



UNIVERSITY OF OTTAWA
HEART INSTITUTE
INSTITUT DE CARDIOLOGIE
DE L'UNIVERSITÉ D'OTTAWA

2022

A YEAR IN REVIEW

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MESSAGE FROM DR. PETER LIU

Our Heart Institute research teams continue to “punch above their weight”, achieving another record year of accomplishments in 2022 despite ongoing pandemic challenges.

The teams achieved outstanding peer-reviewed funding success. We garnered grants from major funding agencies including CIHR, NSERC, SSHRC, the Heart and Stroke Foundation of Canada and Brain Canada. We collaborated with national and regional partners to win large-scale funding. Highlights of our large-scale grant efforts include “STROKECOG”, a CIHR Clinical Trials Fund Training Platform. The first state-of-the-art training platform in stroke and cognition clinical trials research in Canada, the program embeds Equity, Diversity and Inclusion in its research design – reaching all patients including those outside of major centres, as well as in its training approaches – mentoring the next generation of diverse stroke clinical trials leaders. We are also collaborating with national partners to make Ottawa a leader in brain-heart research, through the Brain-Heart Connection IMPACT Award co-funded by the Heart and Stroke Foundation of Canada and Brain Canada. We are advancing research ideas and translating findings into real-world tools that will benefit Canadians.

Research is where patient care begins. Through research, we discover new solutions to our patients’ heart conditions and related areas of health. Continuing our theme on “Precision Medicine”, we are finding solutions to tailor treatments to individual patient’s needs. Our patients inspire us to innovate, and together, we can prevent and treat heart disease more effectively.

Kudos to the Heart Institute research teams on another outstanding year! Dr. Thierry Mesana, our President and Chief Executive Officer, and I are most proud of our teams’ accomplishments. We look forward to celebrating more impactful work with you in the years to come!

Peter Liu, MD
Chief Scientific Officer and VP Research
University of Ottawa Heart Institute

Our patients inspire us to innovate, and together, we can prevent and treat heart disease more effectively.

INVESTIGATOR OF THE YEAR

*This annual award recognizes
outstanding research achievements
by a UOHI investigator.*



INVESTIGATOR OF THE YEAR



Heather Tulloch, PhD

Clinical Psychologist, Clinician Scientist & Director,
Cardiovascular Health Psychology & Behavioural
Medicine Laboratory, UOHI

Associate Professor
Department of Medicine, uOttawa




Dr. Heather Tulloch is recognized for her outstanding research achievements, including peer reviewed funding and publications and mentorship. Her innovative research program is focused on the development of psychological interventions to improve mental health and cardiovascular outcomes for patients.

Dr. Tulloch was also recognized with the Canadian Association of Cardiovascular Rehabilitation and Prevention's Terry Kavanagh and uOttawa Faculty of Medicine's PhD Scientist Awards.

TRAINEE OF THE YEAR

This annual award recognizes exceptional achievements by a cardiovascular research trainee in the Ottawa region.

A close-up photograph of a laboratory setting. A pipette with a white tip is positioned over a microplate, dispensing a small amount of blue liquid into one of the wells. The microplate contains several other wells, some with blue caps. The background is softly blurred, showing more of the lab equipment. The entire image has a semi-transparent purple and blue overlay.

TRAINEE OF THE YEAR



Richard Jung

MD-PhD Candidate
uOttawa, UOHI

*(Dr. Jung has defended his PhD dissertation since
being selected for this award.)*



Dr. Richard Jung is recognized for his exceptional productivity in research and outstanding leadership in the community. His doctoral dissertation, under the tutelage of Benjamin Hibbert, MD, PhD, is focused on translational research and meta-research through clinical outcomes studies.

GLOBAL ACHIEVEMENT AWARD

This annual award recognizes a UOHI researcher who has exerted significant global leadership in their sphere of work.

GLOBAL ACHIEVEMENT AWARD



**David Messika-Zeitoun,
MD, PhD**

Director, Centre for Valvular Heart Disease,
UOHI

Professor, Department of Medicine, uOttawa



Dr. David Messika-Zeitoun is recognized for the global impact of his contributions to the field of valvular heart disease. He is also the Associate Editor of the prestigious European Heart Journal, a globally leading cardiovascular science publication.

**DR. ROBERT ROBERTS
AWARDS FOR RESEARCH
EXCELLENCE**

This annual award recognizes peer reviewed publications led by UOHI investigators that have a high impact within cardiovascular science and medicine.



DR. ROBERT ROBERTS AWARD FOR RESEARCH EXCELLENCE



The high impact study by Dr. Mireille Ouimet et al, published in Circulation Research, shows that vascular smooth muscle-derived and macrophage foam cells perform cholesterol efflux by distinct mechanisms, and that autophagy flux is highly impaired in vascular smooth muscle foam cells but can be induced by pharmacological means. These findings demonstrate that targeting autophagy in vascular smooth muscle foam cells is key to more effectively treat heart disease.



Mireille Ouimet, PhD

Scientist & Director, Cardiovascular Metabolism & Cell Biology Laboratory, UOHI

Canada Research Chair (Tier 2) in Cardiovascular Metabolism & Cell Biology

Associate Professor
Department of Biochemistry, Microbiology & Immunology, uOttawa

DR. ROBERT ROBERTS AWARD FOR RESEARCH EXCELLENCE



The high impact study by Drs. Emilio Alarcón and Suuronen, published in ACS Nano, demonstrates that a spray-on nanotherapeutic is highly effective, and simpler in application compared to other regenerative approaches for treating an infarcted heart.



Emilio Alarcón, PhD

Scientist & Director, Bio-nanomaterials
Chemistry and Engineering Laboratory, UOHI

Associate Professor, Department Cellular &
Molecular Medicine, uOttawa



Erik Suuronen, PhD

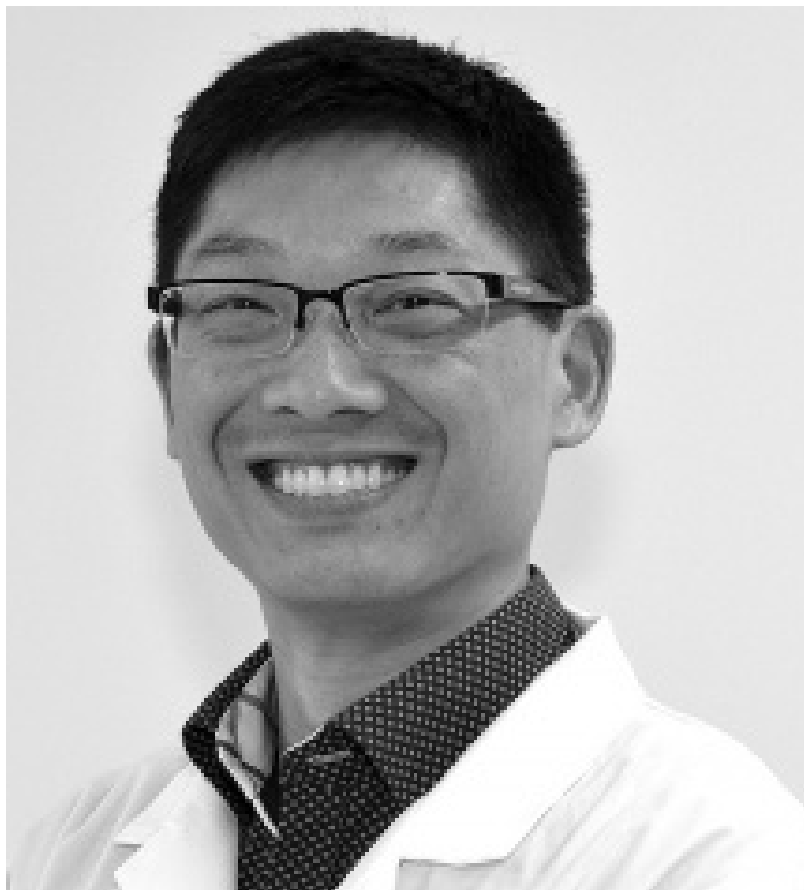
Scientist & Director, Cardiovascular Tissue
Engineering Laboratory, UOHI

Professor, Department Cellular & Molecular
Medicine, uOttawa

DR. ROBERT ROBERTS AWARD FOR RESEARCH EXCELLENCE



The high impact study by Dr. Benjamin Chow et al, published in Circulation: Cardiovascular Imaging, shows that subendocardial and transmural attenuation on coronary computed tomography (CT) predicts major adverse cardiovascular events 30 days after elective non-cardiac surgery.



Benjamin Chow, MD

Clinician Investigator, UOHI

Professor, Department of Medicine, uOttawa

DR. FRANS LEENEN
TRAINEE AWARDS
FOR PUBLICATION
EXCELLENCE

This annual award recognizes UOHI trainees' significant contributions to high impact, peer reviewed publications.

DR. FRANS LEENEN TRAINEE AWARD FOR PUBLICATION EXCELLENCE



The study by Nadya Morrow et al, published in Arteriosclerosis, Thrombosis, and Vascular Biology, shows that nobiletin, a dietary flavonoid, targets the intestine to counter the effects of a high-fat, high-cholesterol diet in an experimental model. These results support the anti-atherogenic effects of nobiletin treatment.



DR. FRANS LEENEN TRAINEE AWARD FOR PUBLICATION EXCELLENCE



The DOREMI trial by Drs. Rebecca Mathew and Pietro Di Santo et al, published in the New England Journal of Medicine, demonstrates that for patients with cardiogenic shock, inotropic therapy of dobutamine or milrinone results in comparable patient outcomes. Selection can therefore be based on physician comfort, cost, and response to therapy. These findings will help design future studies to improve outcomes in this high-risk patient population and inform physicians caring for these patients.



Rebecca Mathew, MD

Former Cardiology Resident, UOHI
(Dr. Mathew is currently a Staff Cardiologist and
Critical Care Medicine Specialist at UOHI.)



Pietro Di Santo, MD

Former Cardiology Resident, UOHI
(Dr. Di Santo is currently a Critical Care and
Interventional Cardiology Fellow at UOHI.)



ORACLE HIGHLIGHTS

The ORACLE strategy pilot funding supports new, innovative projects. This pilot funding helps UOHI researchers and their teams generate novel preliminary data to be successful in national competitions. Included here is some exemplary success from 2022. With thanks to the donors to the UOHI Foundation who helped springboard these research projects to benefit patients.



Kyoung-Han Kim, PhD and team are studying how SGLT2 inhibitor, a new class of blood sugar lowering drug, promotes ketone body synthesis in the liver when used to treat heart failure in presence of absence of Type 2 diabetes.

Dr. Kim was awarded a **Diabetes Canada “End Diabetes 100 Award”** and the prestigious **Canadian Cardiovascular Society/Heart and Stroke Richard Lewar Centre of Excellence/BI-Lilly Cardiometabolic Research Award** to expand his pilot study.



Wenbin Liang, MD, PhD and team are studying the novel mechanisms of how T-type calcium channel regulates the pacemaker function of the sinoatrial node in the heart.

Dr. Liang was awarded a **Heart and Stroke Foundation of Canada Grant-in-Aid** to expand his pilot work. Findings will inform novel therapies and prevention strategies for patients with sinoatrial node dysfunction.



Louise Sun, MD and team are studying the impact of physician and patient gender, sex and other socio-demographic determinants on operating room teamwork and patient outcomes after cardiac surgery.

Dr. Sun was awarded a **CIHR Project Grant** to expand this work. Findings will inform teamwork interventions to improve surgical success and the quality of teamwork in the cardiac operating room.

(Dr. Sun is currently Chief, Division of Cardiothoracic Anesthesiology, Stanford University School of Medicine.)



GRANTS & AWARDS HIGHLIGHTS

UOHI researchers, from Principal Investigators to Trainees, are awarded national peer reviewed funding in support of their excellent research. Some highlights from 2022.



Erin Mulvihill, PhD and team are investigating the roles, intersection and contributions of diabetes and dyslipidemia to increased cardiovascular disease risk. The objective is to evaluate how the enzymatic and non-enzymatic functions of a protein known as dipeptidyl peptidase 4, or DPP4, contribute to dyslipidemia and cardiovascular function in patients with diabetes. Findings from Dr. Mulvihill's research program will inform new strategies for dyslipidemia treatment and improve patient stratification for high-risk cardiovascular outcomes.

Dr. Mulvihill was awarded a prestigious **Heart and Stroke Foundation of Canada New Investigator Award** in support of her excellent research program.



Girish Nair, MBSS and team are conducting a multicenter, randomized controlled trial (AWARE-2) to evaluate a new, patient-specific, catheter-based radio frequency ablation strategy in preventing atrial fibrillation recurrence. It is expected that this precision approach will reduce atrial fibrillation recurrence and improve quality of life for patients.

Dr. Nair was awarded a **CIHR Project Grant** in support of his innovative work.



GRANTS & AWARDS HIGHLIGHTS (cont.)

UOHI researchers, from Principal Investigators to Trainees, are awarded national peer reviewed funding in support of their excellent research. Some highlights from 2022.



Tahir Kafil, MD, is completing a fellowship in Advanced Heart Failure and Cardiac Transplantation.

Dr. Kafil was awarded a **US Myocarditis Foundation Fellowship** in support of his excellent research project. The study is focused on COVID-related inflammatory heart disease. The goal is to develop prediction tools that can identify patients at risk for this condition.



Karen Bouchard, PhD, is completing her postdoctoral training in Cardiovascular Health Psychology.

Dr. Bouchard was awarded a **SSHRC Insight Development Grant** in support of her research excellence. This project is focused on couples' relationship quality and family functioning in patients with premature acute coronary syndrome. Findings will provide targeted information for educational resources to enhance support for families experiencing premature acute coronary syndrome.



COVID-19 GRANTS

UOHI investigators are recognized with peer reviewed funding for their COVID-19 related research.

See also Grants and Awards Highlights.



Peter Liu, MD and team are assessing the health impact of COVID-19 on the risk and resilience in special communities of Chinese, South Asians and Blacks.

Dr. Liu was awarded a **CIHR Wider Health Impacts of COVID-19 Grant** in support of this important and excellent project. The goal is to develop effective intervention strategies with these affected communities to improve outcomes.



Louise Sun, MD and team developed the CardiOttawa Length of Stay and Waitlist Scores to prioritize patients needing cardiac surgery. These decision support tools are evidence-based and founded on high-quality, population data and already implemented at the UOHI with a high degree of clinical success.

Dr. Sun was awarded a **CIHR Wider Health Impacts of COVID-19 Grant** to systematically implement the CardiOttawa throughout Ontario and Alberta and evaluate its clinical impact. It is anticipated that the CardiOttawa will augment physicians' ability to safely clear the surgical backlog and more efficiently allocate health system resources.

(Dr. Sun is currently Chief, Division of Cardiothoracic Anesthesiology, Stanford University School of Medicine.)



SELECT NATIONAL COLLABORATIONS

Collaborations with our partners across Canada enhance the collective research effort. Included here are select examples of national collaborations in 2022.



The Brain-Heart Research Integrative Innovation Team Endeavour (BHRITE) is a national collaboration spanning cutting-edge multidisciplinary teams of researchers from the **UOHI**, the **University of Ottawa Brain-Mind Institute** (uOBMRI), **McGill University**, **Sunnybrook Research Institute** and the **University of Alberta** and **People with Lived Experience**. BHRITE's ambitious research agenda is transforming our understanding of the critical connection between brain and heart chronic conditions. Its paradigm-shifting framework will deliver novel brain-heart disease predictive and diagnostic tools and treatments that will improve care for both vascular cognitive impairment and heart failure. This world-leading team is co-led by **Ruth Slack, PhD** (uOBMRI) and **Peter Liu, MD** (UOHI) and recognized with the prestigious **Brain-Heart Connection IMPACT Award** funded by the Heart and Stroke Foundation of Canada and Brain Canada.





SELECT NATIONAL COLLABORATIONS (cont.)

Collaborations with our partners across Canada enhance the collective research effort. Included here are select examples of national collaborations in 2022.



Emilio Alarcón, PhD is leading the **INterdisciplinary Training in BIOMedical TECHnologies Program (INTBIOTECH)** in collaboration with researchers at the **UOHI**, the **University of Ottawa**, the **Ottawa Hospital Research Institute**, **Université de Montréal**, **École de technologie supérieure** and private sector partners.

Funded by an **NSERC Collaborative Research and Training Experience (CREATE) grant**, INTBIOTECH embraces Equity, Diversity and Inclusion practices and is setting new standards for attracting and supporting high-caliber trainees from non-standard pathways and backgrounds. Participants in the program gain skills in state-of-the-art academic laboratories, GMP facilities and leading-edge companies. Using cutting-edge pedagogy, INTBIOTECH delivers training in biomaterials innovation and translation that ranges from data visualization and project management to mindfulness and professional skills.



Jodi Edwards, PhD is leading the **STROKE and COGnition Training Platform (STROKECOG)**, **ranked #1** in the competition. Developed in partnership with the **Canadian Stroke Consortium** and the **Canadian Partnership for Stroke Recovery**, the platform is a national collaboration with co-leads from **UOHI**, the **University of Calgary**, **Université Laval**, the **University of Manitoba**, the **UBC**, and the **Sunnybrook Research Institute/University of Toronto**.

Funded by the **CIHR Clinical Trials Fund Training Platforms** initiative, STROKECOG is redefining how stroke clinical trials expertise is developed in Canada. It embeds Equity, Diversity and Inclusion approaches in training a new generation of more diverse stroke clinical trial leaders. Its innovative approaches move training beyond a few major centres where advances are accessible and generalizable to only a fraction of Canadians impacted by stroke, and reach out across the country to smaller centres and populations with the highest risk and the most severe deficits. The platform provides the training needed to conduct inclusive complex trials in diverse populations across a wider range of care settings to maximize benefits for all Canadians.





SELECT REGIONAL ACCOLADES

We value our collaborations with regional partners in all research activities. Included here are select examples of regional collaborative projects in 2022.

Faculty of Medicine Translational Research Grants

This initiative leverages the tremendous strengths in basic and clinical sciences in the Faculty of Medicine and the affiliated research institutes. The program provides seed funds to test new, innovative research ideas to support future external grant success. The goal is to ensure excellent integration of research teams in the basic and clinical sciences. The UOHI is pleased to be a funding partner on this initiative.

Katey Rayner, PhD (Department of Biochemistry, Microbiology & Immunology/UOHI), **Rob Beanlands, MD** (Department of Medicine/UOHI) & **Vicente Corrales Medina, MD** (Department of Medicine/OHRI)
Targeting vascular INflammation in patients with Community-Acquired Pneumonia: TIN-CAP

Benjamin Rotstein, PhD (Department of Biochemistry, Microbiology & Immunology/UOHI) & **Terry Ruddy, MD** (Department of Medicine/UOHI)
Fluorine-18 Annexin PET Imaging of Apoptosis to Detect Advanced Atherosclerosis

Faculty of Medicine Path to Patenting and Pre-Commercialization Grant

This initiative helps top-flight researchers translate their breakthroughs to benefit the wider world. The UOHI is pleased to join the initiative to support this critical translation of research findings into real-world tools.

Erin Mulvihill, PhD
New materials for rapid DPP4-cleavage Resistant Therapies for Metabolic Disease and Atherosclerosis

Study on “The histone H3.1 variant regulates TONSOKU-mediated DNA repair during replication”

Published in **Science**

In this collaboration, **Emilio Alarcón, PhD**; **Marcelo Muñoz, PhD, Postdoctoral Fellow**; **Alex Ross, PhD Candidate**; and **Benjamin Rotstein, PhD** (UOHI) partnered with **Jean-François Couture, PhD and team** at uOttawa and **Yale University researchers** to explore the role of histone H3.1 during DNA replication. The UOHI team synthesized peptides (via the Advanced Peptide Synthesis Facility) to test the effects of amino acid residue mutations on interactions between H3.1 and the TPR domain of the DNA repair protein TSK/TONSL. The study team discovered that TSK/TONSL maintains genome stability during replication, by interacting with the H3.1 variant, and this interaction regulates DNA repair protein activity – likely conserved from flowering plants to mammals. This high impact study reveals a common strategy in multicellular eukaryotes for regulating DNA repair.



If you want to know more about **research at the Heart Institute**



ottawaheart.ca/researchers



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