



Department of Medicine  
Annual Report 2018-2020

**RESEARCH**



# Reports: Research Institutes

POPULATION HEALTH  
RESEARCH INSTITUTE



Photo taken pre-COVID



**Population Health  
Research Institute**  
1999 - 2019

## PHRI: Transformative global health research

As a world leader in high-impact, large clinical trials and population studies, entering its third decade of operations, PHRI continues to strengthen local, national and international collaborations and broaden the scope of research including in arrhythmia and heart failure, brain health and stroke, cancer survivorship, CVD prevention, diabetes and GI, global and population health, infectious diseases, ACS and interventional cardiology, perioperative and surgery, renal, thrombosis and more.

## Successful global collaboration

In November 2019, PHRI celebrated its 20th anniversary by hosting more than 200 researchers from 24 countries on six continents at The Future of Global Health symposium in Hamilton. Topics over two days ranged from Oxford's Sir Richard Peto reviewing the first half-century in population health, to new directions including advanced data analytics and technology discussed by Robert Califf of Google Health. This event was a tribute to past and present collaborations, and gave momentum to ideas and strategies for new international efforts.

## Advanced program in translational research to identify new mechanisms that cause heart attacks, strokes, heart failure and kidney disease

The Biomarker Discovery Partnership Program was initiated in November 2019 with substantial funds from Bayer, grants from CIHR and investments from Hamilton Health Sciences Research Institute. Led by Drs. Guillaume Paré, Director of the Genetic and Molecular Epidemiology Laboratory (CRLB-GMEL), and Salim Yusuf, Executive Director of PHRI, the program aims to identify novel blood biomarkers to predict coronary artery disease, stroke, heart failure, kidney diseases and diabetes, and link them to genetic markers using sophisticated analysis conducted in the lab. Detailed clinical information is integrated with investigations including proteomics (>1,000 proteins per sample), high-throughput genotyping and DNA sequencing, epigenetics and metabolomics. Using advanced analytic and bioinformatics tools including Mendelian randomization and artificial intelligence, this large effort is expected to identify new mechanisms for the causation of various diseases.

## First study to demonstrate the importance of blood thinners in preventing future death and complications in high-risk people after surgery

Management of myocardial injury after noncardiac surgery (MANAGE), an RCT conducted in 19 countries, showed that the blood thinner, dabigatran, reduced deaths, heart attacks, strokes and other vascular complications in patients who suffered MINS. Dr. P.J. Devereaux presented the findings at the European Society of Cardiology (ESC) Congress in Munich, Germany August 2018, the world's largest meeting on cardiovascular disease, and published in *The Lancet* in 2018.



Dr. Shamir Mehta

## Heart attack treatment breakthrough

COMPLETE is the first large RCT to definitively show a reduction in death and myocardial infarction by opening all narrowings in coronary arteries with angioplasty, rather than just the blocked artery that caused a heart attack. The results were presented by Dr. Shamir Mehta at ESC Congress in September 2019 in Paris, France and published in *The New England Journal of Medicine* (2019) and named that year's *NEJM* Notable (original research) Article.

On the heels of this landmark trial, COMPLETE TIMING and OCT sub-studies were presented at two other major conferences: the timing of staged non-culprit revascularization (at Transcatheter Cardiovascular Therapeutics meeting in late 2019, published in *Journal of American College of Cardiology*); and non-culprit lesion plaque morphology by optical coherence tomography (at American Heart Association meeting in 2019, *Circulation CV Intervention* in 2020).



Janette Panhuis

## Best of teams – at the worst of times

When the pandemic struck, herculean obstacles faced PHRI's Chief Operating Officer, Janette Panhuis. Janette and the heads of the operations departments and study teams pivoted quickly to ensure that all research programs ran successfully using virtual communications and meetings, upgrading infrastructure, security, remote capacity and more. It meant that PHRI's global studies continued without major disruptions.

Near the start of the pandemic, three new initiatives were launched – the ACT trials evaluating treatments for COVID-19 (Dr. John Eikelboom, Sumathy Rangarajan and others), a large sub-study of 40,000 people in PURE to understand the factors contributing to the development of COVID-19 in the community from 13 countries (Dr. Darryl Leong), and innovative trials in virtual care for post-surgery patients using remote automated monitoring technology, PVC-RAM (Dr. P.J. Devereaux) at nine sites across Canada.

## Global diet insights, and disparities in gender and LMIC health outcomes

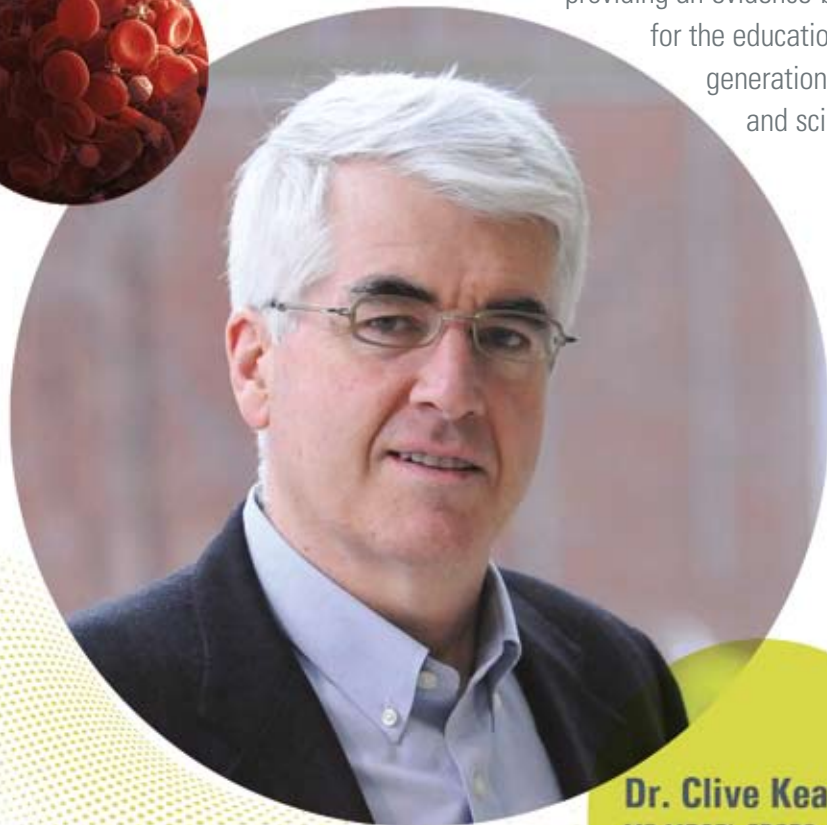
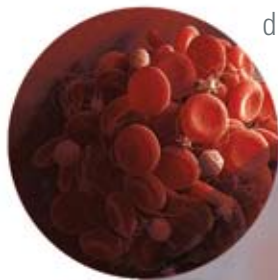
New information on healthy diets emerged from the Prospective Urban Rural Epidemiology (PURE) study encompassing about 160,000 participants in 21 countries. In a diverse multinational cohort, dairy consumption was associated with lower risk of mortality and major cardiovascular disease events (*Lancet*, 2018) and higher nut intake was associated with lower mortality risk from both cardiovascular and non-cardiovascular causes in low-, middle-, and high-income countries (*Am J Clinical Nutrition*, 2020). PURE found consistently better outcomes in women than in men among people with and without cardiovascular disease and, for both genders, larger gaps were observed in disease management and worse outcomes in poorer countries than in richer countries (*Lancet*, 2020).

## RESEARCH INSTITUTES

### THROMBOSIS & ATHEROSCLEROSIS RESEARCH INSTITUTE (TAARI)

The Thrombosis & Atherosclerosis Research Institute (TaARI), located at the state-of-the-art research facility at the David Braley Research Building (DBRB) at the Hamilton General Hospital campus, has continued to maintain excellence in education and research over the past two academic years under the leadership of Dr. Jeffrey Weitz, Executive Director. The DBRB is shared with the Population Health Research Institute with the goal of creating synergies between basic and clinical research, thereby enabling a seamless “bench to bedside and back again” approach to complex healthcare problems. Our laboratories have enabled new collaborations that extend to all hospital sites as well as national and international research collaborations.

TaARI remains focused on its mission to reduce death and disability from thrombotic diseases by conducting research into the pathogenesis, prevention, diagnosis and treatment of thrombosis and vascular disease and by providing an evidence-based platform for the education of the next generation of clinicians and scientists.

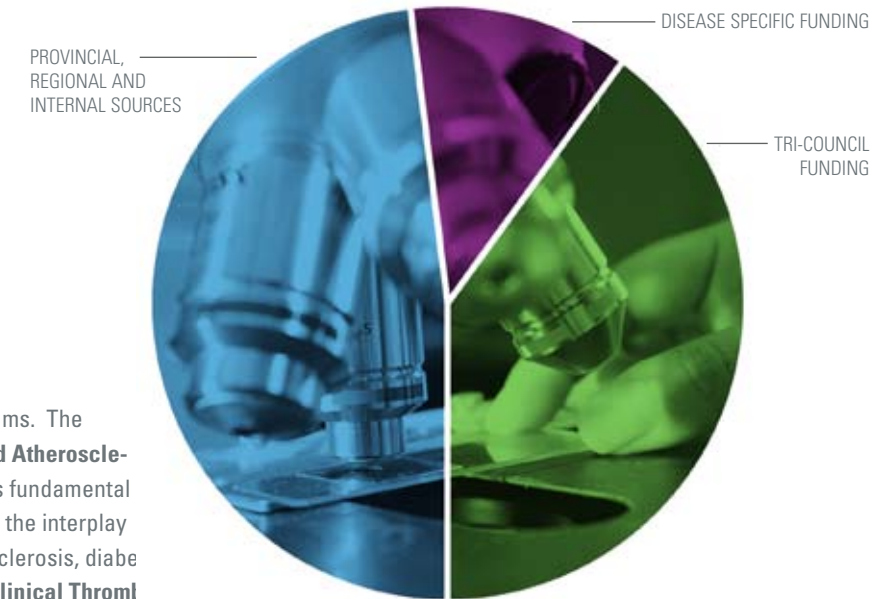


**Dr. Clive Kearon**  
MB, MRCPI, FRCPC, PhD

#### Transitions

Dr. Clive Kearon, a Professor in the Department of Medicine and Director of the Clinician Investigator Program died after a courageous battle with cancer. Dr. Kearon will be remembered for the impact he has had on the lives of many and for his deep commitment to research, teaching and clinical care. Work is ongoing to establish a thrombosis fellowship and professorship in his name.

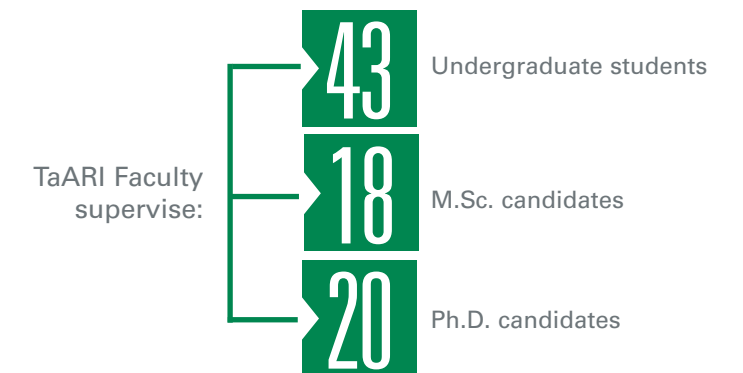
#### RESEARCH FUNDING \$12M



TaARI has two research streams. The **Experimental Thrombosis and Atherosclerosis (ETA) Program** conducts fundamental and translational research on the interplay between thrombosis, atherosclerosis, diabetes and inflammation, while the **Clinical Thrombosis Research Program (CTP)** performs research that informs optimal prevention, diagnosis and treatment of patients with thrombotic disorders, as well as research in health outcomes and knowledge translation aimed at optimal transfer of this information to the bedside. The clinical program, which is regional in nature and includes all Hamilton Health Sciences (HHS) sites as well as St. Joseph's Healthcare, also provides clinical care to patients in the hospital and in the community who have or are at risk for thrombotic disorders.

TaARI faculty significantly contribute to the Department of Medicine's educational mission and provide a rich learning environment for trainees. Learners span the spectrum from undergraduate thesis students to M.Sc. and Ph.D. candidates and on to Postdoctoral Fellows. In 2019-20, TaARI faculty supervised 43 undergraduate students, 18 M.Sc. candidates, and 20 Ph.D. candidates and Postdoctoral Fellows. Therefore, TaARI remains the major off campus hub for undergraduate and postgraduate learning at McMaster University.

Continued funding from HHS provided support for research infrastructure, thereby enabling excellent research productivity and fostering a superb learning environment. Over the past two fiscal years, TaARI raised \$12 million in research funding. Of these funds, 40% were derived from Tri-council funding and 12% from disease specific funding agencies. The remainder of the funding came from provincial, regional, and internal sources. Of the TaARI faculty, 8 hold Endowed Chairs and the expendable interest from these chairs contributes 20% of the research funding.



## RESEARCH INSTITUTES

### FIRESTONE INSTITUTE FOR RESPIRATORY HEALTH

In 2019, the Firestone Institute for Respiratory Health (FIRH) celebrated its 40th anniversary as a world-renowned centre for the investigation and treatment of respiratory diseases. More than 100 guests gathered to celebrate the past achievements of the institute and listen to a vision for its future. FIRH scientists and clinicians continue to contribute to ground-breaking respiratory research with global impact. FIRH provides comprehensive in-patient and out-patient respiratory care as the regional respiratory centre for the City of Hamilton and the Hamilton Niagara Haldimand Brant Local Health Integrated Network. FIRH has a unique Chest Program that encompasses the spectrum of respiratory medicine together with affiliated head-and-neck and thoracic surgery services; all are located on one site. Clinical, research and educational activities are integrated and collaborative within FIRH. The intent is to provide exemplary clinical care, in tandem with basic and translational research inquiry, while educating and mentoring healthcare professionals to treat, research, teach, and lead. The strength of FIRH continues to be its focus on improving patient outcomes.

#### Highlight for this year - FIRH Respiratory Rehabilitation Day Program (RRDP)

##### Accomplishments:

The RRDP program has had to make a number of changes over the past few years, initially due to the loss of funding for inpatient beds, and more recently to adapt to the new world of a respiratory pandemic. The program has weathered both of these storms through guidance and expertise from Dr. Stewart Pugsley as well as the new leadership of Dr. Natya Raghavan and the recruitment of Dr. Joshua Wald and Dr. Terence Ho.

Currently the program continues to provide exemplary multidisciplinary care to complex chronic lung disease patients. We recently received a grant to help launch virtual respiratory rehabilitation both in our existing program as well as to expand our program to patients post exacerbation of COPD. Dr. Ho has received an early career award recognizing and supporting his work with rehabilitation as well as with the COPD care path. Dr. Wald sits on the CTS COPD steering committee and has collaborated on five timely guidelines to guide optimal care during COVID.

# 40

40th anniversary as a world-renowned centre for the investigation and treatment of respiratory diseases

Dr. Kjetil Ask,  
Pleural Space Clinic



Dr. Jeremy Hirota  
Photo taken pre-COVID

What makes McMaster University and FIRH the perfect environment to conduct research?

The support for multidisciplinary care is the cornerstone of rehab. Our collaborations with the School of Rehabilitative Sciences, FIRH basic scientists, Psychology, PT, RT, OT, SW and Geriatrics help us provide outstanding clinical care while always striving to validate our interventions and advance the knowledge base in Respiratory Rehabilitation. Working in the Division of Respirology at McMaster also allows us to work in conjunction with our world-renowned colleagues across all respirology subspecialties who refer patients with complex chronic disease to our program.

#### Future directions

The advent of virtual rehabilitation in the post pandemic world will allow us to expand our reach to more complex and frail patients. This will provide unique opportunities and challenges to determine how to provide safe and effective virtual rehabilitation. We are also excited to work with Dr. Ciaran Scallan who is setting up a satellite lung transplant centre locally. We will expand our rehabilitation program to support this endeavor. We are also exploring collaborations with Physiatry to address the complex rehabilitative needs of post COVID 19 patients.

“We are also exploring collaborations with **Physiatry** to address the complex rehabilitation needs of **post-COVID 19 patients.**”



DR. STEWART PUGSLEY



DR. NATYA RAGHAVAN



DR. JOSHUA WALD



DR. TERENCE HO

## RESEARCH INSTITUTES

### AllerGen NCE INC.

#### Helping Canadians living with allergies and asthma

One in three Canadians lives with allergic disease; nearly three million Canadians suffer from asthma; and 50% of the nation's households are directly or indirectly affected by food allergy.

In 2004, the Allergy, Genes and Environment Network (AllerGen) was established at McMaster University to unite Canada's allergic and respiratory disease communities with the goal of improving the lives of Canadians living with asthma, allergies, anaphylaxis and related immune diseases.

Led by Dr. Judah Denburg (William J. Walsh Chair in Medicine, Professor of Medicine), AllerGen received the full 14 years of federal Networks of Centres of Excellence (NCE) funding, as well as an additional two years of support to mobilize knowledge and commercialize research results.

Dr. Judah Denburg

"While AllerGen concludes its term as NCE in March 2021, this Network has provided novel and enduring discovery capacity and translational clinical, policy and commercial legacies for Canada with global impact," says Dr. Denburg. "AllerGen has invested over \$51M in 220 research projects; trained 1,763 Highly Qualified Personnel (HQP) students and trainees; partnered with 651 organizations across sectors to leverage \$128.6M; generated 6,730 scientific publications; and had our Network's research featured in major national and international media over 4,000 times."

#### Legacy Initiatives

Through its strategic research investments, AllerGen catalyzed three ongoing, self-sustaining Legacy Initiatives that benefit those living with – or caring for people affected by – allergy, asthma and related immune diseases.

- The **CHILD Cohort Study (CHILD)**, with four recruitment sites across Canada and an administrative core at McMaster, is a general population birth cohort study of nearly 3,500 Canadian children and their families being followed from pre-birth through childhood and beyond. CHILD has "already made important discoveries about the long-term health impacts of early childhood exposures, including breastfeeding, nutrition and foods, microbiome, maternal stress, and air pollution," says Dr. Denburg.
- The **Clinical Investigator Collaborative (CIC)**, operating at eight universities across Canada and one abroad, and led by investigators at McMaster, is a Phase II clinical trials group that evaluates potential drug candidates for the treatment of allergic and severe asthma. Since 2005, the CIC has undertaken 29 clinical trials and attracted nearly \$28 million in R&D investment to Canada, according to Dr. Denburg. "Developing new drugs is an extremely expensive business for pharmaceutical and biotechnology companies. The CIC is expert at predicting if a potential new asthma drug will work."
- The **National Food Allergy Strategic Team (NFAST)**, a transdisciplinary food allergy consortium, studies the biology of food allergy/anaphylaxis and translates that knowledge into clinical and public health practice. NFAST research teams, which include McMaster allergists, have conducted



Canada's first studies on food allergy and anaphylaxis prevalence, management, and economic burden, and have contributed to food labelling reforms, developed evidence-based guidelines for the management of food allergies in schools, and produced new findings on the genetic basis of peanut allergy.

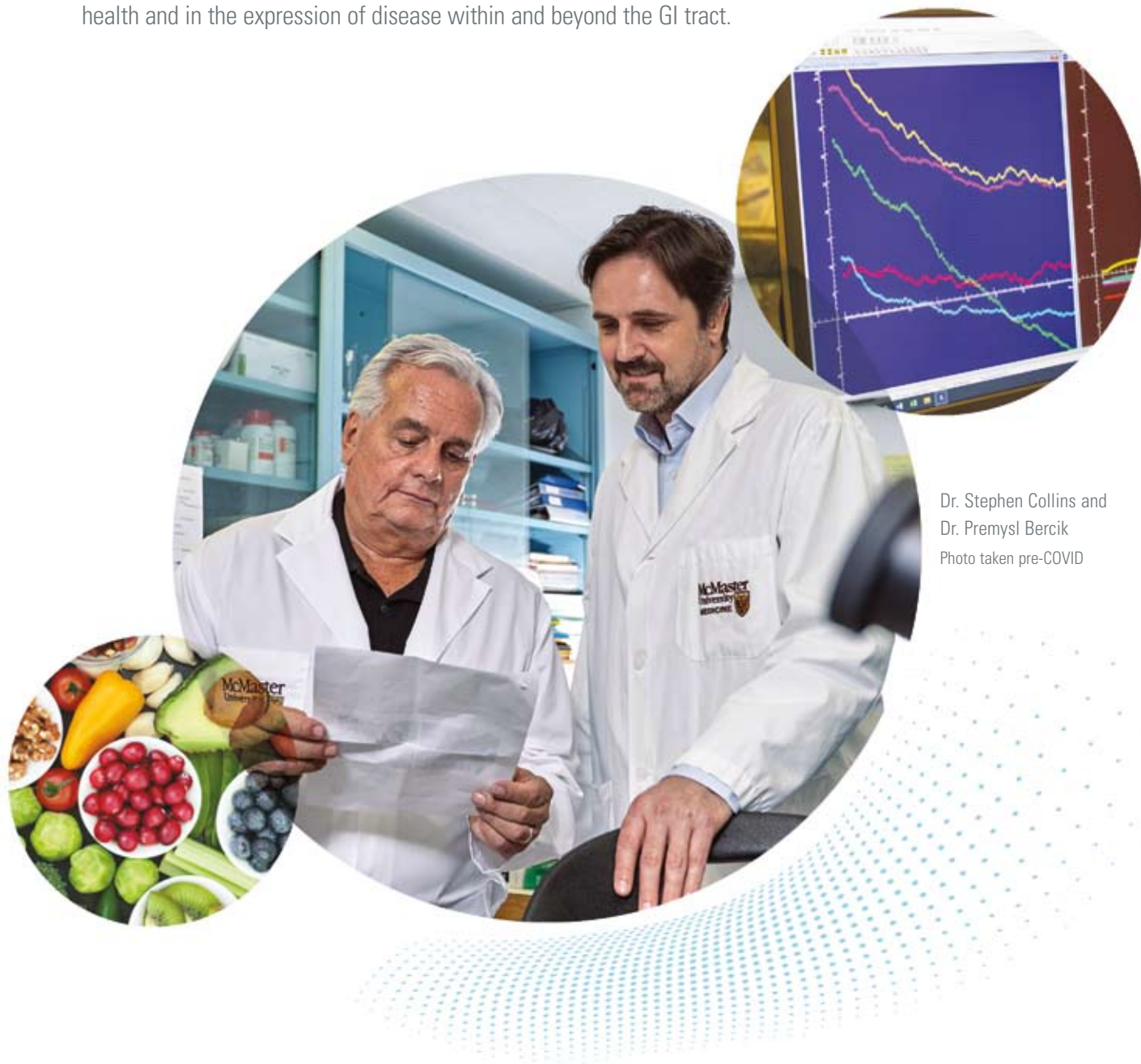
"Over the past 16 years, AllerGen has united the country's top allergy/asthma researchers and provided added-value funding for research, knowledge mobilization, trainee development, networking and partnerships," adds Dr. Denburg. "Together with our researchers, trainees, partners, advisory committees, and host institution McMaster University, we have truly transformed the landscape of allergic and respiratory disease in Canada and beyond for decades to come."

Read AllerGen's Outcomes & Impacts Report (2004-2021) at <https://impacts.allergen.ca/>

## RESEARCH INSTITUTES

### FARNCOMBE FAMILY DIGESTIVE HEALTH RESEARCH INSTITUTE

The Institute was founded in 2008 and has 20 full-time faculty members including active clinicians and PhD scientists. Dr. Stephen Collins is the Director and Dr. Elena Verdu is its Associate Director. Its research encompasses the bench-bedside spectrum with emphasis on translational research. An important component of its mission is to investigate and exploit the role of the intestinal microbiota in the maintenance of health and in the expression of disease within and beyond the GI tract.



Dr. Stephen Collins and  
Dr. Premysl Bercik  
Photo taken pre-COVID

The Institute includes two important research facilities: The McMaster Genomic and Metagenomic Sequencing Facility and The Axenic-Gnotobiotic Mouse (AGU) Facility. Each facility is utilized by researchers within and beyond McMaster University. The AGU facility was the first of its kind in Canada in the molecular era. These facilities enable studies on host-microbiota interactions under carefully controlled environmental conditions, and culture-dependent and -independent molecular profiling of microbes. In addition, we are developing a bacteriophage library that will assist in manipulating the microbiota for investigative and possible therapeutic gain.

Currently, the institute has 7 endowed chairs, two of which are rotating “junior chairs” that are held for 6 years by promising young investigators, providing them sufficient time to secure external salary support. In addition, Farncombe members hold one Tier I and one Tier II Canada Research Chairs.

Between 2019-20 Institute members collectively held a total of \$43,128,527 in external peer reviewed funds of which \$18.5M are CIHR team grants (2) or CIHR SPOR grant (1). The remaining \$24.6M are from CIHR, NIH, NSERC, Crohns Colitis Canada, Genome Canada and the W Garfield Weston Foundation as well as from the private sector (Nestle, Biocodex, Gilead).

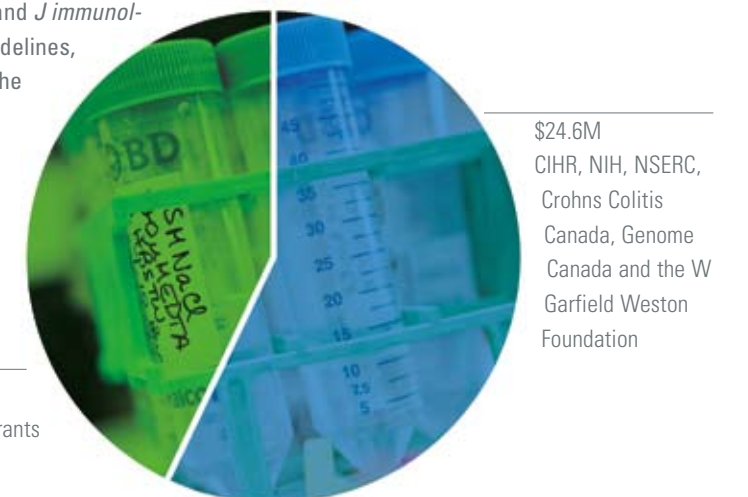
The Institute has a very strong educational program and provides limited funding towards the training of graduate and post-doctoral students. During the 2019-20 period, Institute members supervised 28 PhD and 23 MSc students, 17 post-doctoral fellows and 2 clinical fellows – a total of 70 trainees. In addition, Institute members supervised 13 undergraduate students.

Between 2019-20, Institute members have published 192 papers listed on Pub Med and these include publications in high impact journals that include *Nature Communications*, *Science Translational Medicine*, *Nature Microbiology*, *Gastroenterology*, *Nature Reviews Gastroenterology* and *J Immunology*. The published work ranges from meta-analyses and guidelines, clinical trials to basic mechanistic or translational studies. The latter include understanding factors that influence microbial colonisation of the gut at birth, microbial exposure in utero, bacteriophage-bacterial interactions, host-microbial interactions in the contexts of Irritable Bowel Syndrome, Inflammatory Bowel Diseases and Celiac Disease. Work on the microbiota-brain axis has identified a probiotic bacterium

that improves depression in humans and ongoing work examines the role of the microbiota in the expression of generalised anxiety disorders and major depressive disorders. Work on motility focuses on developmental aspects and the role of the microbiota, understanding colonic motility in the context of severe constipation.

An increasingly dominant theme of the Institute’s work is the relationship between ingested nutrient, the microbiota and the host. For example, our studies have demonstrated how the proteolytic activity of duodenal bacteria determine whether or not we digest wheat (gluten) in a harmful immunogenic manner, thus explaining the rising prevalence of gluten sensitivity that occurs not only in the context of coeliac disease but other disorders including Irritable Bowel Syndrome and IBD. Work also examines the role of bacteria in determining responses to fermentable carbohydrate in the diet, and the role of food additives in promoting intestinal inflammation. Based on these findings, we propose to develop a new basic science and clinical initiative that integrates nutrition science with gastroenterological research and practice in the coming year.

#### PEER REVIEWED FUNDS



\$18.5M  
CIHR team grants

\$24.6M  
CIHR, NIH, NSERC,  
Crohns Colitis  
Canada, Genome  
Canada and the W  
Garfield Weston  
Foundation

## CHANCHLANI RESEARCH CENTRE



*Jaya and Vasu Chanchlani provided foundation funding for the Chanchlani Research Centre.*

The Chanchlani Research Centre (CRC) was established in 2011 after a generous donation was made by Vasu and Jaya Chanchlani to McMaster University. The Chanchlani Research Centre pursues research studies seeking to add to the collective knowledge in the areas of genetics, genomics, and environmental risk factors for chronic diseases across the life course, with special emphasis on high risk groups including ethnically-diverse populations, those of low socioeconomic status and women.

### The objectives of the CRC are:

- 1) To provide a stimulating environment to create new research collaborations which culminate in acquiring peer review grants, industry funding and private/corporate funding;
- 2) To provide core faculty with infrastructure to acquire and analyze their data, and,
- 3) To promote mentoring and training of students at all levels including undergraduate, graduate, and post-doctoral fellows.

**Faculty Members who participate in centre research include:** Dr. Sonia Anand (Director, Departments of Medicine and Health Research Methods, Evidence, & Impact), Dr. Joseph Beyene (Department of Health Research Methods, Evidence, & Impact), Dr. Russell de Souza (Department of Health Research Methods, Evidence, & Impact), Dr. Guillaume Paré (Department of Pathology), Dr. Zena Samaan (Department of Psychiatry), Dr. Jennifer Stearns (microbiome), Dr. Gita Wahi (Pediatrics)

**Featured Projects:** The transdisciplinary group of researchers brought together in the Chanchlani Research Centre are involved in a wide array of innovative initiatives from investigating the social determinants of health to genomics.

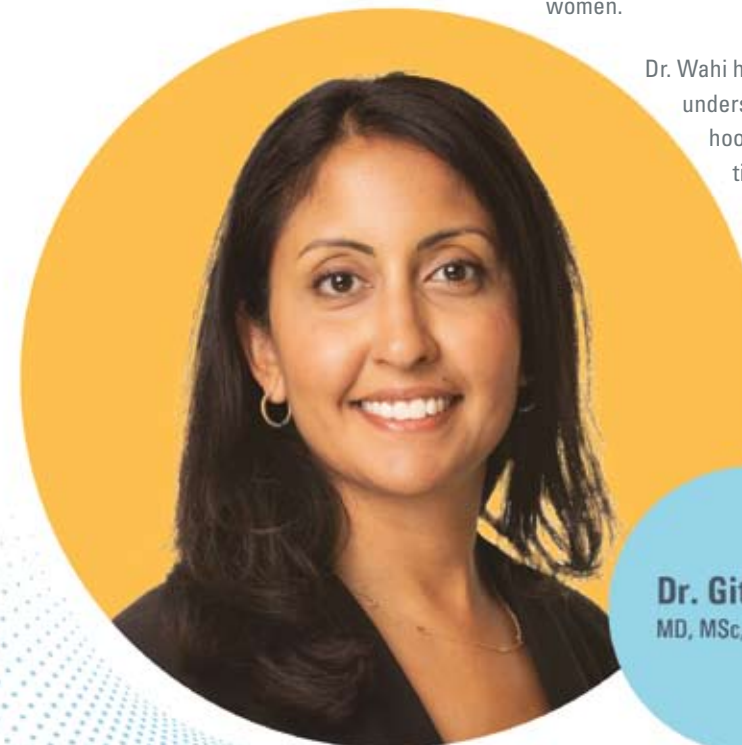
### Featured Researcher: Gita Wahi

Dr. Gita Wahi is an Associate Professor of Pediatrics and is in her final year of completing her PhD in Health Research Methodology under the supervision of Dr. Anand. Dr. Wahi is lead co-PI the Indigenous Birth Cohort (formerly ABC) and in partnership with the Birthing Centre on the Six Nations reserve aims to identify the causes which lead to an increased risk of obesity among Indigenous infants in their first three years of life. In partnership with the Six Nations of the Grand River Birthing Centre, the team works with community members to learn about the traditional knowledge, beliefs, and priorities towards the health of children and their families.

An award-winning video about this work can be seen at: <https://youtu.be/EYvfqcGKAiw>  
Dr. Wahi has been awarded a NEIHR CIHR development grant to work with Indigenous mid-wives to understand how to optimize and promote the care they deliver to Indigenous pregnant women.

Dr. Wahi has recently published a systematic review to better understand the effectiveness of programs aimed at childhood obesity prevention among Indigenous communities.

An impact report was recently published, highlighting the work of the research centre.



**Dr. Gita Wahi**  
MD, MSc, FRCPC

CHANCHLANI GLOBAL HEALTH RESEARCH AWARDS

February 10, 2020

Eighth Annual Chanchlani Global Health Research Award Recipient:  
Dr. Jonathan Patz



Past Recipients include:

February 4, 2019

Seventh Annual Chanchlani Global Health Research Award Recipient:  
Dr. Camara Phyllis Jones



February 12, 2018

Sixth Annual Chanchlani Global Health Research Award Recipient:  
Dr. Dariush Mozaffarian



February 6, 2017

Fifth Annual Chanchlani Global Health Research Award Recipient:  
Dr. John Ioannidis



February 24, 2014

Second Annual Chanchlani Global Health Research Award Recipient: Dr. Hans Rosling



February 29, 2016

Fourth Annual Chanchlani Global Health Research Award Recipient:  
Vikram Patel



November 27, 2012

First Annual Chanchlani Global Health Research Award Recipients:  
Dr. Madhukar & Dr. Nikika Pant Pai



February 25, 2015

Third Annual Chanchlani Global Health Research Award Recipient:  
Professor Dr. Ab Osterhaus

GERIATRIC EDUCATION AND RESEARCH IN AGING SCIENCES (GERAS) CENTRE

GERAS Centre for Aging Research

The aging population is the biggest challenge facing our healthcare system today. In Canada we expect that 25% of our population will be over the age of 65 by 2041, almost doubling the population from 2016. To ensure the sustainability of our healthcare system during this profound demographic shift, we need to examine innovative solutions and models of care that meet the needs of older Canadians. During the COVID-19 pandemic, this work has never been more critical. GERAS is leading the way in practical innovations, new models of care and clinical interventions and tools for seniors who are at “at-risk”, their caregivers and healthcare professionals.

The GERAS Centre for Aging Research has grown to become a CIHR recognized Research Center of Excellence. The research at the GERAS Centre is inspired by seniors and is working alongside the largest network of geriatricians and specialized geriatric teams in our region. We lead in research and innovation in the Geriatric 5Ms: mind, mobility, medications, multi-complexity building on a framework of what matters most for older adults.

Our projects and programs focus on individual components of the Geriatric 5Ms and are the biggest challenges facing our seniors and our healthcare system today: frailty, dementia, falls and fractures, and empowering patients. Our research can make a difference to seniors every day in meaningful ways.

L-R: Courtney Kennedy, Charles Juravinski, George Ioannidis Photo taken pre-COVID



Dr. Alexandra Papaioannou

GERAS Virtual Frailty Rehabilitation at Home during COVID-19

The McMaster COVID-19 Research Fund, the Juravinski Research Institute (JRI), and donors, generously funded the GERAS Virtual Frailty Rehabilitation at Home study. Built on the CIHR-funded Frailty Rehabilitation trial, Dr. Papaioannou and colleagues have pivoted to meet the needs of frail older adults during the COVID-19 pandemic. The decrease in physical, cognitive and social stimulation can accelerate functional decline, increase the risk for negative events such as depression and injurious falls/fractures that may result in hospital admission. The study is examining the benefits of frailty rehabilitation delivered virtually. Given the uncertain timeframe for returning to in-person non-urgent rehabilitation, our long-term objectives are the seamless implementation of a new model for multimodal frailty rehabilitation that closes the care gap in rehabilitation for frail seniors in the immediate and foreseeable future.



## Detecting Frailty in Routine Clinical Practice: The Senior-Friendly Fit-Frailty App

Comprehensive assessment of frailty is a timely and often difficult process, which has been further complicated during COVID-19. The GERAS Fit-Frailty App, which has been funded by the GERAS Centre for Aging Research, the Centre for Aging and Brain Health Innovation, the Hamilton Health Sciences Foundation, and the Chair in Aging, is an innovative technology solution that could have wide applicability within clinical and research settings.

The GERAS Fit-Frailty App is an interactive tool that helps determine interventions to prevent and manage frailty in older adults. Dr. Courtney Kennedy and co-authors (Drs. Ioannidis, Papaioannou, Adachi and Rockwood) and Dr. Sarah Park (geriatrics resident) are examining the reliability/validity and testing the usability of this tool with patients and healthcare professionals. The tool will be launched internationally, on the App store, and available for download on phones and iPads. The standard version includes a cognitive screen and guided assessments for upper and lower extremity function (with instructional videos). A completely self-reported version is also being examined for phone and virtual assessment.



Courtney Kennedy

Sarah Park

Pauline Fisher (left)  
Photo taken pre-COVID

## GERAS DANCE to reduce falls in older adults

Falls are the leading cause of injury among older Canadians. Every 13 seconds an older adult is treated in the emergency department because of a fall. The good news is that falls are preventable, and new research shows dance may reduce fall-risk.

“Dance is a mind-body activity of purposeful rhythmic and coordinated movement to music, and older adults who walk slower with less rhythm and coordination are at increased falls-risk” says Dr. Patricia Hewston, an occupational therapist and inaugural recipient Labarge Postdoctoral Fellowship in Mobility in Aging, funded by McMaster’s past chancellor Ms. Suzanne Labarge.



Patricia Hewston  
Photo taken pre-COVID

**430** Older adults dancing for good health with GERAS DANCE

Dr. Hewston’s post-doctoral research explored if dance improves walking patterns in older adults. Older adults participated in the GERAS DANCing for Cognition and Exercise (DANCE) program at the YMCA (2x weekly, 1-hour classes). Walking patterns were measured using a ProtoKinetics Zeno Walkway at the beginning and end of the study. After 12-weeks of GERAS DANCE older adults walked faster with improved rhythm and coordination indicative of reduced fall-risk. The GERAS DANCE program of research currently has 28 certified GERAS DANCE instructors with 430+ older adults dancing for good health.

## Preventing fractures in home care residents: The Fracture Risk Scale Home Care (FRS-HC)

Dr. Caitlin McArthur, a postdoctoral fellow with the GERAS Centre, led work about fracture risk for vulnerable older adults receiving home care. Fractures cause devastating consequences for older adults including pain, disability, and death. It is essential to identify who is at high risk for fracture to put preventive strategies in place to decrease the risk of fracture. Dr. McArthur led development and validation of the Fracture Risk Scale for Home Care (FRS-HC) which predicts how likely someone is to break a hip in the next year. The FRS-HC can also predict how likely someone is to experience other major osteoporotic fractures (i.e., wrist, spine, humerus, and pelvis) within the next year and has been validated across four Canadian provinces. The FRS-HC is derived from routinely collected comprehensive home care assessments, is specific to the home care population, and does not require any additional documentation or testing (e.g., bone mineral density tests). The tool helps identify who is at high risk so that strategies like nutrition, exercise, and medication can be put in place to prevent the fracture from happening. This work has been published in the Journal of the American Medical Director’s Association and BMC Musculoskeletal Disorders.



Caitlin McArthur

# Reports: Endowed Chairs and Professorships

## ABBVIE CHAIR IN EDUCATION IN RHEUMATOLOGY

Dr. Alfred Cividino



Dr. Alfred Cividino's focus for the chair position continues to be the expansion of awareness and education about rheumatic diseases to physicians, residents, and students.

The chair continues to participate in undergraduate and postgraduate teaching.

Educational activity in the Division of Rheumatology has been recognized by The Arthritis Society with a grant from the rheumatic disease unit's annual competition.

In continuing the commitment to education in rheumatology, Dr. Cividino co-chaired the fifth 'Annual Clinical Day in Rheumatology'. The virtual event was very well received and attended by nearly 500 family physicians and allied health professionals. Funds raised at the virtual event will help support ongoing research activity in the Division of Rheumatology.

Nationally, the chair's efforts in our "Become a hero, become a rheumatologist" campaign continues to attract great interest with many students and residents seeking clinical opportunities in rheumatology. Training programs across the country have many excellent candidates applying for training in rheumatology. At McMaster, we have increased training to three residents per year. We continue to attract the finest candidates.

Our division has added Dr. Tselios and Dr. Garner with expertise in Lupus and Vasculitis, respectively. Additional recruitment is underway for Education and Quality Improvement roles. ■

Endowed Chairs  
or Professorships



## ACTAVIS CHAIR IN RHEUMATOLOGY FOR BETTER BONE HEALTH

Dr. Jonathan D. Adachi



The scope of our rheumatology scholarship and research continues to grow and thrive in an effort to meet the need to enhance care for our patients, increase training opportunities for our undergraduate, graduate and medical trainees, and improve our understanding of disease processes. Our key goals have always focused on building research capacity, fostering existing collaborations, and expanding our research network. In building research capacity, we have significantly increased the quantity and quality of our research training programs which include trainees at the undergraduate, undergraduate medical, resident, and fellowship levels. We have increased both the depth and breadth of our rheumatologic research through linkages with colleagues in respirology, geriatrics, nephrology, and pediatrics at the local, national and international levels. Through these collaborations and training programs we have increased and improved our knowledge about the effects of aging and frailty on various rheumatological conditions, the use of apps and other technology in caring for patients and assessing health, and understanding the true impact of rheumatologic disease on activities of daily living and physical functioning. Our research has contributed to our improved understanding of the effects of aging on rheumatic diseases. We have explored new areas of research and quality improvement to ultimately have positive impacts on our patients affected by rheumatologic conditions. Over the past years, we have improved care for our patients, improved and increased our ability to train experts in the field, and have produced high-quality research that has been recognized nationally and internationally.

With the increasing size of the aging population, rheumatologic diseases associated with aging continue to be a major stress on individuals, our society and healthcare systems. None of these diseases are curable, yet we know that chronic

conditions like osteoporosis, rheumatoid arthritis, lupus, osteoarthritis, and scleroderma significantly negatively impact quality of life and the abilities of people to perform activities of daily living. The loss of bone mass, muscle mass and strength can lead to a cascade of negative health consequences. Our research focuses on the development and improvement of methods to detect and assess changes in outcomes at a basic science and clinical level. In turn, this improves our understanding, recognition and diagnosis of rheumatologic diseases and associated conditions such as frailty, which enable us to measure the impact of treatments or other interventions with potential to interrupt these processes. Using valid and rigorous research methodology, we have the ability to improve our understanding of disease and effectively evaluate the influence of potentially disease-modifying interventions. This research has significant and widespread relevance at a national and international level.

Over the next year, we will focus on sustaining all the progress we have made in terms of research education and training, conducting research studies, building research capacity, submitting research grants, and increasing our collaborations nationally and internationally. We will expand our research in education and continue to increase patient involvement and engagement in research. We will collaborate with patient groups and partner with national organizations to build on our reputation in research and education with patients and caregivers. We will increase our capacity for Quality Improvement work and submit operating and catalyst grants that build on our current research. We will continue to collect and analyze data from projects currently underway with a goal towards increasing knowledge translation in terms of presentations at meetings and publications. ■

### AMGEN CANADA CHAIR IN NEPHROLOGY

Dr. Richard C. Austin



Dr. Austin currently holds the Amgen Canada Chair in Nephrology which supports biomedical research aimed at better understanding the underlying cellular mechanisms that drive cardiorenal disease. Although it is well established that patients with chronic kidney disease are at high risk of developing heart disease, the underlying mechanisms are relatively unknown. The overall goal of Dr. Austin's research program is to elucidate the underlying cellular stress pathways that contribute to cardiorenal disease, including vascular calcification. This has led to the discovery of several novel cellular factors that influence the development of vascular calcification, the underlying cause of heart disease in patients with impaired kidney function.

Some of the major discoveries in Dr. Austin's laboratory include:

- (i) defining the role of endoplasmic reticulum (ER) stress in cardiorenal disease,
- (ii) demonstrating a causal role of TDAG51 in driving vascular calcification, and
- (iii) identifying novel therapeutic approaches for the treatment of chronic kidney disease and its cardiovascular complications.

The Austin laboratory has recently reported the existence of unique circulating autoantibodies, termed anti-GRP78 autoantibodies, that accelerate the development of atherosclerosis, the underlying cause of heart disease. Studies are now underway to determine whether these autoantibodies contribute to chronic kidney disease. Finally, Dr. Austin has recently reported the novel finding that human variations in the PCSK9 gene modulate kidney function and contribute to heart disease. These important findings may allow for the development of new medicines that are able to treat the development and progression of both chronic kidney disease and cardiovascular disease.

Dr. Austin's role as Research Director is to foster the interaction between biomedical scientists and clinicians/nephrologists in the Divisions of Nephrology and Urology. We have now implemented a translational research program that encompasses a bench to bedside approach. Formal research meetings are now underway to identify important and relevant research areas in nephrology that directly impact patient care and treatment. This will allow both clinician scientists and researchers to develop a dynamic and relevant research program that will tackle the major issues relevant to cardiorenal function and pathology. This combined translational and pre-clinical approach represents a major initiative for the development of novel therapeutic strategies directed against chronic kidney disease and its cardiovascular complications. ■

### ANDREW BRUCE DOUGLAS CHAIR IN NEUROLOGY

Dr. John Turnbull



The Andrew Bruce Douglas Chair in Neurology was established in March 2006 to further the clinical, educational, and research aspects of Amyotrophic Lateral Sclerosis (ALS) at McMaster, and this report is for the year 2018-20. As with all tertiary clinics, the Covid pandemic has impacted our activities. With respect to clinical activity, we remain a premier clinical site in Canada for the treatment of ALS, and follow about 350 patients with motor neuron diseases, which places us among the largest ALS clinics in Canada and indeed, North America. Over the last year (2020), much clinical activity has been by videoconference, which has been helpful in many situations and less satisfactory in others. We remain grateful to Hamilton Health Sciences for their ongoing support of the clinic, which includes respiratory technology, speech and language support, social work, seating and mobility support, equipment loans (with the ALS Society of Ontario), and is ably coordinated by Ms Barbara Miller. Ms Shelley Curry provides the logistic and administrative support. We have close collaborations with Dr Siwar Albashir and Dr Andy Freitag for gastrointestinal and ventilation issues, respectively, and Dr Peter Varey for Physiatry support. With respect to education, medical students, residents, and fellows rotate through the clinic. One undergraduate student has undertaken senior thesis projects this last year, with the research component again impacted by Covid. Dr Daniela Trapsa and Mrs Jane Allan coordinate our clinical research activities. We have 6 clinical trials presently ongoing, ramped up from spring 2020 when nearly all our clinical research was stopped. Locally, we are collaborating with Dr Venina Bello Hass in developing a quality of life scale for ALS patients, with Dr Yingfu Li in developing an unbiased test for ALS, and Dr Matt Miller for viral factors influencing ALS progression. We have identified a significant limitation of placebo-controlled trials which has achieved a measure of international recognition and has resulted in the re-interpretation of one therapeutic for ALS. Our basic research continues as we explore the possibility that ALS terminally involves de-differentiation of motor neurons, which may have therapeutic implications. We have examined the possibility that heat is beneficial in ALS model mice, and it is, and may be due to the induction of heat shock proteins. Unfortunately, in spite of our work here and elsewhere, advances that fundamentally affect ALS (and indeed all neurodegenerative diseases) remain elusive. ■

### ASTRAZENECA CHAIR IN RESPIRATORY EPIDEMIOLOGY

Dr. Malcolm Sears



Dr. Sears has focused his research interests on the developmental origins of asthma and allergy, as Founding Director of the Canadian Healthy Infant Longitudinal Development (CHILD) Study funded by CIHR and the Allergy, Genes and Environment (AllerGen) Network of Centres of Excellence. This large national longitudinal epidemiological study, involving 3,455 families and numerous investigators across Canada, is now internationally renowned for its research findings. He also continued to participate in analyzing and publishing data from his first longitudinal birth cohort study of 1000 children in New Zealand, commenced in 1972-1973, and now analyzing data from assessments at age 45 years.

The CHILD Cohort Study was initiated at McMaster in 2008 as an intensive investigation of factors responsible for development of allergy and asthma, with emphasis on gene-environment interactions. A very broad definition of the environment included not only indoor and outdoor air, but psychosocial environment including maternal stress, infections, and nutrition. This has allowed expansion of the scope of the study to include the early origins of obesity, metabolic diseases including diabetes, cardiovascular disease, and neurodevelopment. A particular focus of the study has been the influence of the gut microbiome on a wide range of childhood health outcomes. Other work identified early introduction of 'allergenic' foods as effective in reducing sensitization to these foods and reducing the risk of the "atopic march" in children. Numerous analyses in the full cohort and in sub-cohorts are now in progress in multiple institutions across Canada, with increasing involvement of international collaborators. These include studies of environmental pollutants, sleep disorders, neurodevelopment, metabolic disorders, nutrition including sophisticated analyses of components of breast milk, and development of Genetic Risk Scores for several diseases. A great strength of the study is having collected data and biological samples from mothers and most fathers, in addition to that collected in serial assessments of the children from birth to the most recent visits at 8-9 years of age.

In 2017, Dr. Sears passed the Director's role on to Associate Professor Padmaja Subbarao, based at The Hospital for Sick Children, but with a cross-appointment at McMaster. He remained heavily involved in the study, chairing the Publications Committee and editing the many publications emerging from this highly productive study until retiring in September 2019. In April 2019, the Canadian Thoracic Society presented Dr Sears with their Research Excellence Award and in November 2019, he was inducted into the McMaster University Faculty of Health Sciences Community of Distinction, in recognition of his lifetime work in understanding asthma and allergy. ■

### AUDREY CAMPBELL CHAIR IN ULCERATIVE COLITIS RESEARCH

Dr. Paul Moayyedi



Established in 2010 via a generous gift from the daughters of the late Audrey Campbell (Linda Campbell, Gaye Farncombe and Susan Grange) via the Crohn's and Colitis Foundation of Canada, the goals of the Audrey Campbell Chair in Ulcerative Colitis Research are to provide leadership in research relevant to improving the health of persons with ulcerative colitis, promote collaborative research across disciplines, and attract outstanding students, research associates and faculty to McMaster University.

Canada has the highest incidence of inflammatory bowel disease (IBD) in the world and it is rising rapidly. It is estimated that almost 1% of Canadians will suffer from IBD in the next 10 years with preteens and adolescents having a particular increase in incidence.

Over the past year, Dr. Moayyedi was the principal applicant on a \$12.5 million CIHR grant to study how gut bacteria as well as how diet might interact to cause ulcerative colitis and Crohn's disease. Another important component of this grant is understanding why patients with these diseases are particularly prone to suffer from anxiety and/or depression. We have attracted a further \$20 million from various sources to conduct this work. We have formed the IMAGINE network, which involves 17 centres across Canada including all major universities and multidisciplinary researchers such as gastroenterologists, paediatricians, epidemiologists, immunologists, microbiologists, psychiatrists and psychologists. This study is being coordinated at McMaster University and the Farncombe Family Digestive Health Research Institute under his leadership. This is a five-year study that promises to find cures for at least a subset of patients with these diseases, as well as ways to better personalize the treatment of Crohn's disease and ulcerative colitis. Currently, we are in year four of the study with over 4,500 participants recruited. The last year has been particularly challenging with COVID-19 slowing recruitment but we are still on target to complete recruitment by the end of the funding period.

We published the first randomized trial in the world that evaluated transplanting healthy stool into patients with ulcerative colitis, which could bring them into remission. This trial was positive with a success rate similar to current therapies. This is proof of concept that changing gut bacteria can improve ulcerative colitis. We now have up to 4-years follow-up on some patients who have remained in remission, on no medication other than fecal transplants with no relapse of their disease. This paper has been cited over 629 times and was among the top 1% cited articles in its field. Our work has been repeated by others and so far three research centres have replicated our findings with similar studies. We still need to understand better why it is successful in some patients and not others so we can improve the effectiveness of this approach - this will be achieved through the IMAGINE network.

## ENDOWED CHAIRS AND PROFESSORSHIPS

Dr. Moayyedi has 429 publications that have been cited over 58,500 times. This places him as the top 10 most cited authors in gastroenterology in the Google Scholar database. He is also on the Clarivate™ Highly Cited Researchers™ list of the top 0.1% of world researchers from the last decade. He published 30 peer-reviewed papers and with a total of 6,122 citations in 2020. He presented virtually at the American College of Gastroenterology meeting in 2020.

Paul Moayyedi is Assistant Dean of Research and is promoting clinical research at McMaster University and across Hamilton. He has attracted the inflammatory bowel disease Cochrane Review Group to Canada and now all systematic reviews published in gastroenterology in the Cochrane Library are supported by the Cochrane Gut Group based at Farncombe Family Digestive Health Research Institute. This supports all gastroenterology guidelines in Canada, as well as many US clinical guidelines that guide doctors on how to best treat patients using evidence-based medicine principles. Dr. Moayyedi was a methodologist on the Canadian guidelines on the management of fistulizing Crohn's disease in adults and a separate guideline for pediatric Crohn's disease both published in 2020. He was also instrumental in the development of the first IBD quality guidelines worldwide and this was also published in 2020. This will improve the care of all IBD patients in Canada. He is the President-Elect of Canadian Association of Gastroenterology and was also Chair of Clinical Practice at the American Gastroenterology Association Institute. He was responsible for organizing the clinical part of Digestive Diseases Week – the main research meeting for gastroenterologists worldwide.

In the coming year we plan to:

1. Continue to develop the IMAGINE network to coordinate research across Canada for new approaches to treating patients with IBD. We will also better understand how to manage anxiety and depression that is associated with these diseases.
2. Improve our understanding of how fecal transplant therapy works in ulcerative colitis.
3. Continue to support Canadian and US guidelines on the management of IBD and other GI diseases.
4. Further develop quality measures that will improve the care of IBD patients across Canada. ■

## BAYER CHAIR FOR CLINICAL EPIDEMIOLOGY RESEARCH IN BLEEDING DISORDERS

Dr. Alfonso Iorio



Established in 2017 via a generous gift from Bayer Inc., the goal of the Bayer Chair for Clinical Epidemiology Research in Bleeding Disorders is to contribute significantly to the body of scholarship in the area of bleeding disorders through research, teaching and clinical work at McMaster. The Bayer Chair is an integral part of the institutional vision towards establishing and maintaining a world-class program in bleeding disorders research.

Over the first three years as inaugural chairholder, Dr. Iorio has published 41 scientific papers, was awarded a CIHR grant and has been leading the following projects:

- 1) Expanding the Web Accessible Population PK service (WAPPS-Hemo) research network to include over 500 centers worldwide and delivering approximately 20,000 individualized PK profiles. The tool is recognized worldwide as the reference standard for providing tailored treatment to hemophilia patients. Its use is recommended by the World Federation of Hemophilia guidelines, and it is adopted and integrated into world leading organizations in the field, like UKHCDO, and ATHN.
- 2) Bringing to McMaster University all the cutting-edge phase III clinical trials in the field of hemophilia, including 4 different gene therapy trials (for we act as Canadian hub, offering enrollment opportunities to patients from all over the country), the novel VWF-decoupled FVIII, bi-specific antibodies, anti-TFPI.
- 3) Re-establishing the prevalence of hemophilia and estimating for the first time the prevalence of hemophilia at birth, with a landmark paper published on Annals of Internal Medicine. The project was based on an innovative epidemiological approach leveraging the Canadian Bleeding Disorders Registry hosted at McMaster.
- 4) Expanding the capacity of the McMaster hemophilia research group with the addition of Dr. Davide Matino, a rising star in the field and directing a wet lab research project in factor VIII tolerance and extravascular role of factor IX. As well, Noella Norhona and Suzanne Bajkor have been hired to triple up the research associates running clinical trial in hemophilia. ■

## ENDOWED CHAIRS AND PROFESSORSHIPS

### BORIS FAMILY CHAIR IN EDUCATION AND INTERNAL MEDICINE

Dr. Akbar Panju



It gives me great pleasure to provide report on the Boris Family Chair in Education and Internal medicine for the 2018-2019 and 2019-2020. This will be my last report since I have completed my tenure as the holder of this chair. As of July 2020, Dr John Neary is the holder of this chair. I have resumed to be the holder of Medard DeGroot Chair, which I held prior to taking on the Boris Family Chair.

At the outset, I would like to extend my thanks and gratitude for being given the opportunity to be the Boris Family Chair for the last 5 years. My major task, when I took the Chair, was to create a state-of-the-art Ambulatory Medical Clinic and I am happy to say that we now have a vibrant and functional academic ambulatory clinic. The clinic provides exemplary clinical care and an exceptional research and learning environment.

The Boris Clinic has an Executive Committee which oversees the functions of the four components of the Clinic. The Diabetes Care and Research Center, headed by Dr Hertz Gerstein, continues to provide secondary and tertiary care for patients with diabetes. The Diabetes team also carry out major research activities. The multi-specialty component of Boris Clinic, headed by Dr Martha Fulford, has multiple physicians from multiple specialties providing secondary and tertiary care. In the last 2 years, we have added more physicians in clinics. We were able to achieve this by creating innovative work models for allied health professional and by creative scheduling. I am happy to say that the clinic now works more efficiently. Our Medical Day Care component, headed by Dr Mark Matsos, has been very busy and able to accommodate a large number of patients requiring intravenous infusions and blood transfusions. Lastly, our General Internal Medicine Rapid Assessment Clinic (GIMRAC) and our Ambulatory Clinical Teaching Unit (A-CTU), headed by Dr Mohamed Panju, have been very busy. We have internal medicine residents from different levels of training and residents from Family Medicine Training Program rotate on a regular basis. The feedback and evaluation we receive from learners has been very positive. I would like to thank Drs Gerstein, Fulford, Matsos, and Panju for their leadership.

Over the last 2 years, I continued to plan and organize Internal Medicine Review Course which attracted more than 1000 attendees. The speakers at the Review Course are all members of the Department of Medicine. This Review Course which occurred over a 3-day period had over 50 topics in Internal Medicine. The feedback we received was very positive. For the present year, we have started the Virtual Review Course.

I would be remiss if I did not mention the impact that the COVID-19 pandemic has had on the clinic. Despite the challenges it posed, we were able

to continue providing care to our patients and keep the clinic functioning. We were not able to provide on-site visits in most areas and had to rely on virtual visits. As part of our visioning for the clinic, we had already started to adopt virtual visits in certain specialties and therefore, we were well prepared for the transition.

Overall, I feel I was able to accomplish the major task given to me when I took on as a holder of the Boris Family Chair in Education and Internal Medicine. It was a great privilege and I thoroughly enjoyed it. I wish my successor, Dr John Neary, all the best. ■

### DAVID BRALEY AND NANCY GORDON CHAIR IN THROMBOEMBOLIC DISEASE

Dr. Jeffrey Ginsberg



Established in 2004 via a generous gift from Mr. David Braley and Mrs. Nancy Gordon, the goal of the David Braley and Nancy Gordon Chair in Thromboembolic Disease is to contribute significantly to the body of scholarship on thromboembolic disease; to mentor and train the next generation of physician scientists in thrombosis research; to develop, implement and evaluate curricular innovations in undergraduate (MD), postgraduate and Continuing Education; and to undertake quality research in thromboembolic disease.

The major foci of my research have evolved over the years. I continue to co-supervise, along with Drs. Eikelboom and Hirsh, the research fellows that have come to McMaster. The fellows include not only local trainees but also trainees from Australia, China, Belgium, Holland, etc.

During 2018-2020, a number of articles were published in peer-reviewed journals. As well, several meetings with trainees have been held to provide focused support on their research. With my upcoming retirement, I would like to congratulate Dr. Jim Douketis, the new Chairholder of this Endowed Chair. I am confident that under his leadership the program will continue to flourish. ■

### DOUGLAS FAMILY CHAIR IN GASTROENTEROLOGY RESEARCH

Dr. Alberto Caminero



Dr. Caminero transferred to the Department of Medicine as an assistant professor in the Fall of 2019. As part of the Farncombe Family Digestive Health Research Institute, Dr. Caminero studies mechanisms by which intestinal microbes participate in food sensitivities and chronic disorders such as inflammatory bowel disease (IBD). It is estimated that one fifth of the population worldwide experience adverse reactions to food and IBD affects around 1.6 million people in the USA and 270,000 in Canada. Although the role of the intestinal microbiota in the pathogenesis of these conditions have been proposed, the mechanisms are not well understood. Specifically, the central aim of Dr. Caminero's research program is to identify diet-microbiota interactions for the treatment or prevention of food sensitivities and IBD. The human gut microbiota implies a vast catalog of metabolic pathways that will participate in the digestion of dietary components, even those that are difficult to digest by human digestive enzymes. Dr. Caminero studies the metabolism of dietary components by intestinal microbiota and the determination of the immune and physiological pathways induced in the host by the products of that metabolism. Indeed, he has shown that human intestinal microbiota modifies the immunogenicity of common dietary antigens *in vivo*, and in this manner may influence risk for food sensitivity and inflammation in genetically predisposed people. His research is supported by the Canadian Institutes for Health Research Foundation (CIHR), Canada Foundation for Innovation (CFI) and a Tri-agency Program award. Dr. Caminero has shown a fruitful publication record with 21 peer-reviewed original publications, 10 reviews, 5 book chapters and 2 editorials, in prestigious journals including *Gastroenterology*, *Nature Communications* and *Nature Gastroenterology & Hepatology*. He is also a member of the Committee of Research Affairs of the Canadian Association of Gastroenterology and actively speaks to both the scientific community and the public about his main research program. Dr. Caminero has been invited to give 4 national and 8 international talks between 2019 and 2021. ■

### ELI LILLY CANADA CHAIR IN OSTEOPOROSIS

Dr. Alexandra Papaioannou



The support of the chair has been vital to build resilience and empower people living with osteoporosis to age with dignity and independence. As a consequence of the COVID-19 pandemic's impact on the social determinants of health for adults living with osteoporosis and fractures, our rapidly aging population, and with more people living with the disease, her work has never been more critical.

Dr. Papaioannou is a national and international leader in osteoporosis research. Her research is informed by real-life environments where she works with patients, families, researchers, policymakers, and industry partners to co-create innovative solutions to improve patient care and quality of life. Her collaborative, user-centric approach bridges the gap between research and clinical practice. She is recognized in the 95th research percentile in the Department of Medicine at McMaster University, has 107 first or senior author peer-reviewed publications, 17 book chapters and 374 research presentations/abstracts.

She has established the largest regional network of geriatricians with meaningful connections to older adults and embedded her research directly in clinical care. She is actively involved in five national training programs that support her osteoporosis and fracture prevention research program: (1) Canadian Institutes of Health Research (CIHR) Drug Safety and Effectiveness across Cross-Disciplinary Training (DSECT), to teach how to effectively bridge scientific domains for drug safety; (2) Natural Science and Research Council Canada (NSERC) sMAP CREATE training program, to foster a world-class, collaborative training environment and provide high qualified personnel with unique experiential training opportunities in a multi-university, multidisciplinary program centered around technologies and best practices for smart mobility for the aging population; (3) Canada's technology and aging network at AGE-WELL training and mentorship program, to train innovators of tomorrow as they

accelerate the delivery of technology-based solutions to make a meaningful difference to the lives of Canadians; (4) Canadian Frailty Network Interdisciplinary Fellowship program, to provide mentorship on how to conduct transformative frailty research; and (5) Canadian Geriatrics Society Mentor, to connect with trainees with experienced clinicians to provide guidance towards a career in geriatric medicine. Dr. Papaioannou is committed to providing trainees from undergraduate students to post-doctoral fellows and early-career researchers with innovative research, mentoring and training opportunities within her osteoporosis research program.

As lead of the Fracture Risk Scale (FRS) program of research, Dr. Papaioannou has the opportunity to make a significant impact on developing service delivery models and health policy changes that will impact vulnerable residents living in long term care worldwide. The FRS predicts hip fracture over a 1-year duration (a 90% reduction in the timeframe of the current gold-standard assessments, the FRAX and CAROC). The FRS is a standardized instrument that automatically generates fracture risk assessments for residents as part of the Resident Assessment Instrument Minimum Data Set Version 2.0. The FRS is currently available in 1200 long-term care homes across Canada that use Point Click Care electronic medical record software and has international recognition from our partner institute in Australia: Australian Institute for Musculoskeletal Science. Dr. Papaioannou will continue to develop tools to use the FRS to its full capability and provide support, strategies, and instruments to enhance uptake.

Dr. Papaioannou is committed to take a leading role in reducing health inequities in osteoporosis research, identify knowledge or research gaps, implement knowledge translation activities, and continue to examine multicomponent fracture prevention models for long term care. She is dedicated to advancing the health and well-being of older adults with osteoporosis. ■

## ENDOWED CHAIRS AND PROFESSORSHIPS

### ELI LILLY CANADA/MAY COHEN CHAIR IN WOMEN'S HEALTH

Dr. Shannon Bates



I am very honored to have held the Eli Lilly Canada/May Cohen Chair in Women's Health since January 2014. Dr. Cohen, a former Associate Dean and Professor in the Faculty of Health Sciences well known for her leadership in the field of women's health and contributions to gender equality within the medical profession, is an important role model for me and for other women in medicine. The Eli Lilly Canada/May Cohen Chair in Women's Health was established in 1998 with funding from Eli Lilly Canada Inc. The Chair is responsible for developing an awareness of the current activities in women's health that are in place in the broader academic and health network and for the promotion of McMaster as a leader in women's health. The chair will make contributions to the education programs of the faculty, remain a leader in the field and, where appropriate, be involved in clinical work that informs the research agenda.

The support of the Eli Lilly Canada/May Cohen Chair in Women's Health has been instrumental in allowing me to pursue my interests related to women's health. My clinical and academic work focuses on women's issues in thrombosis and anticoagulant therapy, especially as they relate to pregnancy, assisted reproduction, and hormonal therapy. My goal is to enhance the care of women in these settings through physician and patient education, development and dissemination of evidence-based practice guidance, advocacy, and participation in related research.

I hold six half-day clinics per month devoted to issues in women's health and thrombosis. During these clinics, I see women from throughout the region and supervise medical students, local and elective internal medicine and hematology residents, residents in general internal medicine, and thrombosis fellows. Despite the COVID-19 pandemic, no clinics were missed as we were able to pivot seamlessly to a virtual format.

I am a co-investigator and steering committee member for three CIHR-funded studies examining the diagnosis of suspected deep vein thrombosis in pregnancy, the potential use of Aspirin for postpartum thrombosis prophylaxis, the role of complement activation among pregnant patients with obstetrical antiphospholipid antibody syndrome. I continue as a member of a PhD Supervisory Committee for a thesis examining shared decision-making and improving decision-making, particularly in pregnant women facing a decision about thrombosis prophylaxis. The protocol paper for our sequential explanatory mixed methods pilot study protocol has been submitted for peer review.

Between July 1, 2018 and June 30, 2020, I had the opportunity to present sessions on thrombosis and women's reproductive issues at the Annual Meeting of the American Society of Hematology, the American Heart Association Scientific Sessions, the inaugural McMaster University Women's Health Review, and the 15<sup>th</sup> Annual McMaster Update in Thromboembolism.

I conducted a Master Class on thromboprophylaxis in pregnancy at the XVII Congress of the International Society on Thrombosis and Haemostasis, led a webinar on the prevention and management of venous thromboembolism for the Foundation for Women & Girls with Blood Disorders and delivered a lecture on gender inequities in health research for the Master of Science program in Global Health. The international panel I chaired that was tasked with developing evidence-based guidelines on the diagnosis, prevention, and treatment of venous thromboembolism in pregnancy for the American Society of Hematology, completed its work and these guidelines were published in the Fall of 2018. I was lead or co-author on two additional publications and two book chapters related to women's health and thrombosis. I used my platform as a newly appointed Co-Editor-in-Chief for *Thrombosis Research* to initiate a process to address gender inequities on the journal's Editorial Board and Associate Editor panel. I continued to serve on the Medical Advisory Committee of the Foundation for Women and Girls with blood disorders. ■

### FARNCOMBE FAMILY CHAIR IN DIGESTIVE HEALTH RESEARCH

Dr. Stephen Collins



The holder of this chair is Dr. Stephen Collins, Director of the Farncombe Family Digestive Health Research Institute. The support from this chair enables Dr. Collins to direct the research of the Institute and to facilitate its operation. The Institute is focused on digestive health with a particular focus on the role of the intestinal microbiota in the maintenance of health and in the expression of diseases within and beyond the gastrointestinal tract, including the brain. Support from this chair also enables Dr. Collins to pursue his own research program that examines how the intestinal microbiota influences the gut-brain axis in the context of functional gastrointestinal disorders with or without associated psychiatric morbidity. To date, his research program has established a bi-directional interaction between the intestinal microbiota and the gut-brain axis and has demonstrated that the microbiota from patients with functional intestinal disorders have the capacity to induce dysfunction in both the gut and in the brain, and to alter behavioural profiles in ex-germ free mice colonised with microbiota from these patients. In addition, the research team has shown that selected probiotic bacteria can influence brain activity and behaviour in both mice and humans. This work will be continued with the support of the chair. It is expected that this program of research will help identify subsets of patients in whom the microbiota is relevant to the disease phenotype and to offer novel therapeutic strategies for these patients. ■



## ENDOWED CHAIRS AND PROFESSORSHIPS

### FARNCOMBE FAMILY CHAIR IN MICROBIAL ECOLOGY AND BIOINFORMATICS

Dr. Jennifer Stearns



Dr. Stearns studies how microbial communities are formed in the gut in early life and what impact the microbiota has on health outcomes and disease risk. To study these questions, she is combining basic microbiology, bioinformatics and epidemiology. In close collaboration with clinical researchers nationally and internationally, Dr. Stearns is studying the interaction of the gut microbiota with metabolic disease and infant development with publications in *Gut*, *Pediatric Obesity*, *Nature Communications* and *Frontiers in Microbiology*, and received a CIHR Early Career Investigator Award in Maternal, Reproductive, Child & Youth Health. She is most interested in how to maintain a healthy gut microbiota throughout development with a special interest in pregnancy, early life exposures, diet and probiotics. She has recently published on how the persistence of probiotic bacterial strains administered during preterm infant in-hospital stay can have a lasting effect many weeks later. She has also recently uncovered the connection between the gut microbiome in Mexican children and pre-obesity phenotypes such as insulin resistance and high circulating triglycerides. In the field of microbiome research, Dr. Stearns has 4,400 total citations, with over 500 citations per year since 2018 (H-factor of 20) and is invited to speak to both the scientific community and the public about what shapes the gut microbiome and the impact of microbes on human health. ■

### FARNCOMBE FAMILY CHAIR IN PHAGE BIOLOGY

Dr. Alexander Hynes



Dr. Hynes joined the Department of Medicine as an assistant professor in the Fall of 2017. His arrival and the creation of the Farncombe Family Chair in Phage Biology follow a renewed global interest in bacteriophages (bacteria-specific viruses) as tools to control and manipulate bacterial populations, especially in the face of the growing antimicrobial resistance crisis. With his lab opening its doors in January 2018, Dr. Hynes rapidly built up his team with seven graduate students (two now graduated), a postdoc, and 12 undergraduate trainees in various capacities. To support his team, in the 2018-2020 academic years, Dr. Hynes was awarded four research operating grants totalling over \$750 000, and with his students, over \$200 000 in student funding was secured. In that same period, he and his team have presented their research 44 times, seven of which were awarded prizes for their presentation. While building his research group, he has published an important first-author article in *Nature Communications* in July 2018, which

has already been cited 98 times, as well as two international patents and a notice of disclosure.

The public (and even internal) perception of his field was that it was small, with articles regularly claiming there were only a handful of scientists conducting phage research in Canada. Addressing this critical gap, especially as the applications of phage therapy will require coordinated efforts across a broader base of stakeholders, in early 2020 Dr. Hynes founded "Phage Canada". Its goal is to create a network of researchers, industry, and government in the field. The inaugural symposia were attended by 150 members spanning 43 research teams across 23 different Canadian institutional/governmental/industrial affiliations, connecting many of them for the first time. ■

### FREDERICK HARGREAVE / TEVA INNOVATION CHAIR IN AIRWAY DISEASES

Dr. Parameswaran Nair



In the fourth and fifth years of this endowed chair, our research program has continued to grow and attract funding from governmental agencies, biotechnology and pharmaceutical industry. The research program has been recognized by invitations to a number of national and international scientific societies, university, and pharmaceutical industry scientific review committees. The success of the research program is reflected in funding of close to \$3.5M, recruitment of four international trainees, two salary support awards from CIHR, 52 peer-reviewed publications some in major medical journals such as the *New England Journal of Medicine*, and 85 national and international invited lectures. A major achievement has been bringing on faculty three of my post-doctoral trainees. Dr. Terence Ho, Dr. Mukherjee and Dr. Svenningsen were appointed to our division as assistant professors, leading their own programs. Dr. Ho is directing a program that investigates mechanisms of exacerbations of COPD and strategies to decrease hospitalizations and health care utilization, through grants from CIHR and HAHSO. Dr. Manali Mukherjee is funded by a CIHR/CAAIF/AllerGen/AZ career award in translational airway immunology, and Dr. Sarah Svenningsen has been awarded a tier-2 Canada Research Chair in Airway Imaging Research, to continue to lead Canada's leading translational pulmonary imaging MRI program. ■

### HAMILTON HOSPITALS ASSESSMENT CENTRE ENDOWED PROFESSORSHIP IN NEUROMUSCULAR DISEASE

Dr. Steven Baker



The Hamilton Hospital Assessment Centre Endowed Professorship in Neuromuscular Disease has permitted continued productivity in the Peripheral Neuropathy Clinic. Charcot-Marie-Tooth Disease (CMT) continues to be a focus. I have recently participated in an international Delphi survey addressing the topic of pediatric CMT management. This was the first collaboration to address the knowledge gap in this area of medicine. Additionally, we have shown that a home-based series of balance exercises in CMT patients can improve both static and dynamic balance.

Chronic inflammatory demyelinating polyneuropathy (CIDP) continues to be a focus for the Peripheral Nerve Clinic. I am collaborating with Dr. Hans Frykman from the BC Neuroimmunology Laboratory and investigating novel antibodies that are proving to be pathogenic (i.e., NF-186, NF-155, CNTN1). I presented a talk on CIDP (Chronic Inflammatory Demyelinating Polyneuropathy) at the 53<sup>rd</sup> Annual Canadian Neurological Sciences Federation (CNSF) Congress. I have one of the largest databases of seropositive CIDP cases in Canada. Dr. Adrian Opala, a fellow working under my supervision, has published the effects of IVIg therapy with regards to nerve conduction studies and strength data in a cohort of CIDP patients. This work has shown that peak strength occurs after three to six months of treatment, suggesting that Ig-based treatments may require greater persistence than initially thought.

I continue to work with AKCEA and Alnylam with regards to their anti-sense oligonucleotide drugs which target transthyretin (TTR) as a treatment for hereditary amyloidosis. I am the only physiatrist in Canada to be participating in the rollout of these medications. As such, I am McMaster's point physician for the neurological evaluation of these patients in collaboration with Dr. Katie Connolly.

Collaborations with Dr. Stuart Phillips continue with regards to muscle metabolism and strategies to minimize sarcopenia and disuse atrophy. My goal is to explore the effects of strength training on muscle protein synthesis in patients with CMT. ■

### HEART AND STROKE FOUNDATION / J. FRASER MUSTARD CHAIR IN CARDIOVASCULAR RESEARCH

Dr. Jeffrey Weitz



Dr. Weitz has held this endowed chair since 2000, with renewals granted in 2005, 2010, 2015 and 2020. With a \$1 million endowment from the Heart and Stroke Foundation of Ontario and a matching amount from McMaster University, the interest from this chair has been used to support the Thrombosis and Atherosclerosis Research Program. Funds have been used to supplement the salaries of new investigators.

With this Chair, the thrombosis group has expanded over the past five years with the recruitment of Drs. Noel Chan and Davide Matino. The increase in critical mass has expanded research, educational and clinical capabilities. Currently, the thrombosis research group oversees research projects that span the spectrum from basic research, to translational studies that link basic science with patient-oriented research, to clinical trials, to health outcomes research, and on to knowledge translation. In addition, the group has supervised 20% of all of the MSc and PhD candidates who have received degrees under the supervision of faculty members within the Department of Medicine over the past five years. ■

### HEART AND STROKE FOUNDATION / MARION W. BURKE CHAIR IN CARDIOVASCULAR DISEASE

Dr. Salim Yusuf



Established in 1997 via a gift from the Heart and Stroke Foundation of Ontario, the goal of the Heart and Stroke Foundation/Marion W. Burke Chair in Cardiovascular Disease is to focus on the field of cardiovascular disease and address scientific uncertainty and contribute significantly to the body of scholarship through teaching and research.

The goals of the chair are to develop the evidence base and strategies that will reduce premature CVD deaths globally by 30% by 2030 (compared to the rates in 2000). In addition, we are working with basic scientists to build new bridging programs in translational research.

#### ACCOMPLISHMENTS

1. Improving outcomes in cardiovascular diseases and identifying new therapies through randomized clinical trials.
2. Understanding the societal, the environmental, behavioural and genetic causes of cardiovascular disease globally.

## ENDOWED CHAIRS AND PROFESSORSHIPS

3. Documenting the clinical course of cardiovascular diseases that have been less well studied.
4. Improving the implementation of strategies for the control of cardiovascular risk factors.
5. A new program of studies in COVID-19.

### FUTURE DIRECTION

The future focus is mainly related to building upon existing studies and completing several ongoing major activities and studies within the above themes. In addition, we have embarked on a major initiative on identifying new pathways for CVD using stored samples with the new technologies of proteomics, genomics and metabolomics, combined with new analytic approaches (such as Mendelian randomization and Artificial Intelligence). In addition, we are planning new initiatives on brain health with a focus on vascular dementia and cognitive decline, as well as a new translational research program in molecular epidemiology. ■

## HEART AND STROKE FOUNDATION / MICHAEL G. DEGROOTE CHAIR IN POPULATION HEALTH RESEARCH

Dr. Sonia Anand



Dr. Anand received the Heart and Stroke Foundation / Michael G. DeGroot Chair in Population Health Research at McMaster University in 2008, and it was renewed in 2013 and 2018. The mandate of this chair is to improve research in population health as it relates to cardiovascular disease.

Dr. Anand's research focuses on understanding the contribution of environmental and genetic factors on the development of cardiovascular risk factors and cardiovascular disease. She has a particular interest in conducting intersectoral research including ethnicity, sex/gender, and social factors.

The two major themes of Dr. Anand's work include:

1. Understanding the environmental and genetic causes of cardiovascular risk factors including type 2 diabetes, and cardiovascular disease among high-risk groups including people of South Asian origin, Indigenous people, and women.
2. Developing and evaluating health behaviour interventions to modify risk in high-risk groups.

Dr. Anand is leading the Canadian Alliance of Healthy Hearts and Minds (CAHHM) study funded by the Canadian Partnership Against Cancer and the Heart and Stroke Foundation. CAHHM recruited > 10,000 people living in Canada including the establishment of a new Indigenous cohort recruiting > 1,000 men and women from 8 Indigenous communities.

In the COVID-19 pandemic response, Dr. Anand and her colleagues are investigating vaccine hesitancy, immunogenicity, and effectiveness in the South Asian population in Canada

### Key publications include:

1. **Anand SS**, Abonyi S, Arbour L, Balasubramanian K, Brook J, Castelden H, Chrisjohn V, Cornelius I, Davis AD, Desai D, De Souza R, Griedrich MG, Harris S, Irvine J, L'Hommecourt J, Littlechild R, Mayotte L, McIntosh S, Morrison J, Oster RT, Picard M, Pictou Landing First Nation, Poirier P, Schulze KM, Toth EL. Explaining the variability in cardiovascular risk factors among First Nations communities in Canada: a population-based study. *Lancet Planetary Health* 2019 Dec;3(12):e511-20.
3. **Anand SS**, Tu J, Desai D, Awadalla P, Robson P, Jacquemont S, Dummer T, Le N, Parker L, Poirier P, Teo K, Lear SA, Yusuf S, Tardif JC, Marcotte F, Busseuil D, Despres FP, Black SE, Kirpalani A, Parrage G, Noseworthy MD, Dick A, Leipsic J, Kelton D, Vena J, Thomas M, Schulze KM, Larose E, Moody AR, Smith EE, Friedrich MG on behalf of the Canadian Alliance for Health Hearts and Minds Cohort. Cardiovascular risk scoring magnetic resonance imaging detected subclinical cerebrovascular disease. *Eur Heart J Cardiovasc Imaging* 2020 Jun 1;21(6):692-700.
4. **Anand SS**, Friedrich MG, Desai D, Schulze KM, Awadalla P, Busseuil D, Dummer T, Jacquemont S, Dick A, Kelton D, Kirpalani A, Lear SA, Leipsic J, Noseworthy MD, Parker L, Parrage G, Poirier P, Robson PJ, Tardif JC, Teo K, Vena J, Yusuf S, Moody AR, Black SE, Smith EE. Canadian Alliance for Healthy Hearts and Minds Cohort. Reduced Cognitive Assessment Scores Among Individuals with Magnetic Resonance Imaging-detected Vascular Brain Injury. *Stroke* 2020 Apr;51(4):1158-1165.
5. Gerstein HC, Smith, EE, Ramasundarahettige C, Desai D, Awadalla P, Broet P, Balck S, Dummer TJB, Hicks J, Moody A, Tardif JC, Teo KK, Vena J, Yusuf S, Lee DS, Friedrich MG, **Anand SS**. Diabetes, Brain Infarcts, Cognitive Impairment and Small Vessel Disease in the Canadian Alliance for Healthy Hearts and Minds Study. *J Clin Endocrinol Metab* Jan 23;106(2):e891-e899. ■

### JACK HIRSH/PHRI CHAIR IN THROMBOSIS AND ATHEROSCLEROSIS RESEARCH

Dr. John Eikelboom



John Eikelboom is a Professor in the Department of Medicine, McMaster University, haematologist in the Thrombosis Service, Hamilton General Hospital, and Senior Scientist, Population Health Research.

Over the past four years since being awarded the Jack Hirsh/PHRI Chair in Thrombosis and Atherosclerosis, he has obtained further peer reviewed funding support from the Canadian Institutes for Health Research and the National Health and Medical Research Council of Australia to support his research into the prevention and management of thromboembolism and bleeding. More recently, he has received support for a multicentre randomized trial testing promising therapies for COVID-19. During this time, he has published >200 papers peer reviewed papers, including first and senior authored papers in the *New England Journal of Medicine* and *Lancet*, and his work has been cited in national and international treatment guidelines and consensus conferences.

Since 2014, he has been listed annually among the top 1% of most cited researchers in clinical medicine (Recipients - Highly Cited | Researcher Recognition (webofscience.com)) and in 2018, he received the Jack Hirsh Award for Outstanding Academic Achievement from the Department of Medicine. ■

### J. BRUCE DUNCAN CHAIR IN METABOLIC DISEASES

Dr. Greg Steinberg



A disparity between cellular energy demand and nutrient availability is a key factor contributing to metabolic diseases including obesity, non-alcoholic steatohepatitis (NASH), type 2 diabetes, as well as cardiovascular disease and many cancers. Dr. Steinberg's research into mechanisms regulating energy sensing has formed the basis for the development of several new classes of therapeutics. Specific highlights from 2018-2020 included the approval of the ATP citrate lyase (ACLY) inhibitor bempedoic acid for the lowering of LDL-cholesterol and small molecules targeting AMP-activated protein kinase (AMPK) and Acetyl-CoA Carboxylase (ACC) entering phase 2/3 clinical trials for non-alcoholic steatohepatitis (NASH).

Additional research accomplishments from 2018-2020 included: the graduation of 5 PhD and 5 MSc. students, receiving funding for a Tier 1 Canada Research Chair and a CIHR Foundation Grant, and delivering over 30 invited presentations at national and international meetings (including 3 plenaries). During this time period, our research team also published 26 peer-reviewed manuscripts highlighted by:

- 1 A comprehensive invited review article on the physiological significance and therapeutic targeting of the AMP-activated protein kinase (Steinberg and Carling *Nature Reviews in Drug Discovery* 2019).
- 2 The discovery that inhibiting lipid synthesis, by targeting two key phosphorylation sites on acetyl-CoA carboxylase, can reduce liver cancer in mice (Lally et al. *Cell Metabolism* 2019).
- 3 The discovery that the type 2 diabetes medication metformin reduces body mass and blood glucose, in mice and humans, by enhancing the production of a hepatocyte derived endocrine factor called growth differentiation factor 15 (Day et al. *Nature Metabolism* 2019). ■

### JOHN G. KELTON CHAIR IN TRANSLATIONAL RESEARCH

Dr. Donald M. Arnold



Dr. Donald M. Arnold holds the John G. Kelton Chair in Translational Research. He is the Director of the McMaster Centre for Transfusion Research.

Dr. Arnold's team is focused on clinical and laboratory-based research in blood transfusion and bleeding disorders. Priority research areas include optimal utilization of blood products and novel tools to identify trends in blood product use over time. The McMaster Centre for Transfusion Research is at the forefront of large clinical trials and patient registries that support a research platform spanning from blood donors to blood recipients. The Centre continues to advance clinical and immunology research and innovative clinical trials, with collaborators across Canada and internationally.

Translational studies in immune-mediated platelet diseases have influenced treatment guidelines for patients and advanced research methods in rare disease research. Dr. Arnold's team is leading several multicentre studies in therapeutics related to bleeding disorders, which will have direct clinical impact on patient care. New diagnostic strategies, novel biomarkers, and the role of cellular immunity are current areas of active research. The team's research in blood transfusion ranges from biomarkers to clinical outcomes with the goal of improving blood product use and sustainability. Dr. Arnold's team is dedicated to expanding existing research databases to create province-wide and ultimately, national registries. This data platform will enable research across Canada that will ensure a safe and sustainable blood supply.

In response to the COVID-19 pandemic, Dr. Arnold's team launched a large international trial to evaluate the efficacy and safety of COVID-19 convalescent plasma as a potential treatment for COVID-19. The CONCOR-1 trial enrolled patients from across Canada, New York City and Brazil. Under Dr. Arnold's leadership, the trial team quickly mobilized investigators, collaborators, and three large blood suppliers to access this new potential treatment. The trial included a community-led advisory committee, and a novel plasma distribution program that will inform future trials. The CONCOR-1 trial was stopped in January 2021 on the recommendation of the independent data safety monitoring committee, and the team is now gathering the final data to analyze and publish the results rapidly. Tied to the clinical research program, Dr. Arnold's team also shifted to study the immune response to COVID-19 infection. In collaboration with Dr. Ishac Nazy and the platelet immunology laboratory, Dr. Arnold's team developed novel antibody tests and cell-based assays to understand protective immunity and determine how long it lasts. The translational focus of this research program combined both clinical and laboratory research goals to address the COVID-19 pandemic.

Dr. Arnold's group is funded by Canadian Institutes of Health Research, Canadian Blood Services, the Ontario Ministry of Health, Health Canada and McMaster University. ■

### JOSEPH E. DESROCHES CHAIR IN BONE MARROW TRANSPLANTATION

Dr. Irwin Walker



Established in 2015 via a generous gift from Mr. E.J. DesRoches and funding from McMaster University, the goal of the Joseph E. DesRoches Chair in Bone Marrow Transplantation is to contribute significantly to the body of scholarship in the area of bone marrow transplantation as a treatment for cancer.

#### FOCUS

The focus of the Chair's research continues to be on graft-versus-host disease, which is the most frequent and serious complication of bone marrow transplantation (also known as stem cell transplantation).

#### ACCOMPLISHMENTS

The main activity for the last few years has been to investigate the use of anti-thymocyte globulin (ATG) in preventing graft-versus-host disease. A multi-centre and multi-national randomized trial headed by the Chair has established ATG as standard therapy in all transplant centres across Canada and elsewhere. The final results of this trial were published in *Lancet Haematology* during this year.

#### ONGOING ACTIVITIES

Though the incidence of graft-versus-host disease has now decreased through the use of ATG, it still remains a problem for many patients, so more research is needed. To this end and continuing the focus of the Chair on randomized trials, an investigation has been started into the efficacy of a newly proposed preventive measure - the injection of cyclophosphamide to recipients after receiving their transplant graft. This procedure is called Post-Transplant Cyclophosphamide, or PTCy. Cyclophosphamide kills those immune cells that cause graft-versus-host disease. While a comparison of ATG with PTCy would be a reasonable option to pursue, Canadian centres did not wish to withhold ATG, our recently proven therapy, from half of the patients. Instead, they were in favour of a bolder design - to randomize patients to receive or not to receive PTCy while still receiving ATG. On the other hand, Canadian centres counselled caution in favour of a small pilot trial. The design of the trial is as a "randomized pilot (syn. feasibility) trial", following methodologies described predominantly by McMaster researchers and adopted by the international journal editors' organization (CONSORT). Funding and ethics approval for this trial have been obtained, and six centres have signed agreements to participate.

#### FUTURE

The vision for the future is a full-scale phase III randomized controlled trial as an expansion of the pilot trial described in the previous paragraph. Such a trial poses the challenge of recruiting a much larger cohort of participating patients. To facilitate this, the Chair with the assistance of the Clinical Trials Committee of Cell Therapy and Transplantation Canada has signed an agreement between McMaster University and the Australasian Leukaemia

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and Lymphoma Group to conduct this trial as a partnership. This will allow some major Australian centres to participate and has kicked off discussions toward a broader CTTC-ALLG research alliance.

### PUBLICATIONS IN 2020

- 1 Walker I, Panzarella T, Couban S, Couture F, Devins G, Elemetry M, et al. Addition of anti-thymocyte globulin to standard graft-versus-host disease prophylaxis versus standard treatment alone in patients with haematological malignancies undergoing transplantation from unrelated donors: final analysis of a randomised, open-label, multicentre, phase 3 trial. *The Lancet Haematology*. 2020 Jan;S2352302619302200.
- 2 Bonifazi F, Rubio M-T, Bacigalupo A, Boelens JJ, Finke J, Greinix H, et al. Rabbit ATG/ATLG in preventing graft-versus-host disease after allogeneic stem cell transplantation: consensus-based recommendations by an international expert panel. *Bone Marrow Transplant*. 2020 Jun;55(6):1093–102. ■

## LEO PHARMA CHAIR IN THROMBOEMBOLISM RESEARCH

Dr. Mark Crowther



Dr. Crowther is currently Chair and a Professor in the Department of Medicine. He also holds the positions of co-chair, Senior Research Committee, Heart and Stroke Foundation of Canada, and Treasurer of the American Society of Hematology. Dr. Crowther completed the Career Investigator Award Program from the Heart and Stroke Foundation of Canada in 2016 and holds the Leo Pharma Chair in Thromboembolism Research at McMaster University. His research focus is on studies designed to improve the quality of anticoagulant care and his endeavors include a wide variety of projects examining the optimal methods to prevent and treat both arterial and venous thrombosis. Working closely with a large group of collaborators, Dr. Crowther continues to lead systematic reviews and meta-analyses examining various aspects of anticoagulant care and control. His work also extends to other areas of benign hematology, including evaluation of patients with immune mediated hematologic disorders. Dr. Crowther was inducted into the Royal Society of Canada in 2017 and is on Clarivate Analytics' list of most cited scientists in Health Research. ■

## MARTA AND OWEN BORIS CHAIR IN STROKE RESEARCH & CARE

Dr. Ashkan Shoamanesh



Dr. Shoamanesh's main research focus is the characterization of hemorrhage-prone cerebral small vessel disease (CSVD), namely, hypertensive arteriopathy and cerebral amyloid angiopathy, and the optimization of clinical care in this patient population. The risk-benefit analysis of anti-thrombotic and fibrinolytic therapy in patients who have previously suffered hemorrhagic strokes, or have underlying hemorrhage-prone CSVD, is of particular interest. His personal and collaborative research in the last two academic years has shown that:

- i) Patients with acute ICH and cerebral microbleeds or white matter hyperintensities on MRI respond similarly to intensive blood pressure lowering in subgroup analyses of the NIH-funded ATACH-2 randomized trial,
- ii) Patients with cerebral microbleeds on MRI are associated with a 2-fold increased risk of future ischemic stroke, 4.5-fold increased risk of intracerebral hemorrhage and 1.35-fold increased risk of both incident dementia and all-cause mortality,
- iii) There is an overrepresentation of the apolipoprotein E epsilon 2 allele in cerebral amyloid angiopathy patients with cortical superficial siderosis on MRI, iv) racial/ethnic disparities in ICH recurrence with greater risk of recurrence in Asian and Black patients,
- iv) A reduced incidence of covert cerebral infarcts with statin treatment,
- v) There exists broad variability in physician practice and equipoise surrounding optimal stroke prevention in intracerebral hemorrhage survivors with atrial fibrillation, and
- vi) Systemic delays in the administration of intravenous thrombolysis to acute ischemic stroke patients during the 1st wave of the COVID-19 pandemic.

As principal investigator (PI) of the Non-Vitamin K Antagonist Oral Anti-coagulants for Stroke Prevention in Patients with Atrial Fibrillation and Previous Intracerebral Hemorrhage (NASPAF-ICH) trial, he led the first completed pilot trial establishing the feasibility of a multicenter main phase randomized trial assessing optimal antithrombotic therapy in patients with atrial fibrillation and previous intracerebral hemorrhage. On the basis of these preliminary findings, he now leads the ongoing Edoxaban for Intracranial Hemorrhage survivors with Atrial Fibrillation (ENRICH-AF; NCT03950076) trial that is being activated at a target of over 300 sites in 21 countries. He is the Canadian National PI of the NIH-funded SATURN (NIH-StrokeNet; NCT03936361) assessing the effect of statin continuation compared with discontinuation on recurrent hemorrhage in patients with lobar ICH, and also serves on the Steering and/or Executive Committees of several public and industry funded international randomized trials, including

the ASPIRE (NIH-StrokeNet; NCT03907046), ANNEXA-I (Portola pharmaceuticals; NCT03661528), PACIFIC-Stroke (Bayer AG; NCT04304509), and NAVIGATE ESUS (Bayer AG; NCT02313909) trials. He is the Adjudication Committee Co-Chair of INVICTUS (Bayer AG; NCT0283253), and on the Data Safety Monitoring Board of CONVERT (Bayer AG; NCT04523220) and RE-THINc ESRD (Bayer AG; NCT04534114). Moreover, he continues in his role as Chair of the Canadian Hemorrhagic Stroke trials initiative (CoHESIVE; www2.phri.ca/cohesive).

His work was recognized by the 2019 Heart and Stroke Foundation of Canada Henry J.M. Barnett Scholarship (recognizing the highest ranked National New Investigator in cerebrovascular disease research), the 2019 American Heart/Stroke Association Robert G. Siekert New Investigator and Paul Dudley White International Scholar Awards, and the 2020 American Academy of Neurology Michael S. Pessin Stroke Leadership Prize. He has been awarded over \$28.3 million CAD in operational research funding as PI during this time. ■

## MCMASTER UNIVERSITY / GLAXOSMITHKLINE CHAIR IN LUNG IMMUNOLOGY AT ST. JOSEPH'S HEALTHCARE

Dr. Mark Larché



Dr. Mark Larché was appointed to the McMaster University/GSK Chair in Lung Immunology at St. Joseph's Healthcare in March 2008. This chair was renewed in 2013 for a further 5-year term. Funding in 2018-2020 to support research activities associated with this Chair came from CIHR, the National Institutes of Health (USA), Hamilton Scleroderma Group, and Adiga Life Sciences Inc. Active areas of research within the laboratory were:

- 1 The role of T lymphocytes in the pathogenesis of asthma/allergic airways disease (together with Dr. Gail Gauvreau, Dr. Paul O'Byrne, Dr. Helen Neighbour and Dr. Mark Inman, NIH). Investigation of chemokine receptor usage by allergen-specific T cells provides insight into why chemokine receptor antagonists for asthma have been disappointing in the clinic
- 2 Mechanisms of peptide-induced immune tolerance (with Dr. Elena Tonti, NIH, Adiga Life Sciences). Inhibition of IL-8-secreting T cells following peptide immunotherapy;
- 3 The pathogenesis and treatment of scleroderma (with the Hamilton Scleroderma Group, Dr. Boyang Zhang, Dept. Chemical Engineering). Assessing pro-fibrotic properties of patient serum in 3-D microvascular networks
- 4 Development of peptide immunotherapy for peanut allergy (together with Dr. Manel Jordana, and Dr. Susan Waserman; Aravax Pty Australia). Evaluation of efficacy and mechanism of action of a peanut allergy vaccine now in clinical trials
- 5 Pathogenesis and treatment of rheumatoid arthritis (with Dr. Maggie Larché, Dr. Derek Haaland & Dr. Elena Tonti; CIHR, Adiga Life Sciences). A pre-clinical model of RA has been developed, and is being investigated for signs of interstitial lung disease
- 6 The role of complement proteins in the pathogenesis of pulmonary fibrosis in graft versus host disease. A Crispr-Cas9-based intervention has been developed for experimental GvHD

Collaborative projects are currently underway with other faculty at McMaster University and St. Joseph's Healthcare within the Firestone Institute for Respiratory Health, the Division of Nephrology, the Division of Hematology & Thromboembolism, the McMaster Immunology Research Centre within the Department of Pathology & Molecular Medicine, and the Department of Chemical Engineering at McMaster University. ■

## ENDOWED CHAIRS AND PROFESSORSHIPS

### MICHAEL G. DEGROOTE CHAIR IN INFECTIOUS DISEASES

Dr. Mark Loeb



Dr. Loeb has completed the third year of a cluster randomized controlled trial to assess whether adjuvanted influenza vaccine in children leads to greater herd immunity. The trial is being conducted in a unique setting: Hutterite colonies in Alberta and Saskatchewan. In 2020, Dr. Loeb received funding from CIHR to conduct a longitudinal cohort study of COVID-19 in Hutterite colonies to better understand the impact of pre-existing antibodies to elicit protection in both individuals as well as the impact of herd immunity against COVID-19 at the community level. Dr. Loeb is the principal investigator of a trial funded by Joint Global Health Trials competition of UK MRC Wellcome Trust to assess whether inactivated vaccine can reduce adverse vascular

events. This is an international trial being conducted in 10 countries and in collaboration with Dr. Salim Yusuf and other colleagues at PHRI. There have been about 5,000 participants enrolled in this study which is currently in progress. Dr. Loeb obtained funding from CIHR in 2020 to conduct a randomized trial of surgical masks versus N95 respirators to protect healthcare workers against COVID-19. This is an international trial which has been cited by WHO as a critically important study. Dr. Loeb is also leading a cohort study of Lyme disease which is funded by CIHR. Dr. Loeb was named a Fellow of the Canadian Academy of Health Sciences in 2019 and a Fellow of the Royal Society of Canada in 2020. ■

### MICHAEL G. DEGROOTE CHAIR IN STROKE PREVENTION

Dr. Mukul Sharma



Dr. Sharma's research focus remains on stroke prevention in the subacute phase of stroke and TIA and the prevention of covert infarcts – imaging defined infarcts which are not recognized acutely due to subtle or non-acute deficits. These infarcts are more common than clinically recognized stroke and are associated with cognitive, motor and possibly psychiatric manifestations. Following on the success of COMPASS, which demonstrated the benefit of combining an anticoagulant and antiplatelet in stroke prevention, a new trial is underway using this combination in the acute period following minor stroke and TIA. Critical to future developments in this area is the need for careful dose development in stroke patients. AXIOMATIC SSP is a large international trial whose aim is to establish a safe and effective dose of a new class of anticoagulants in stroke prevention. The design of this trial owes much to the insights gained from the MRI substudies in COMPASS and NAVIGATE.

Combining imaging derived outcomes with clinical events comprehensively captures damage to the brain and increases trial efficiency. Previously, antithrombotic doses were developed in models of venous thrombosis for use in stroke populations. AXIOMATIC SSP represents the vanguard of a new design of trials to address this issue in stroke patients. COVID-19 has significantly slowed the pace of clinical research and modification of our trial methods was required to ensure safety of participants and staff. These changes have mirrored the sweeping move to virtual care in stroke prevention and acute treatment throughout the regional and provincial networks. Dr. Sharma has assumed leadership in the Regional Stroke Program and now serves as its Medical Director and will lead the medical initiatives adapting to this reality while continuing to improve quality of care. ■

### MICHAEL G. DEGROOTE PROFESSORSHIP IN STROKE MANAGEMENT

Dr. Demetrios (James) Sahlas



Dr. Sahlas has continued to promote interprofessional collaboration with respect to quality improvement research in the management of stroke. His work on carotid revascularization pathways brings together stakeholders from Neurology, Neurosurgery, Interventional Neuroradiology, and Vascular Surgery, as well as nursing and administrative leadership to optimize patient outcomes. He continues to serve as the clinical stroke prevention lead at Hamilton Health Sciences and as a member of the Central South Ontario Regional Stroke Steering Committee.

The stroke research group based at the Hamilton General Hospital was able to retain its research personnel and continued to recruit into several important stroke clinical trials, despite the COVID-19 pandemic. The support and leadership of research administration at Hamilton Health Sciences played a critical role in this accomplishment. As a result, Dr. Sahlas and his colleagues are well-positioned to maintain McMaster University's prominent national and international role as leaders and key collaborators on the success of multicentre stroke trials. ■

### MORAN CAMPBELL CHAIR IN RESPIRATORY MEDICINE

Dr. Martin Kolb



Dr. Martin Kolb's major research area is focused on mechanisms of lung injury, repair and fibrosis, particularly in Idiopathic Pulmonary Fibrosis (IPF). He has a strong interest in growth factor biology (e.g. TGF $\beta$  and IL-1), extracellular matrix, and mesenchymal cell progenitors (mesenchymal stem cells and fibrocytes). In his lab, he uses a variety of animal models to study disease mechanisms as well as the efficacy of novel drugs in the preclinical setting. Further, Dr. Kolb leads activities in biomarker development for lung fibrosis and he participates as a principal investigator and steering committee member on numerous clinical trials on interstitial lung disease. Dr. Kolb has over 240 peer-reviewed publications in journals such as *New England Journal of Medicine* (2 papers since 2018), *Journal of Clinical Investigation*, *American Journal of Pathology*, *American Journal of Respiratory and Critical Care Medicine*, *Journal of Immunology*, *European Respiratory Journal* and many others. His H-factor is 60. He is/was funded by CIHR, NIH, CFI, OTS and different Pharmaceutical companies over the years. He has received career awards from the Parker B. Francis Families Foundation, the Department of Medicine at McMaster, and the New Investigator Award from the Canadian Institute for Health Research.

Dr. Kolb is very active in scientific publications. He was a deputy editor for *Respirology*, the official journal of the Asian Pacific Society for Respirology, and associate editor for *Thorax* — journal of the British Thoracic Society. Since 2018, he is a chief editor for the *European Respiratory Journal*, ranked number 3 amongst more than 60 specialty journals in respiratory medicine globally, with a current impact factor of 12.44. ■



## ENDOWED CHAIRS AND PROFESSORSHIPS

### POPULATION HEALTH INSTITUTE CHAIR IN DIABETES RESEARCH AND CARE

Dr. Hertzl Gerstein



This chair was established in 2001 to provide broad support for research activities focused on the prevention and treatment of dysglycemia and its serious consequences. Dr. Gerstein is pursuing these goals through a broad range of research-related activities at the international, national and local levels. These activities include (but are not limited to):

- a) International PI and leader of the 4000-person AMPLITUDE O trial of the effect of an injected GLP-1 receptor analog on cardiovascular and renal outcomes in people with diabetes and either cardiovascular or renal disease
- b) Ongoing analyses of the recently completed 9901-person REWIND trial of a GLP-1 analog on serious health outcomes in people with diabetes that he led as international PI, and in which he published that the intervention reduced a first and recurrent cardiovascular outcomes, strokes, renal outcomes, and cognitive impairment
- c) Collaboration on proteomic and genomic analyses of 8000 participants followed for up to 8 years in the ORIGIN trial that identified several causal protein mediators of cardiovascular and renal diseases, and targets for novel drug therapy in people with and without dysglycemia,
- d) Collaboration with basic scientists to determine that metformin's metabolic effects are mediated by metformin-mediated GDF15 secretion – a relationship he discovered during analyses of the ORIGIN trial data
- e) Epidemiologic and ancillary analyses of data collected in a variety of these and other completed global trials and epidemiologic studies that have identified capillary disease as a mediator of the cardiovascular consequences of dysglycemia
- f) Conceptualization and chair of a program of research including four multi-centre trials focused on testing therapies that could induce remission of type 2 diabetes

In addition to these clinical research activities, he continues to collaborate with colleagues at McMaster in research using animal and cellular models of dysglycemia to identify the mechanisms underlying the development of diabetes, and the relationship between dysglycemia and cardiovascular diseases, mortality, cognitive decline, and cancers. Dr. Gerstein's research is currently funded by peer-review agencies and industry, and is conducted through the Population Health Research Institute, where he is deputy director.

During the two academic years ending in June 2020, Dr. Gerstein published more than 48 articles and editorials in major peer-reviewed journals and

presented data and perspectives as an invited guest speaker, commentator, or faculty member at 39 national and international scientific meetings. In 2019, he was elected to and inducted as a fellow of the Canadian Academy of Health Sciences. Based on his research contributions from 2010-2020, ExpertScape ranks Dr. Gerstein in the top 20 of all type 2 diabetes experts in the world (expertscape.com). ■

### RICHARD HUNT / ASTRAZENECA CHAIR IN GASTROENTEROLOGY

Dr. Premysl Bercik



Growing evidence suggests that the gut microbiota is a major player in health and disease, affecting the function not only of the digestive tract, but also of distant organs, including the central nervous system. Dr. Bercik's research focus remains on the microbiota-gut-brain axis, a bidirectional communication between the digestive system and the brain, and its role in chronic gastrointestinal diseases.

His current research in animal models investigates how gut bacteria modulate visceral sensitivity, gastrointestinal motility, and mouse behavior through the production of immunomodulatory and neuroactive metabolites. Dr. Bercik's research is highly translational, providing proof of concept studies, from bench to bedside. Using microbiota transplantation into germ-free mice, his team studies how specific bacteria obtained from patients with Irritable Bowel Syndrome (IBS), chronic constipation or patients diagnosed with anxiety or depression, affect mouse gut and brain function. His clinical research applies the finding from animal models by investigating the mechanisms underlying pain signaling and motility regulation by specific microbial strains, and their modulation by dietary components. Ongoing clinical trials study the role of wheat proteins in patients with IBS, or those with type 1 diabetes that suffer with severe dyspepsia and gastroparesis.

His basic research is supported by the Canadian Institutes for Health Research and the National Institutes of Health (USA) grants, with additional funding from the W. Garfield Weston Foundation, the Biocodex Foundation, the Canadian Digestive Health Foundation and the Society for Study of Celiac Disease. He is also co-principal investigator of a pan-canadian CIHR SPOR grant investigating the role of gut microbiota and diet in patients with chronic gastrointestinal illnesses, including Inflammatory Bowel Disease and IBS.

For his research achievements, Dr. Bercik was awarded the 2021 Canadian Association of Gastroenterology Research Excellence Award. ■

### STUART CONNOLLY CHAIR IN CARDIOLOGY RESEARCH

Dr. Jeff Healey



Dr. Healey is a professor in the Department of Medicine at McMaster University, and is an associate faculty in the Department of Health Research Methods, Evidence and Impact. He is the director of division of cardiology at McMaster University, and is a senior scientist at the Population Health Research Institute. Dr. Healey is the principal investigator and chair of the Canadian Stroke Prevention Intervention Network (CSPIN), which is conducting a series of clinical trials related to atrial fibrillation and stroke prevention and will support the development of new Canadian researchers in this field. He is also the Chair of the Canadian Cardiovascular Society's (CCS) development committee, a member of the CCS guidelines committee and a member of the executive committee of the international AF-Screen collaboration. Dr. Healey serves on the editorial boards of the Canadian Journal of Cardiology, Heart Rhythm, and is an associate editor of Heart Rhythm-O2. He is also a member of the research committee and scientific program committees for the Heart Rhythm Society.

Dr. Healey was the lead author of the ASSERT trial, which was published in the *New England Journal of Medicine* in 2012, and demonstrated the increased stroke risk associated with sub-clinical atrial fibrillation detected by pacemakers. He went on to conduct the ASSERT-II trial, which demonstrated that sub-clinical atrial fibrillation is present in over a third of older individuals with cardiovascular conditions, but without pacemakers, and published the results in *Circulation* in 2017. Dr. Healey now leads the 4000-patient ARTESiA trial, which will determine if treatment with direct anticoagulants can prevent stroke in patients with sub-clinical atrial fibrillation.

Dr. Healey also continues to study outcomes for patients receiving implantable defibrillators, specifically to find ways to reduce the morbidity associated with these life-saving devices. He was the lead author of the SIMPLE trial, published in the *Lancet* in 2015, which demonstrated that implantable defibrillators could be safely inserted without performing intra-operative defibrillation testing. He is currently leading the ATLAS trial comparing a new, totally sub-cutaneous defibrillator against the traditional defibrillator which requires a lead to be placed through a vein and into the heart.

In his role as Chair in Cardiology Research, Dr. Healey supervises students in the Health Research Methodology Program, and mentors several young researchers starting programs in the field of cardiac arrhythmia. Dr. Jorge Wong has established a research program examining the impact of sub-clinical AF on heart failure, and is studying the role of bariatric surgery to improve outcomes in patients with AF. Dr. Bill McIntyre has also completed his PhD and is continuing his work in the field of atrial fibrillation occurring with stress, specifically, at the time of surgery or hospitalization for medical reasons. ■

### ST. PETER'S / MCMASTER CHAIR IN AGING

Dr. Sharon Marr



The impact of COVID-19 on frail older adults has been unprecedented and the need to reduce the gaps in care and improve the attitudes towards older adults has been critical. The Chair's vision and focus has been to accelerate the development of optimal care for older adults by supporting clinical and research programs which focus on innovative evidence-based care. Ongoing support for future scientists in the field of geriatrics and initiatives to enhance human resources, training, and access to specialized geriatric services has remained a priority. The Chair has also been committed to the development of equitable and inter-professional geriatric educational programs nationally and internationally. Proudly, the Chair has supported the Geriatric Certificate Program (GCP) and its expansion of its e-learning programs. There have been over 1,000 healthcare workers registered across Canada and internationally, and of those, approximately 350 have graduated.

The Chair has supported the recognition of essential care providers and the inaugural Senior Community Development Investment fund in partnership with the Division of Geriatric Medicine, Hamilton Health Sciences and the Regional Geriatric Program Central. The Chair has continued to promote and support many educational programs such as the Annual Geriatric Education day and the Department of Medicine, Division of Geriatric Medicine Life-Long Achievement Award. In 2018, Dr. Christopher Patterson was the recipient and other distinguished recipients included Dr. John Kelton in 2019. In recognition of essential workers, the Chair partnered with the Planning Committee in 2020 for the 10th Annual Geriatric Education Day to recognize the following healthcare workers in the Hamilton, Niagara, Haldimand, and Brant and Waterloo/Wellington regions, for their exemplary care and compassion during the COVID-19 pandemic: Sherry Fjell is a Personal Support Worker, Team Lead at Acclaim Health and Community Services; Michelle Barclay is a Victim Support Coordinator at Halton Regional Police – Victim Services Unit; and Sandy Croley is the Executive Director of Foxridge Care Community.

The Chair has proudly supported scientists including: Drs Courtney Kennedy, George Ioannidis, Patricia Hewston, and Justin Lee, and their research to reduce frailty and improve the mental health, mobility, medication use and independence of older adults, as well as Dr. Sarah Sztramko and her scholarly activities on empowering older adults and healthcare workers. In addition, the Chair has supported the research activities of our future scientists at the McMaster University Undergraduate Medical School Research Day and in the McMaster Phone-a-Friend Program.

The accomplishments of the current St. Peter's/McMaster Chair of Aging would not have been possible without the leadership, mentorship, and support by the following: Drs Paul O'Byrne, John Kelton, Mark Crowther, Barry Lumb, Khalid Azzam, Alexandra Papaioannou, Ameen Patel, Parveen

## ENDOWED CHAIRS AND PROFESSORSHIPS

Wasi, Rob Whyte, Christine Ribic, Samaan Constantine, the Department of Medicine Administration Staff, St. Peter's Hospital Foundation/ Hamilton Health Sciences, Pearl Veenema, Sharon Pierson, Estate of Lindsay Thompson, Division of Geriatric Medicine, Geriatric Certificate Program (GCP) and Regional Geriatric Program Central and its partners including older adults and their caregivers, Continuing Health Science Education Program, Kevin Sulewski, Clare Mitchell, Graeme Matheson, GERAS team, Loretta Hillier, Stephanie Morrow, Brandon Van Dam, Lynn Pacheco, Lily Consoli, Jane McKinnon-Wilson, Jenny Siemon, Michelle Doherty, and David Jewell. ■

## WILLIAM J. WALSH CHAIR IN MEDICINE

Dr. Judah Denburg



Dr. Denburg continues to actively contribute to clinical, educational, and research endeavours in academic internal medicine. He attends to one of the largest and most intensive specialist academic internal medicine practices in Canada, with a focus on immune aspects of disease affecting many organ systems. Dr. Denburg's patients present with complex medical problems, continuing to provide a rich resource for teaching medical trainees and other health professionals. Dr. Denburg has helped to form a growing, multidisciplinary Lupus Group, which is building pioneering patient-centred databases and clinical trials capacity in autoimmune disorders at McMaster.

Dr. Denburg's longstanding research interest has been in the mechanisms of allergic inflammation, with particular emphasis on hemopoietic cytokines and their role in activating the differentiation and recruitment of inflammatory cells such as eosinophils, basophils, and mast cells. He has established world-renowned expertise in the growth and differentiation of human basophil and eosinophil progenitors in relation to allergic responses in allergic rhinitis, nasal polyposis and asthma, pinpointing the biological importance of hemopoietic mechanisms in allergic inflammation, and the now globally-recognized links among rhinitis, asthma, and other allergic disease manifestations ("allergy as a systemic disease"). Recently, Dr. Denburg has pivoted his lab's capabilities in immunophenotyping to investigate the immune correlates of SARS-CoV2 infection and vaccination in several clinical and community settings, as a co-investigator on four new peer-reviewed grants, and mentor/colleague of basic and applied biomedical scientists at McMaster and across Canada.

As founder, former Scientific Director and CEO of AllerGen NCE Inc. from 2004-2019, Dr. Denburg created a strong and unified national research and training community in allergic disease, bringing together academics, researchers and students from 50 disciplines and 30 affiliated Network universities and hospitals into multi-sectoral partnered teams, which are still spawning national and international connections and visibility. The William J. Walsh Chair has been a critically important asset in support of Dr. Denburg's role in developing and maintaining these major international efforts and activities, which have translated his and his colleagues' discoveries and knowledge into novel biomarkers, therapies, and directions of research for the next generation. ■

# Reports: Canada Research Chairs

## CANADA RESEARCH CHAIR IN ALLERGY AND IMMUNE TOLERANCE

Dr. Mark Larché



Dr. Larché was appointed Canada Research Chair in Allergy and Immune Tolerance in September 2006. This chair was renewed in 2013 and the second and final term completed in August 2020. Dr. Larché's group is based at both McMaster University Medical Centre and St. Joseph's Healthcare. For the 2018-2020 period, the group consisted of approximately 12 researchers including postdoctoral fellows, project managers, technicians, graduate students, undergraduate co-op/thesis students, and a part-time clinical study coordinator. The laboratory continued to investigate the pathogenesis and treatment of a variety of chronic inflammatory diseases including allergic rhinitis and asthma (NIH, CIHR, Adiga Life Sciences Inc), peanut allergy (Aravax Pty), rheumatoid arthritis (CIHR, Adiga Life Sciences Inc), scleroderma (Hamilton Scleroderma Group), the role of complement proteins in transplant rejection (graft versus host disease), and autoimmune thrombocytopenia. Funding has come from CIHR, the National Institutes of Health (USA), Aravax Pty (Australia) and Adiga Life Sciences Inc. Dr. Larché continued to develop and evaluate peptide therapies for allergic disease in close collaboration with Aravax Pty (Australia), and Adiga Life Sciences. Clinical efficacy of a peanut allergy vaccine was established in a pre-clinical model of anaphylaxis. A pre-clinical model of rheumatoid arthritis was established during this reporting period. Collaboration with colleagues at UBC and Queen's University led to the identification of potential biomarkers of efficacy in peptide immunotherapy. Dr. Larché's group continues active collaborations nationally and internationally (Australia, UK, USA, Canada (UBC)) and with other researchers based at McMaster University and St. Joseph's Healthcare including members of the Department of Biochemistry & Biomedical Science, the Department of Pathology & Molecular Medicine, the Department of Medicine (Divisions of Clinical Immunology & Allergy, Rheumatology, Nephrology, Respirology and Hematology & Thromboembolism), and the Department of Chemical Engineering. ■

Canada  
Research  
Chairs



## CANADA RESEARCH CHAIR IN ETHNIC DIVERSITY AND CARDIOVASCULAR DISEASE

Dr. Sonia Anand



In April 2011, Dr. Anand received the Canada Research Chair in Ethnic Diversity and Cardiovascular Disease. This CRC was renewed in 2018. The goal of the chair includes:

1. Identifying health behaviours (dietary and activity) and genetic determinants of abdominal obesity in related cardiometabolic risk factors in adults of diverse ethnic origin,
2. Evaluating interventions aimed at lowering CV and diabetes risk in high risk ethnic groups.
3. Investigating the impact of the *in utero* environment, maternal fetal-genetics and epigenetics together with early life behaviours on the development of cardio-metabolic traits among South Asian and Aboriginal people.

Dr. Anand and her colleagues are conducting this work in two CIHR team grants (NutriGen and Metabolomics) aimed at understanding the early origins of chronic diseases by studying the nutritional, genetic, epigenetic, metabolomic, and microbiome associations with cardio-metabolic phenotypes and allergic disorders among 5,500 newborns from the CHILD, FAMILY, START and ABC birth cohort studies.

Dr. Anand supervises three post-doctoral fellows and two PhD students as part of this research program.

Key Recent Publications reflecting this work include:

- 1 De Souza RJ, Bilodeau N, Gordon K, Davis AD, Cranmer-Byng M, Stearns JC, Gasparelli K, Davis Hill L, **Anand SS**, Entsisewat'kari:teke (You Will Be Healthy Again): Clinical Outcomes of Returning to a Traditional Haudenosaunee Diet. *Int J Indigenous Health* 2021 (In Press)
- 2 Zulyniak MA, de Souza RJ, Shaikh M, Ramasundarahettige C, Tam K, Williams N, Desai D, Lefebvre DL, Gupta M, Subbarao P, Becker AB, Mandhane PJ, Turvey ST, Moraes TJ, Azad MB, Theo KK, Sears MR, **Anand SS**. Ethnic differences in variation in maternal diet in pregnancy and infant eczema. *PLoS One* May 14;15(5):e0232170.
- 3 Shanmuganathan M, Kroezen Z, Gill B, Azab S, de Souza RJ, Teo KK, Atkinson S, Subbarao P, Desai D, **Anand SS**, Britz-McKibbin P. The Maternal Serum Metabolome by Multisegment Injection-Capillary Electrophoresis-Mass Spectrometry: A High Throughput Platform and Standardized Data Workflow for Large-scale Epidemiological Studies. *Nat Protoc* 2021 Mar 5. Doi:10.1038/s41596-020-00475-0
- 4 De Souza RJ, Lamri A, Shanmuganathan M, **Anand SS**. Maternal diet and the serum metabolome in pregnancy: robust dietary biomarkers generalizable to a multi-ethnic birth cohort. *Curr Dev Nutr* 2020 Sep 2;4(10):nzaa144
- 5 Lamri A, Mao S, Desai D, Gupta M, Paré G, **Anand SS**. Fine-tuning of Genome-Wide Risk Scores and Prediction of Gestational Diabetes in South Asian Women. *Scientific Reports* June 2020;10(1):8941. ■

## CANADA RESEARCH CHAIR IN INFLAMMATION, MICROBIOTA AND NUTRITION

Dr. Elena F. Verdú



Dr. Verdú's CRC program explores host-microbial and dietary interactions in gastrointestinal diseases. Her research aims at deciphering commensal and opportunistic pathogen metabolism of dietary antigens and how that process affects their inflammatory capacity in the host. In addition to her own research lab, Dr. Verdú is the director of the Axenic and Gnotobiotic facility at McMaster University that breeds and provides germ-free mice for investigators within McMaster University and beyond.

During 2019-20, Dr. Verdú has published **23** peer-reviewed papers (20 original papers, including one meta-analysis, and 3 reviews) in top journals of her field (*Gastroenterology*, IF:17,37 and *Gut*, IF:19,8) as well as in general journals (*Nature Communications*, IF:12,12 and *Science Translational Medicine*, IF:16,3). Work published during 2019-20 discovered that in celiac disease, bacterial elastase stimulates innate immunity through PAR-2 signaling in the small intestine. The results bear profound implications to the pathogenesis of celiac disease as it could provide a second signal, independent of gluten exposure, for the worsening of gluten-induced pathology in genetically predisposed hosts. A study published in *Science Translational Medicine* also identified that the essential amino acid, tryptophan, present in foods such as poultry, bananas and chocolate, is poorly metabolized by gut microbes present in the duodenum of celiac patients, leading to impaired activation of the aryl hydrocarbon receptor in the intestinal mucosa and inflammation. She also identified lactobacillus strains capable of metabolizing tryptophan into indoles, which in mice, rescued the microbiota impairment to metabolize tryptophan, improving gluten immunopathology.

The novel pathways discovered by Dr. Verdú's work in celiac disease have stimulated significant food and pharma industry interest and investment in the form of grants and product pipelines (Nestle, Biocodex, Takeda), as well as international collaborations with highly renowned scientists such as Professor Harry Sokol, INRAe, France. A recent meta-analysis in collaboration with a recently recruited young talent, Dr. Ines Pinto-Sanchez, confirmed that there is a 4-fold increased risk to suffer from celiac disease in patients with a previous diagnosis of inflammatory bowel disease (IBD), and a 9-fold risk to suffer from IBD, in patients with a diagnosis of celiac disease. The results can impact clinical management, screening practices and development of novel therapeutic interventions. Not surprisingly, the study has triggered significant interest from patient associations (CCC, CCA), as well as investigation of common mechanisms that could be at play in both diseases. Indeed, recent work from Dr. Verdú's lab in collaboration with Professor Ken Croitoru at University of Toronto and the GEM study cohort ([www.gemproject.ca](http://www.gemproject.ca)) and published in *Gastroenterology* demonstrated that individuals at risk for IBD, exhibit a pre-disease phenotype characterized by increased microbial proteases. Key implications include the potential for a noninvasive early biomarker of disease progression as well as bacteriotherapy using next generation probiotics that produce anti-proteases. Dr. Verdú was honoured by the 2019 CAG Education Excellence Award, the 2020 CAG Research Excellence Award, and the 2020 Crohn's and Colitis of Canada (CCC)-Pfeizer Women in IBD: Outstanding Research Achievement Award. She continues to be funded by CIHR and CCC to industry grants by Biocodex (France), and Gilead (USA). ■

## CANADA RESEARCH CHAIR IN INTERDISCIPLINARY MICROBIOME RESEARCH

Dr. Michael Surette



The human microbiome, the collection of microbes that live on and in the human body, are now widely recognized as contributing to almost all aspects of human biology. Dr. Surette has established a broad and highly collaborative research program addressing the mechanisms by which the microbiota contribute to human health and disease throughout the course of life. This includes the development of the microbiome in infants, and changes that occur in the elderly. His lab has expertise in developing culture-independent and culture-based approaches to characterize and exploit the microbiome. The ability to culture the human microbiome is driving new research into bioprospecting the human microbiota's natural product diversity for bacteria/bacterial products with therapeutic applications. The lab is carrying out microbiome analysis for several cohort studies including two large national initiative CHILD Cohort Study and the IMAGINE SPOR network.

During the reporting period, Dr. Surette gave 21 presentations and the Surette lab contributed to 40 peer reviewed publications. The collaborative nature of his research is reflected in his co-author network which includes 34 different McMaster University faculty. In 2018, he was the Canadian Society of Clinical Chemists Travelling Lecturer for 2018. His research was supported by operating grants from Genome Canada, Canadian Institutes of Health Research, Cystic Fibrosis Canada, Crohn's and Colitis Canada, and the Weston Family Microbiome Initiative. Dr. Surette is a co-applicant on several CIHR funded team grants. Dr. Surette is co-director of McMaster's Farncombe Metagenomic Facility and with support from the Canadian Foundation for Innovation he has expanded the sequencing capacity and sequencing technologies in that facility. ■

Number of papers submitted by the Surette lab during the reporting period



## CANADA RESEARCH CHAIR IN METABOLISM, OBESITY AND TYPE 2 DIABETES

Dr. Gregory Steinberg



Dr. Steinberg was awarded the Tier 1 Canada Research Chair in 2018 after 10 years as a Tier 2 Canada Research Chair during which time he was awarded several prominent national and international awards (*American Diabetes Association Outstanding Scientific Achievement Award, Diabetes Canada Young Scientist Award, Endocrine Society Richard E. Weitzman Award, CIHR Gold Leaf Prize for Early Career Research*).

Dr. Steinberg's research as Canada Research Chair in mechanisms regulating energy sensing has formed the basis for the development of several new classes of therapeutics. Specific highlights include the approval of the ATP citrate lyase (ACLY) inhibitor bempedoic acid for the lowering of LDL-cholesterol and small molecules targeting AMP-activated protein kinase (AMPK), and the approval for Acetyl-CoA Carboxylase (ACC) entering phase 2/3 clinical trials for non-alcoholic steatohepatitis (NASH).

Research and educational accomplishments since starting the Tier 1 CRC in 2018 include: the graduation of 5 PhD and 5 MSc. students, receiving funding for a CIHR Foundation Grant and the delivery of over 30 invited presentations at national and international meetings (including 3 plenaries). During this time period Dr. Steinberg's research team also published 26 peer-reviewed manuscripts highlighted by:

- 1) A comprehensive invited review article on the physiological significance and therapeutic possibilities of targeting the AMP-activated protein kinase (Steinberg and Carling *Nature Reviews in Drug Discovery* 2019).
- 2) The discovery that inhibiting lipid synthesis, by targeting two key phosphorylation sites on acetyl-CoA carboxylase, can reduce liver cancer in mice (Lally et al. *Cell Metabolism* 2019).
- 3) That the type 2 diabetes medication metformin reduces body mass and blood glucose, in mice and humans, by enhancing the production of a hepatocyte derived endocrine factor called growth differentiation factor 15 (Day et al. *Nature Metabolism* 2019). ■

## CANADA RESEARCH CHAIR OF RESEARCH TRANSFER IN INTENSIVE CARE

Dr. Deborah Cook



An extraordinary ferment of courage and collaboration on the part of the interdisciplinary ICU team during the pandemic has been essential to understand and mitigate the ravages of COVID-19. The McMaster ICU community mounted a rapid, effective, multi-faceted clinical response to this devastating pandemic, and a renewed sense of purpose was avowed. In addition, while ICU research has always been important, it clearly became a global priority during the pandemic – despite innumerable barriers.

Rising to the pandemic challenge was the adaptive trial design, which accelerated the evaluation of COVID-19 therapies. Adaptive trials hold the promise of minimizing harm to participants by exposing fewer patients to the treatment burdens and risks, while maximizing treatment benefits for the greatest number of participants. Unlike conventional trials, protocol modifications are expected rather than discouraged, such as enriching, refining, or repressing enrollment of patients with particular genetic, physiological, or clinical profiles. Anticipated modification to the interventions in adaptive trials are additions (newly identified auspicious therapies); adjustments (changes to or deletion of unfavorable drugs or devices); and abandonment (for reasons of benefit, harm, futility, or supply shortages). The previous influenza A (H1N1) pandemic had taught the ICU community how to uphold research ethics, ensure staff safety, reduce regulatory redundancy, and develop protocols for “sleepier trials” in advance of when they would be required --- to accelerate the acquisition of answers once a pandemic arrives. For example, REMAP-CAP (Randomized Embedded Multi-factorial Adaptive Platform Trial for Community Acquired Pneumonia) was augmented with a pandemic treatment domain.

Hundreds of critically ill patients in Hamilton ICUs were offered the opportunity to participate in

many other randomized trials developed locally, nationally and internationally. The Canadian Treatment for COVID-19 (CATCO) Trial was launched – seamlessly woven into the adaptive World Health Organization SOLIDARITY Trial. Observational studies also advanced our knowledge of pathophysiology, immunology, diagnosis, prognosis, and palliation for patients with COVID-19. Infection control measures necessary during the pandemic heralded many adaptations to end-of-life care, generating practical and psychological consequences for all stakeholders. Restricted family presence and mandatory PPE motivated clinicians to make more intentional efforts to learn about their patients, affirm therapeutic presence, address communication barriers, and prevent unmarked deaths.

Concurrent with the flurry of trial activity to address COVID-19, directives emerged to shut down non-pandemic research. While clinical research was prioritized to advantage patients with COVID-19, we believed it should not unduly disadvantage patients without COVID-19. The pandemic required us to adopt a public health ethics approach, prioritizing community and population health as much as the health of individuals. Throughout each wave of the pandemic, timely, rigorous, and relevant clinical research has been needed to improve the care and optimize outcomes for patients with as well as those without COVID-19. Further, many critical care studies that were not exclusively focused on COVID-19 remained relevant to patients with COVID-19.

Accordingly, we developed criteria to pause or pursue non-pandemic research during the pandemic. Considerations acknowledged the status of the pandemic, and the capacity and safety of bedside and research personnel. Our framework evaluated aspects of the research process for each study - such as the consent

## CANADA RESEARCH CHAIRS

model, intervention complexity, data collection methods, research oversight, and infection control concerns such as use of PPE. Working with the Hamilton Integrated Research Ethics Board, hospital leadership and university scholars, we published criteria to guide continuation of non-pandemic research during the pandemic that were proportionate, transparent, informed by key stakeholders, and revisited as the pandemic

abated. These have been used around the world.

The devastation of COVID-19 for humanity will be felt for years to come. Critical care will never be the same. The pandemic demanded responsiveness and resilience in critical care medicine, sparking ingenuity clinically, administratively, and academically. Reflecting on lessons learned, we emerge stronger, ready for the next challenge. ■

## CANADA RESEARCH CHAIR IN RESPIRATORY MUCOSAL IMMUNOLOGY

Dr. Jeremy Alexander Hirota



Dr. Hirota, Assistant Professor of Medicine, was appointed Canada Research Chair in Respiratory Mucosal Immunology in April 2017. During the July 1, 2018 to June 30, 2020 period Dr. Hirota has supervised 9 undergraduate students, 10 graduate students (1 has received their degree – all others are actively enrolled) and 3 postdoctoral fellows. Dr. Hirota's directly supervised students are based at St. Joseph's Research Institute within the Firestone Institute for Respiratory Health and the McMaster Immunology Research Centre on main campus. Dr. Hirota co-supervises students at the University of Waterloo (Adjunct) and University of British Columbia (Affiliate) through appointments at these institutes.

Dr. Hirota's interdisciplinary lung immunology research program stems from molecule to population level projects, with the vision to study how the air that is inhaled impacts lung health and disease. From the basic science level, Dr. Hirota's group is exploring how 3D microenvironments impact lung cell biology and immune responses. As a member of the School of Biomedical Engineering, Dr. Hirota works with his colleagues to develop bespoke

experimental systems to simulate mechanical forces experienced by lung cells and tissues. At a translational level, Dr. Hirota is establishing a cannabis research program that explores in cells, mice, and humans how combustion of this now legal plant impacts host immunity to viruses. Dr. Hirota functions as a lead of the lung working group within the McMaster University Centre for Medicinal Cannabis Research. At a population level, Dr. Hirota has taken his expertise and established a program in host-immunity to explore how an individual's response during early SARS-CoV-2 positivity could predict outcomes in COVID-19 patients. Digital health solutions are being explored to monitor host immunity in a scalable format that can have population reach. An overarching vision of all of these research programs is to achieve traditional academic metrics as well as commercialize any research outputs to ensure maximum socio-economic benefit is realized.

Support for Dr. Hirota's program comes from NSERC, CIHR, CFI, SickKids, Ontario Lung Association, Roche, Ontario Government, and the Thistledown Foundation. Dr. Hirota has an H-Index of 27 and 2481 total citations. ■

## CANADA RESEARCH CHAIR IN THROMBOSIS

Dr. Jeffrey Weitz



Dr. Weitz has held this Tier 1 chair since 2001. The chair was renewed in 2008 and again in 2015. This chair provides salary support for Dr. Weitz and has been used to fund his research program. In addition to the chair, the Canada Foundation for Innovation has twice provided funds to purchase state-of-the-art equipment that is used by Dr. Weitz and other investigators at the Thrombosis and Atherosclerosis Research Institute. Focusing on thrombosis, this chair facilitated (a) the successful Canadian Institutes of Health Research (CIHR) Team Grant in Venous Thromboembolism that was awarded to Dr. Weitz and the McMaster Thromboembolism Group in 2006 and provided \$4.2 million over seven years, (b) the \$35 million Canadian Foundation for Innovation award for Large Scale Institutional Endeavors that provided one-third of the funding for the David Braley Research Institute at the Hamilton General Hospital site, (c) the CIHR Foundation Grant awarded to Dr. Weitz, which will provide \$2.8 million over 7 years, and (d) Heart and Stroke Foundation awards that provide additional funds to Dr. Weitz's research program. Current research projects are focused on the characterization of new regulators of the contact system of blood coagulation, novel methods for rendering blood-contacting medical devices less thrombogenic and basic and clinical studies of inhibitors of factor XI and factor XII. ■

Canadian Foundation  
for Innovation Award  
for the Large Scale  
Institutional Endeavour

