



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

2020

RESEARCH - A YEAR IN REVIEW

UNIVERSITY OF OTTAWA HEART INSTITUTE

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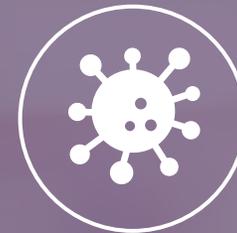
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MESSAGE FROM DR. PETER LIU

2020 is a year that all of us will remember. It started out with unprecedented challenges, but our research teams also worked hard and ended up with great successes! The COVID-19 pandemic threw us a curveball and our research community rose to the challenge—whether it was rapidly responding to changing science and health directives, or modifying how we do research, or pivoting to undertake rapid COVID-19 research, or using the time to publish impactful research articles.

Indeed, in 2020, there was a record number of research publications from our Institute! And what high quality publications! For the first time, our Institute awarded three Dr. Robert Roberts Awards for publications that demonstrate research excellence and impact on cardiovascular medicine.

We also had stellar success in peer reviewed grant competitions. Despite lockdowns, family responsibilities, or mental stresses, our research teams scored wins in very tough competitions. This includes grants from CIHR and NSERC, including large scale clinical trials, successes in COVID-19 rapid funding competitions, and the acquisition of federal/provincial infrastructure funding for the creation of the Preclinical Imaging Core for the Ottawa Region.

We also began the implementation of the Ottawa Region for Advanced Cardiovascular Research Excellence (ORACLE version 2.5) plan, in conjunction with our Heart Institute strategy “Further Together”. We are working towards advancing our capacity and leadership in research to catalyze Precision Medicine. With our regional partners, we are driving disruptive initiatives such as the Brain-Heart connection. With our affiliated partners at the University of Ottawa, we are working towards advancing and enabling innovation right here in Ottawa, creating impact.

Our inspiration comes from the patients we serve today and tomorrow. To that effect, our clinical care Heart Teams work closely with our Innovation Hubs to address the problems that matter to patients. These range from valvular diseases, arrhythmias, and heart failure, to issues that matter on a day-to-day basis for the patient: quality of life, disability, and mental stress.

Dr. Thierry Mesana, our President & Chief Executive Officer, and I could not be prouder of the stellar work of our research teams! We look forward to more exciting research findings and translation of these discoveries and knowledge to benefit all in the years to come.

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



*Our inspiration comes from
the patients we serve today
and tomorrow.*

INVESTIGATOR OF THE YEAR

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

The background of the right side of the slide is a blurred image. It features a hand holding a gold coin, with the coin's surface reflecting light. Below the hand, there is a medical chart with a red ECG line. The overall color palette is warm, with reds, oranges, and yellows.

INVESTIGATOR OF THE YEAR



Jodi Edwards, PhD

Scientist & Director, Brain and Heart
Nexus Research Program, UOHI

Investigator, Bruyère Research Institute

Assistant Professor, School of Epidemiology
and Public Health, uOttawa



Dr. Jodi Edwards is recognized for her stellar success in securing peer reviewed funding (project & infrastructure grants) and publishing original research papers. Dr. Edwards' research is focused on developing innovative tools to predict risks for co-occurring heart and brain conditions.

Dr. Edwards is also recognized as the uOttawa Faculty of Medicine's Early Career Researcher of the Year – Public Health and Epidemiology.

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



Jason Zelt

MD-PhD Candidate
uOttawa, UOHI

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



Jason Zelt is recognized for his research achievements as a trainee. During his PhD studies, Dr. Zelt has developed a “calculator” to predict risk for pulmonary arterial hypertension, published a prolific number of peer reviewed papers and held leadership roles in the scientific/medical community. These accomplishments position Dr. Zelt in the top tier of the next generation of research leaders.

**GLOBAL
ACHIEVEMENT
AWARD**

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

GLOBAL ACHIEVEMENT AWARD



Peter Liu, MD

Chief Scientific Officer
VP Research, UOHI

Professor
Department of Medicine, uOttawa



Dr. Peter Liu is recognized for the global impact of his work on how COVID-19 affects the heart. He is leading a CIHR/IDRC-funded trial testing whether adding ACE inhibitors to COVID-19 treatment would improve outcomes for high-risk patients. His expertise has been widely sought out for collaborations as well as for commentary in scientific journals and the mainstream media. Dr. Liu's work has made, and will continue to make, a significant global impact in the research, medical and patient community in the face of the ongoing COVID-19 pandemic.

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 “CAMRA Cardioliink-2” trial, led by Dr. Vincent Chan and published in Circulation, will have a great impact for patients requiring mitral valve repair. The study dispels misconceptions regarding the leaflet resection method and ascertains that either surgical approach of leaflet resection or preservation will yield similar outcomes for patients.



Vincent Chan, MD

Cardiac Surgeon, UOHI

Associate Professor
Department of Surgery, uOttawa

DR. ROBERT ROBERTS AWARD FOR RESEARCH EXCELLENCE



The “SAFARI STEMI” trial, led by Dr. Michel Le May and published in the Journal of the American Medical Association (JAMA) - Cardiology, settles the debate of radial vs. femoral access for primary Percutaneous Coronary Intervention (PCI). The study confirms that either approach is safe and efficacious and yields similar outcomes for STEMI patients.



Michel Le May, MD

Director, Regional STEMI Program;
Interventional Cardiologist, UOHI
Professor, Department of Medicine,
uOttawa

DR. ROBERT ROBERTS AWARD FOR RESEARCH EXCELLENCE



The “RIPK1” study, led by Dr. Katey Rayner and published in Nature Metabolism, uncovers new evidence showing RIPK1 is a genetic risk factor for obesity. The study shows that reducing the RIPK1 level may be a new drug target for obesity and related diseases.

Dr. Rayner was also recognized as the uOttawa Faculty of Medicine’s Researcher of the Year – Biomedical.



Katey Rayner, PhD

Scientist & Director, Cardiometabolic
microRNA Laboratory, UOHI

Associate Professor, Department of
Biochemistry, Microbiology &
Immunology, uOttawa

DR. FRANS LEENEN
PUBLICATION EXCELLENCE AWARD

A stack of several books is shown from a top-down perspective, slightly angled. The pages are white and the spines are visible. The entire image is overlaid with a semi-transparent purple color. The text is positioned in the upper right quadrant of the image.

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

DR. FRANS LEENEN PUBLICATION EXCELLENCE AWARD



The study by My-Anh Nguyen et al, published in ACS Nano, demonstrated that microRNAs carried by nanoparticles can be efficiently delivered to macrophages to control cholesterol trafficking.

This work points to the potential of these microRNA nanoparticles as a new class of drugs to treat atherosclerotic plaques.



My-Anh Nguyen

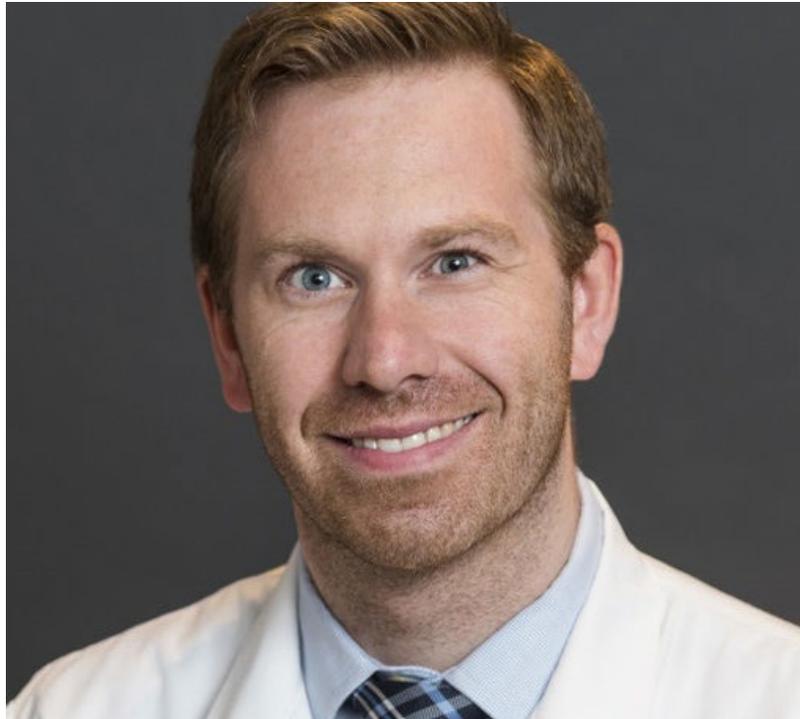
PhD Candidate

Dr. Nguyen has completed her PhD dissertation (with Dr. Katey Rayner) since the publication of this study, and is currently a Postdoctoral Fellow (Mulvihill lab).

DR. FRANS LEENEN PUBLICATION EXCELLENCE AWARD



The study by Dr. Jeffrey Marbach et al, published in the Annals of Internal Medicine, showed that focused cardiac ultrasonography has greater sensitivity (but not specificity), and therefore may help rule out cardiovascular pathology in some patients, but may not be sufficient for definitive confirmation of the presence of heart disease.



Jeffrey Marbach, MD

Interventional Cardiology Fellow

Dr. Marbach is currently a Critical Care Fellow at Tufts Medical Centre (US).



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 are two successes from 2020. With thanks to the donors to the UOHI Foundation who helped springboard these research projects to benefit patients.



Pablo Nery, MD and team are conducting a study looking at a new, innovative ablation strategy to treat atrial fibrillation.

Dr. Nery was awarded a **CIHR Project Grant** (\$942,426) to expand his work into a large-scale randomized controlled trial from an ORACLE pilot study. This new treatment strategy involves, in addition to the current standard of care (pulmonary vein isolation), ablation of scarred tissue in the atria. Dr. Nery's innovative work will directly impact care for patients with atrial fibrillation.



Munir Boodhwani, MD and team are investigating whether preventive surgery or monitoring is the best approach for patients with enlarged ascending aorta (aneurysm).

Dr. Boodhwani was awarded a **CIHR Project Grant** (\$1,797,750) to expand his work into a large-scale randomized controlled trial from an 'ORACLE pilot study'. Dr. Boodhwani's trial will provide crucial data to guide care for patients with aortic aneurysm.



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 2020.



Kyoung-Han Kim, PhD and team are studying a rare heart disease, left ventricular non-compaction cardiomyopathy which can afflict both children and adults. The heart muscle in patients with this condition is sponge-like, unlike healthy heart muscle which is smooth and firm. Dr. Kim is investigating how the interplay of two novel genes, *Irx3* and *Irx4*, contribute to the development of this rare condition.

Dr. Kim was awarded a **CIHR Project Grant** in support of the study; his grant application was *ranked #1* in committee



Amy Johnston is completing her PhD study, focused on assessing the long-term risks to heart health in women who experience high blood pressure during pregnancy. In her project, Ms. Johnston analyzes information collected in large-scale health databases from across Ontario over the past 30 years. Her analysis accounts for several factors, including gender-related characteristics, that may affect a woman's risks for heart disease. This work is addressing a large knowledge gap in women's heart health.

Ms. Johnston was awarded a **Canada Graduate Scholarship – CIHR Doctoral Award** and an **Ontario Women's Health Scholar Award** in support of her research.



COVID-19 GRANTS

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

See also the Global Achievement Award



Emilio Alarcón, PhD developed an innovative system for rapid decontamination of N95 masks. This system combined UV light and temperature that enabled disinfection of several N95 masks in cycles of less than 30 minutes. This innovative project directly addressed the pressing need for Personal Protective Equipment in the COVID-19 pandemic.

Dr. Alarcón was awarded an **NSERC Alliance COVID Grant** in support of his project.



Derek So, MD is evaluating a novel, point-of-care COVID-19 test (in partnership with Spartan Biosciences, an Ottawa-based biotechnology company). The test is being evaluated across a spectrum of patient groups as well as frontline healthcare workers. The goal is to design strategies on ‘who, when and how’ to apply point-of-care testing. Dr. So’s work will help determine the role of point-of-care testing as a tool to improve care and conserve resources.

Dr. So was awarded an **Ontario COVID-19 Rapid Research Fund** in support of the study.



CLINICAL TRIAL KUDOS

The Heart Institute is abustle with clinical trials that generate evidence which will change the face of patient care. Highlighted here are select clinical trial kudos from 2020.

See also the Dr. Robert Roberts Awards

Cryoablation or Drug Therapy for Initial Treatment of Atrial Fibrillation (EARLY-AF Trial)

Published in the **New England Journal of Medicine**

EARLY-AF trial is the first study to show that in patients with atrial fibrillation, cryo-balloon ablation was more effective in preventing recurrence than anti-arrhythmic drugs.

EARLY-AF Coordinating Centre led by the UOHI Cardiovascular Research Methods Centre:
Patricia Théoret-Patrick, Project Manager
My-Linh Tran, Database Manager
Li Chen, Biostatistician
George A. Wells, PhD

EARLY-AF UOHI Site Team:
Andrés Klein, MD

Lead Principal Investigator:
Jason Andrade, MD, Vancouver General Hospital/UBC

Risk Factors for Infections Involving Cardiac Implanted Electronic Devices

Published in the **Journal of the American College of Cardiology**

The largest trial of its kind, this study developed the first-ever ‘calculator’ to predict the risk of implantable electronic device infection.

Known as the ‘PADIT’ (Prevention of Arrhythmia Device Infection Trial) calculator, it is ready for clinical adoption and available on the UOHI’s website.

Lead Principal Investigator:
David Birnie, MD

Site teams include centres in Ontario, Québec, Nova Scotia, Saskatchewan, BC and the Netherlands.



SELECTED REGIONAL ACCOLADES

We value our collaborations with regional partners in all research activities. Included here are select examples of collaborative projects in 2020.

Regenerative Medicine

Darryl Davis, MD (UOHI), **Duncan Stewart, MD**, **David Courtman, PhD** (Ottawa Hospital Research Institute), and **Michel Godin, PhD** (uOttawa Department of Physics), are collaborating to develop new ways to encapsulate cells for delivery to target tissue in cell-based therapies. These novel encapsulation techniques improve cell viability and therapeutic repair of injured tissue. This work addresses a broad range of therapies, from cardiac injury repair to treatment for pulmonary arterial hypertension and chronic lung disease in pre-term births. The research team is collaborating with Northern Therapeutics, a Canadian biotechnology company, on the project.

The team, led by Dr. Michel Godin, was awarded a **CIHR Collaborative Health Research Grant (NSERC-partnered)** in support of their work.

Behavioural & Prevention Research

Jennifer Reed, PhD (UOHI) and **Jennifer Brunet, PhD** (uOttawa Faculty of Health Sciences), *et al* conducted a study examining whether motivation predicts change in physical activity levels in nurses' populations. The study found that a web-based worksite intervention that incorporates self-monitoring and activity challenges can be effective in increasing nurses' physical activity levels.

This randomized controlled trial was published in the **Journal of Medical Internet Research**.

Heart-Brain Linkage

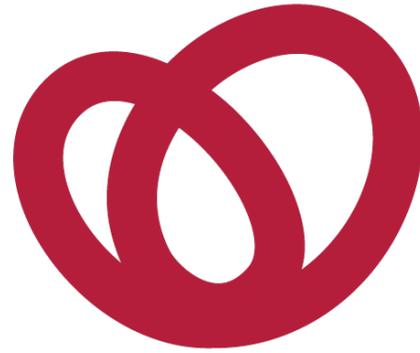
Stuart Fogel, PhD (uOttawa Faculty of Social Sciences/Institute of Mental Health Research at The Royal), is exploring the novel linkage between heart rate and sleepiness. This work uses state-of-the-art driving simulation technology with integrated monitoring (to measure heart rate variability) and vigilance testing. The goal is to inform a robust system that can detect the earliest warning signs of sleepiness to alert drivers to avoid potentially dangerous levels of fatigue.

Dr. Fogel was awarded an **Ontario Centre for Innovation's** Autonomous Vehicle Innovation Network **Pilot Grant** in support of the project.

Infrastructure

Robert deKemp, PhD (UOHI), **Adam Shuhendler, PhD** (uOttawa Faculty of Sciences/UOHI), and **Benjamin Rotstein, PhD** (uOttawa Faculty of Medicine/UOHI), are co-leading an effort to transform basic discoveries into imaging tools, using state-of-the-art PET/CT, for a range of clinical applications. These applications range from disease prediction, (e.g., identifying those at risk for a heart attack before it occurs), to monitoring response to therapy, (e.g., regression of tumour in cancer).

The team was awarded a **CFI John R. Evans Leaders Fund** to acquire a dual modality PET/CT scanner in support of this effort. The PET/CT will be housed at the UOHI and managed as part of the **Preclinical Imaging Core of the Ottawa Region**.



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



ottawaheart.ca/researchers



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