileggi
"Exercise improves body composition and skeletal muscle mitochondrial efficiency in diet-resistant females with obesity"

RESIDENT

Dr. Roupen Odabashian
"Audit of Cardiac Implantable Electronic Device Outcomes at a Large Tertiary Care Hospital"

MEDICAL STUDENT

Carlyn McNeely
"Tibial Shaft Fracture Management at the Ottawa Hospital"

GRADUATE STUDENT (MASTERS)

Ozgun Varol
"Endothelial-derived exosomes protect against angiotensin II-induced oxidative stress in endothelial cells"

GRADUATE STUDENT (PHD)

Elizabeth Walden
"Phenomic screen identifies a role for yeast lysine acetyltransferase NuA4 in the control of Bcy1 subcellular localization, glycogen biosynthesis, and mitochondrial morphology"

HONOURS IN TRANSLATIONAL AND MOLECULAR MEDICINE STUDENT

Amy Dagenais
"Ready, Aim, Fire: Investigating the Target Sequence Requirements for Polyphosphorylation in E. coli"

FACULTY OF MEDICINE CORE FACILITIES

The Faculty of Medicine, with support from affiliated hospital-based research institutes and the University of Ottawa, has developed **17** 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 function as a time-efficient and cost-effective 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.



PROTEOMICS RESOURCE CENTRE (PRC): DR. DANIEL FIGEYS

The Proteomic Resource Centre has a complete series of state-of-the-art mass spectrometers. They offer a complete array of proteomic services from protein and post translational modification (PTM) identification to large scale quantitative proteomics. The PRC developed 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).

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-of-the-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 high-performance computers.

CONTAINMENT LEVEL 2+ CORE FACILITY (CL2+): DR. MARC-ANDRÉ 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 both basic and technologically advanced shared infrastructure in a state of operational readiness and peak performance, with training and research technical assistance available upon request. The CETS on-call service provides out-of-hours response to equipment alarms and rescue space for failed freezer contents. The CETS also provides glass washing 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 its members access to cutting edge instruments for flow cytometry analysis and cell sorting. We support the research community in Ottawa and surrounding regions with training, fee-per-service, and consultations with an expertise in small particle analysis – the analysis and sorting of submicron size particles (down to 100nm in diameter) such as viruses, extracellular vesicles, organelles and much more!

GENOMICS (STEMCORE): DR. MICHAEL RUDNICKI

StemCore Laboratories is a high-throughput 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-to-end 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 (PSCs) can differentiate into all the cells of the embryo proper and adult organism. PSCs include embryonic stem cells (ESCs) as well as induced pluripotent stem cells (iPSCs), which are created by reprogramming mature adult cells (such as skin cells) into PSCs. These stem cells offer unique opportunities 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 performs fee for service and training for all aspects of human PSC projects including reprogramming patient cells to iPSC lines, cell line characterization, differentiation to specific cell types, and CRISPR/Cas9 genome editing in PSCs 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 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. RICHARD AVIV

The Preclinical Imaging (PCI) Core Facility provides small animal imaging equipment (MRI, ultrasound, optical, laser doppler) and an X-ray irradiator for your research. This facility provides 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 imaging protocols. 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 spectrophotometers 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 cells, tissues or biofluids. 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, UHPLC-QTOF, and UHPLC-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 is part of the Metabolomics Innovation Resource of the Goodman Cancer Research Centre, the University of Ottawa and the Van Andel Research Institute (MIRGOV), which serves the broader research community by ensuring that these facilities work synergistically to meet the growing demand for metabolomics services across North America.

**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.

HIGH THROUGHPUT SCREENING: DR. STEPHEN BAIRD

The High Throughput Screening Lab in the CHEO Research Institute is capable of large and small experiments centered on automated fluorescent microscopy. The facility contains automated liquid handlers, a platewasher, incubator, fluorescent plater, and automated fluorescent microscopes that can all be accessed with a robotic arm to run experiments 24/7. The lab houses the PerkinElmer Opera Phenix automated confocal microscope which delivers excellent resolution with 5x air to 60x water objectives at very fast speeds for imaging slides to 1536 well plates. It is capable of FRET and imaging Zebrafish. Image analysis can be done online with our Columbus Image Analysis server. The lab is an excellent environment for screening the uOttawa community genetic and compound libraries as well as multiparametric experiments. Support is readily available for assay development and image analysis.

GENOMIC EDITING AND MOLECULAR BIOLOGY FACILITY (GEM): DR. RYAN RUSSELL / DR. MAXIME ROUSSEAU

The Genomic Editing and Molecular biology (GEM) Facility has begun to deliver CRISPR/Cas9 knockout cell lines, and constructs at uOttawa. Two dedicated undergraduate students have been retained to

continue their work under our technicians this summer in the GEM facility and are now able to make available human cDNAs in gateway vectors or subcloned into compatible vectors of your choice. Other services include CRISPR reagent delivery and bioreagent development.

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



CURRENT RESEARCH CHAIR HOLDERS

CANADA RESEARCH CHAIRS

TIER 1

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. 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 (2019)
Chair in Neuromuscular Genomics and Health

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

Dr. Katalin Toth (2020)
Chair in Neuronal Signalling

TIER 2

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 and Cell Biology

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

Dr. Shawn Beug (2020)
Chair in Apoptosis in Cancer and Immunity

CLINICAL RESEARCH CHAIRS

TIER 1

Dr. Gonzalo Alvarez (2020)

Department of Medicine
Tier 1 Chair in Prevention of Tuberculosis in Indigenous Communities

Dr. Jonathan Angel (2020)

Department of Medicine
Tier 1 Chair in HIV Cure Research

Dr. Rebecca Auer (2020)

Department of Surgery
Tier 1 Chair in Perioperative Cancer Therapeutics

Dr. Robert Beanlands (2016)

Department of Medicine
Tier 1 Chair Cardiovascular Imaging

Dr. David Birnie (2020)

Department of Medicine
Tier 1 Chair in Cardiac Arrhythmia Research

Dr. Marc Carrier (2020)

Department of Medicine
Tier 1 Chair in Venous Thromboembolism and Cancer

Dr. Darryl Davis (2020)

Department of Medicine
Tier 1 Chair in Translational Cardiovascular Medicine

Dr. Dar Dowlatshahi (2020)

Department of Medicine
Tier 1 Chair in Patient Oriented Cerebrovascular Disease Research

Dr. Grégoire Le Gal (2020)

Department of Medicine
Tier 1 Chair in Diagnosis of Venous Thromboembolism

Dr. Doug Manuel (2020)

Department of Family Medicine
Tier 1 Chair in Precision Medicine for Chronic Disease Prevention

Dr. Lisa Mielniczuk (2020)

Department of Medicine
Tier 1 Chair in Heart Function

Dr. Smita Pakhale (2020)

Department of Medicine
Tier 1 Chair in Equity and Patient Engagement in Vulnerable Populations

Dr. Amy Plint (2020)

Department of Pediatrics
Tier 1 Chair in Pediatric Emergency Medicine

Dr. Michael Schlossmacher (2020)

Department of Medicine
Tier 1 Chair in Neurodegeneration

Dr. Andrew Seely (2020)

Department of Surgery
Tier 1 Chair in Innovative use of clinical data to monitor systems and improve patient care

Dr. Venkatesh Thiruganasambandamoorthy (2020)

Department of Emergency Medicine
Tier 1 Chair in Cardiovascular Emergencies

Dr. Christian Vaillancourt (2020)

Department of Emergency Medicine
Tier 1 Chair in Emergency Heart and Brain Resuscitation

Dr. Leanne Ward (2020)

Department of Pediatrics
Tier 1 Chair in Pediatric Bone Health

Dr. Kumanan Wilson (2020)

Department of Medicine
Tier 1 Chair in Digital Health Innovation

Dr. Roger Zemek (2020)

Department of Pediatrics
Tier 1 Chair in Pediatric Concussion (Brain and Mind)

TIER 2

Dr. Angel Arnaout (2020)

Department of Surgery
Tier 2 Chair in Preoperative Cancer Therapeutics

Dr. Sibel Aydin (2020)

Department of Medicine
Tier 2 Chair in Inflammatory Arthritis

Dr. Sylvain Boet (2020)

Department of Anesthesiology
Tier 2 Chair in Perioperative Patient Safety

Dr. Lana Castellucci (2020)

Department of Medicine
Tier 2 Chair in Thrombosis and Anticoagulation Safety

Dr. Innie Chen (2020)

Department of Obstetrics and Gynecology
Tier 2 Chair in Population Health and Health Services for Women

Dr. Sharon Chih (2020)

Department of Medicine
Tier 2 Chair in Cardiac Transplantation

Dr. James Downar (2020)

Department of Medicine
Tier 2 Chair in Palliative and End of Life Care

Dr. David Dymant (2020)

Department of Paediatrics
Tier 2 Chair in Epilepsy Genetics

Dr. Susan Humphrey-Murto (2020)

Department of Medicine
Tier 2 Chair in Medical Education

Dr. Natasha Kekre (2020)

Department of Medicine
Tier 2 Chair in Cellular Immunotherapy

Dr. Claire Kendall (2020)

Department of Family Medicine
Tier 2 Chair in Strengthening Primary Care for Integrated Health Equity

Dr. Daniel Mclsaac (2020)

Department of Anesthesiology
Tier 2 Chair in Innovative Perioperative Care

Dr. Hugh McMillan (2020)

Department of Pediatrics
Tier 2 Chair in Advanced Therapeutics in Neuromuscular Disease

Dr. Tiago Mestre (2020)

Department of Medicine
Tier 2 Chair in Parkinson's Disease

Dr. Sanjay Murthy (2020)

Department of Medicine
Tier 2 Chair in Inflammatory Bowel Disease

Dr. Mark Norris (2020)

Department of Pediatrics
Tier 2 Chair in Eating Disorders

Dr. Louise Sun (2020)

Department of Anesthesiology
Tier 2 Chair in Big Data and Cardiovascular Outcomes Research

Dr. Peter Tanuseputro (2020)

Department of Medicine
Tier 2 Chair in Palliative Care and Predictive Analytics

Dr. Jodi Warman Chardon (2020)

Department of Medicine
Tier 2 Chair in Diagnosis and Discovery Pipeline for Patients with Genetic Neuromuscular Disease





JUNIOR CLINICAL RESEARCH CHAIRS

Dr. Lisa Caulley (2020)

Department of Otolaryngology
Junior Clinical Research Chair in Otolaryngology-Head and Neck Surgery

Dr. Angela Cheung (2020)

Department of Medicine
Junior Clinical Research Chair in Precision Medicine in Autoimmune Liver Disease

Dr. Debra Eagles (2020)

Department of Emergency Medicine
Junior Clinical Research Chair in Geriatric Emergency Medicine

Dr. Darine El-Chaar (2020)

Department of Obstetrics and Gynecology
Junior Clinical Research Chair in Perinatal Research and Epidemiology

Dr. Rustum Karanjia (2019)

Department of Ophthalmology
Junior Clinical Research Chair in Neuro-ophthalmology

Dr. Manoj Lalu (2020)

Department of Anesthesiology
Junior Clinical Research Chair in Innovative Translational Research

Dr. Luke Lavallée (2020)

Department of Surgery
Junior Clinical Research Chair in Surgery

Dr. Derek MacFadden (2020)

Department of Medicine
Junior Research Chair in Antibiotic Use and Antibiotic Resistance

Dr. Kamila Premji (2020)

Department of Family Medicine
Junior Clinical Research Chair in Family Medicine

Dr. Marie-Eve Robinson (2020)

Department of Pediatrics
Junior Clinical Research Chair in Genetic Skeletal Disorders

Dr. Krishan Yadav (2020)

Department of Emergency Medicine
Junior Clinical Research Chair in Skin and Soft Tissue Infections

Dr. Naista Zhand (2020)

Department of Psychiatry
Junior Clinical Research Chair in Schizophrenia

DISTINGUISHED CLINICAL RESEARCH CHAIRS

Dr. Shawn Aaron (2020)

Distinguished Research Chair in Obstructive Lung Disease

Dr. Bill Cameron (2020)

Distinguished Research Chair in Infection and Immunity

Dr. Greg Knoll (2020)

Distinguished Research Chair in Clinical Transplantation Research

Dr. David Mack (2020)

Distinguished Research Chair in Pediatric Inflammatory Bowel Diseases

Dr. Alex Mackenzie (2020)

Distinguished Research Chair in Neurologic Rare Disease Therapeutics

Dr. Ian Stiell (2020)

Distinguished Research Chair in Improving Care for Patients with Acute Cardiac Conditions

UNIVERSITY RESEARCH CHAIRS

Dr. Steffany Bennett (2011)

University Research Chair in Neurolipidomics

Dr. Mary-Ellen Harper (2016)

University Research Chair in Mitochondrial Bioenergetics

Dr. Clare Liddy (2020)

University Research Chair in eConsult and Primary Health Care Delivery

Dr. David Moher (2006)

University Research Chair in Journalology

Dr. Beth Potter (2016)

University Research Chair in Health Services for Children with Rare Diseases

Dr. Phil Wells (2019)

University Research Chair in Thrombosis Research

Dr. Daniel Figeys (2018)

Distinguished University Research Chair in Proteomics and Systems Biology

Dr. Ronald Labonté (2018)

Distinguished University Research Chair in Globalization and Health Equity

Dr. Julian Little (2019)

Distinguished University Research Chair in Chronic Disease Epidemiology and Control



CHAIRES DE RECHERCHE SUR LE MONDE FRANCOPHONE

Dre Marie-Hélène Chomienne (2020)
Chaire de recherche en francophonie internationale
et santé de l'immigrant ou du réfugié d'Afrique
francophone subsaharienne (French only)

ENDOWED AND SPONSORED CHAIRS

Dr. Robert Beanlands
Vered Chair of Cardiology

Dr. David Birnie
Endowed Chair in Electrophysiology

Dr Lise M. Bjerre
University of Ottawa and Institut du Savoir Montfort
Chair in Family Medicine

Dr. Amanda Black
Dr. Elaine Jolly Chair in Women's Health

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

Dr. Rodney Breau
Urology Oncology Research Chair

Dr. Benjamin Chow
Saul & Edna Goldfarb Chair in Cardiac Imaging Research

Dr. Thais Coutinho
Women's Heart Health Chair

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. Ciarán Duffy
Endowed Chair Pediatrics

Dr. Dean Fergusson
OHRI/uOttawa Clinical Epidemiology
Program Endowed Chair

Dr. Steven Gilberg
Chair of the Eye Institute

Dr. Chris Glover
Minto Chair in Interventional Cardiology Leadership

Dr. Duane Hickling
Greta & John Hansen Men's Health Research Chair

Dr. Lyall Higginson
Donald S Beanlands Chair Cardiology Education

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

Dr. Sarina Isenberg
Chair in Mixed Methods Palliative Care Research

Dr. Daniel Krewski
NSERC/SSHRC/McLaughlin Chair

Dr. Marino Labinaz
Chair Interventional Cardiology
Leadership



Dr. Susan Lamb

Jason Hannah Chair for the History of Medicine

Dr. Ian Lorimer

A.&E. Leger Memorial Fund for Oncology
Research Chair

Dr. Guillaume Martel

Vered Family Chair in Hepato-Pancreato-Biliary
Research

Dr. Pierre Mattar

Clifford, Gladys and Lorna J. Wood Chair in
Vision Research

Dr. Ruth McPherson

Merck Frosst Canada Chair
Atherosclerosis

Dr. Thierry Mesana

Gordon F. Henderson Chair Leadership

Dr. Thierry Mesana

Chair Cardiac Surgery Valve Research

Dr. Marc Ruel

Chair Cardiac Surgery Research

Dr. Marc Ruel

Michael Pitfield Chair Cardiac Surgery

Dr. Michael Schlossmacher

Bhargava Research Chair for
Neurodegenerative Diseases

Dr. Sukhbir Singh

Dr. Elaine Jolly Chair in Women's Health Gynecologic
Surgery

Dr. Manish Sood

Siv L. Jindal Chair for Kidney Disease
Prevention Research

Dr. Duncan Stewart

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

Dr. Ian Stiell

Emergency Medicine

Dr. Sudhir Sundaesan

Wilbert J. Keon Chair of the Department of Surgery

Dr. Eve Tsai

Suruchi Bhargava Brain & Cord
Regeneration

Dr. Catherine Tsilfidis

Donald and Joy MacLaren Chair for Vision Research

Dr. Barbara Vanderhyden

Corinne Boyer Research Chair
Ovarian Cancer

RESEARCH FUNDING

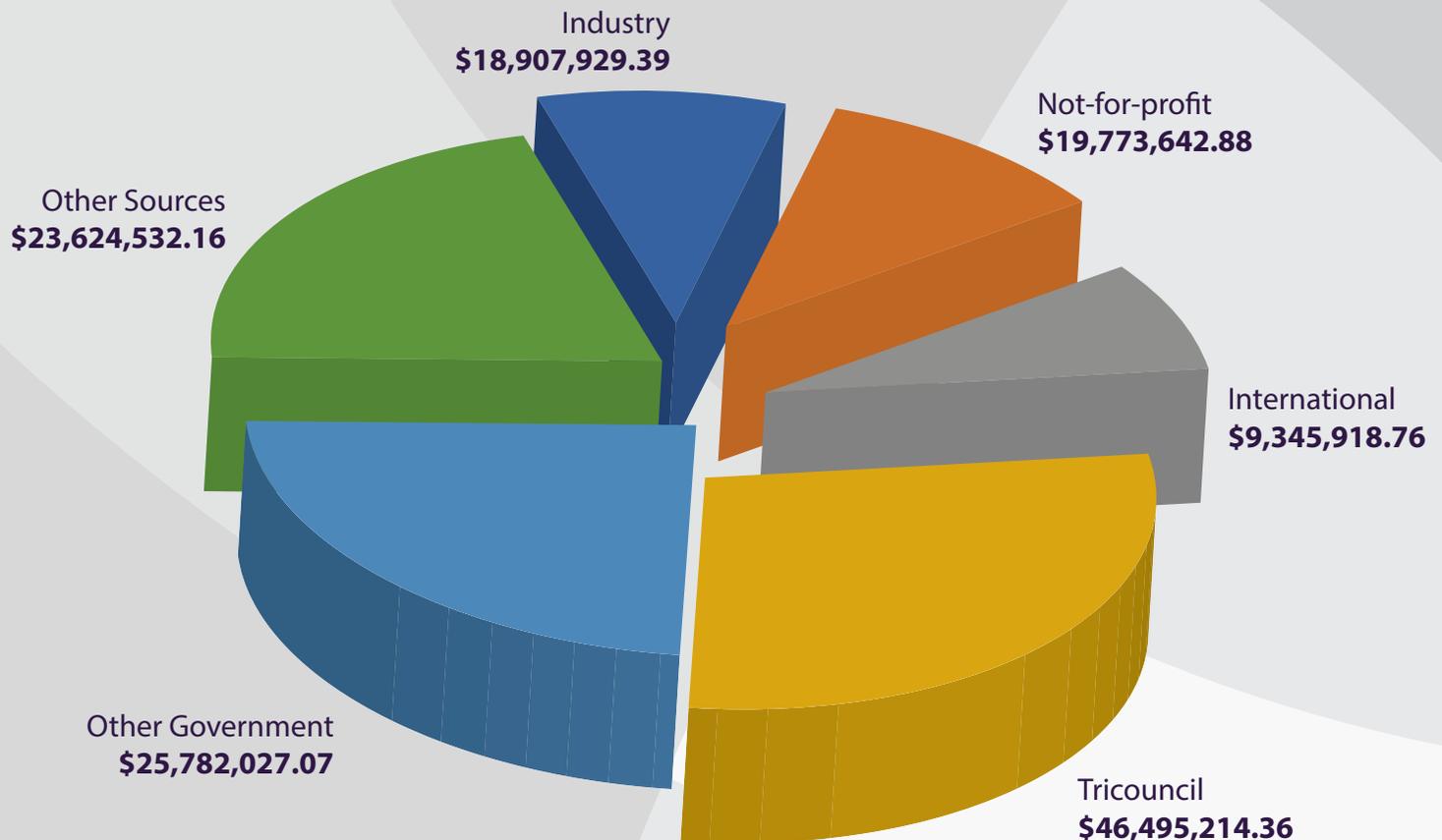
UNIVERSITY OF OTTAWA FACULTY OF MEDICINE 2020

RESEARCH FUNDING	AMOUNT
■ Tri-council	\$46,495,214.36
■ Other Government	\$25,782,027.07
■ Other Sources	\$23,624,532.16
■ Not-For-Profit	\$19,773,642.88
■ Industry	\$18,907,929.39
■ International	\$9,345,918.76
Grand Total	\$143,929,264.62

RANKINGS AND PERFORMANCE

The Faculty of Medicine, University of Ottawa is proud to be among the world's top 150 Universities (QS World University Rankings 2020 (Medicine)).

- #2 for Medical/Science Grants (Maclean's 2020)
- #5 in Canada for scientific impact in biomedical/health sciences (CWTS Leiden, 2020)
- #36 worldwide for public health (Academic Ranking of World Universities, 2019)
- #74 worldwide for clinical medicine (NTU, 2020)
- #76 worldwide for Clinical, Preclinical and Health (THE 2020)





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