# Reports: Research Institutes

## POPULATION HEALTH RESEARCH INSTITUTE

*PHRI Executive Committee discuss new research initiatives.*

The Population Health Research Institute (PHRI) continues to strengthen its research capacity, expertise and international recognition. This starts with a strong operational and scientific leadership team and strategic direction from our executive director. The Executive of PHRI is comprised of:

SALIM YUSUF
EXECUTIVE DIRECTOR

HERTZEL C. GERSTEIN
DEPUTY DIRECTOR

JANETTE PANHUIS
CHIEF OPERATING OFFICER

Here are our Scientific Program Leads:

P.J. DEVEREAUX
PERIOPERATIVE MEDICINE & SURGERY

STUART CONNOLLY
ARRHYTHMIA

ROBERT HART
STROKE

SHAMIR MEHTA
ACUTE CORONARY SYNDROME

SONIA ANAND
POPULATION HEALTH

SALIM YUSUF
GLOBAL HEALTH + PREVENTION

HERTZEL C. GERSTEIN
PREVENTION



PHRI has created an environment to develop scientific research expertise, provide mentorship to junior and mid-career researchers and provide recognition as researchers' progress in their careers. We have done this by establishing scientist designations at different levels of seniority with varying levels of accomplishments, responsibilities, and expectations of productivity. Currently PHRI has 49 researchers and the number of individuals at specific scientific designation levels are as follows:

- 13 senior scientists
- 10 scientists
- 21 investigators
- 5 research fellows

PHRI established two new research chairs in 2016 through contributions from PHRI, PHRI scientists and McMaster Department of Medicine. The new chairs created were awarded to:

- Dr. John Eikelboom – Jack Hirsh Professorship in Thrombosis Research
- Dr. Jeff Healey – PHRI Chair in Cardiology Research

These chairs are in addition to the current chairs held by several of our researchers bringing the total chairs held by PHRI researchers to 11.

| Year | Chairs | Researcher |
|---|---|---|
| 1998 | Heart and Stroke Foundation of Ontario Chair in CVD | Salim Yusuf |
| 2001 | Population Health Institute Chair in Diabetes Research | Hertzel Gerstein |
| 2006 | Salim Yusuf Chair in Cardiology | P.J. Devereaux* |
| 2008 | Heart and Stroke Foundation / Michael DeGroote Chair in Population Health Research | Sonia Anand* |
| 2009 | Canada Research Chair in Genetic and Molecular Epidemiology (Tier II) | Guillaume Pare |
| 2011 | Canada Research Chair in Ethic Diversity and CVD (Tier I) | Sonia Anand |
| 2014 | Heart and Stroke Foundation Chair in Cardiovascular Nursing | Michael McGillion |
| 2015 | Marta and Owen Boris Chair in Stroke Research | Ashkan Shoamanesh |
| 2016 | Canada Research Chair in Perioperative Medicine (Tier I) | P.J. Devereaux |
| 2016 | Population Health Institute Chair in Cardiology Research | Jeff Healey |
| 2016 | Jack Hirsh/PHRI Professorship in Thrombosis Research | John Eikelboom |

*These individuals also hold Canada Research Tier 1 chairs

In addition, PHRI has agreed to contribute $500,000 towards a new chair in the School of Nursing in honor of Dr. Heather Arthur.

PHRI holds four international lectureships annually to bring new ideas and discussion into our environment. The lectureships which PHRI currently hold are:

- Arnold Johnson Memorial Lectureship in its 17th year
- PHRI Lectureship in Anesthesiology, Perioperative Medicine and Surgical Care in its 4th year
- PHRI International Population Health Sciences Lectureship in its seventh year
- Janice Pogue Lectureship in Statistical Methodology was inaugurated in 2017.

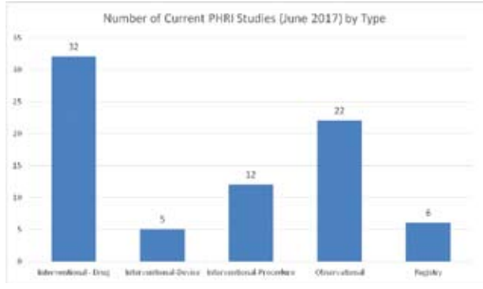
This year, during the PHRI annual scientific retreat, four new initiatives were identified, for which PHRI has provided seed funding. They include:

1. Centre for Data Sciences – collaboration with ICES
   Lead: Shrikant Bangdiwala
2. Digital Health – Centre for Digital Health Research
   Leads: Mike McGillion, Ted Scott
3. Biobank Centre for Advanced Biomarker and Genetics
   Leads: Gui Pare, Hertzel Gerstein
4. Aging, Frailty, Physical and Cognitive function and Multi-morbidity
   Leads: Darryl Leong

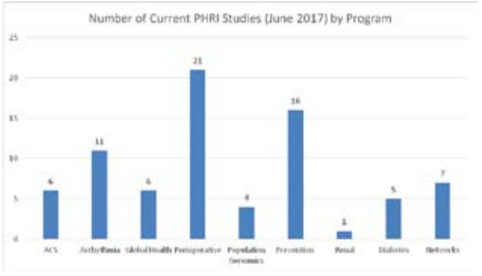
## Awards and Recognition (July 1, 2016 – June 30, 2017)

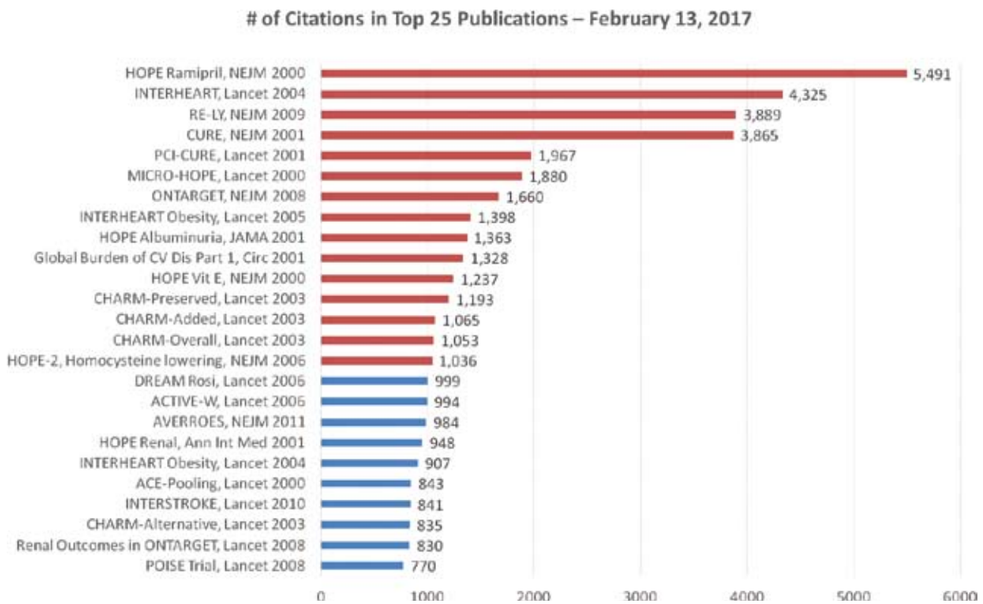
| | | |
|---|---|---|
| Andrew Mente | 2017 | Robert E. Beamish Award, Canadian Cardiovascular Society (CCS) |
| Maura Marcucci | 2017 | Recognized as meeting the criteria for Associate Professor at the Italian National Scientific Evaluation |
| Emily Belley-Cote | 2017 | Faculty of Health Sciences Graduate Programs Excellence Award |
| | 2016-2019 | Canadian Institutes of Health Research - Frederick Banting and Charles Best Graduate Scholarship – Doctoral Award |
| Sonia Anand | 2017 | McMaster Golden Z's Hall of Fame, McMaster University |
| | 2017 | University Scholar, 2017-2020. McMaster University |
| | 2016 | Canadian Cardiovascular Society, Dr. Harold N. Segall Award of Merit in recognition of a significant contribution to the prevention of cardiovascular disease |
| Dorairaj Prabhakaran | | One of PHRI's International Scholars, named the top researcher in Medicine, in India by a study conducted by Scopus and the Department of Science and Technology. |
| Salim Yusuf | 2017 | Prof. Roy Chaudhury Memorial Oration, Delhi, India |
| | 2017 | Honorary Member of the Peruvian Society of Cardiology |
| | 2016 | Canadian Society of Cardiac Surgeons - awarded the Bigelow Lecture |
| | 2016 | Honorary Fellow of the Cardiological Society of India |
| Richard Whitlock | 2017 | Mid-Career Investigator Award, 2017-2021. Heart and Stroke Foundation of Canada |
| | 2017-2020 | Department of Surgery Chair's Award for Distinction in Research, McMaster University, Hamilton, Ontario |
| Michael McGillion | 2016-2018 | Heart and Stroke Foundation Council on Mission: Priorities, Advice, Science and Strategy (COMPASS), Honour |
| | 2016 | Heart and Stroke Foundation - Appointed Spokesperson, Honour |
| Michael Walsh | 2016 | Canadian Society of Nephrology/Amgen New Investigator Lectureship Peer reviewed award for top new investigators in nephrology in Canada $3400 |
| John Eikelboom | 2016-2021 | Jack Hirsh/PHRI Chair in Thrombosis and Atherosclerosis Research |
| P.J. Devereaux | 2016 | Canadian Society of Clinical Chemist Award for Innovation in Laboratory Medicine in 2016, for conducting the VISION Study – Cardiac troponin measurements in the noncardiac surgical population. This was a team award based on the study in which P.J was the Principal Investigator. |
| | 2016 | Listed in the Clarivate Analytics 2016 Highly Cited Researchers list, formerly known as Thomson Reuter's annual publication of The World's Most Influential Scientific Minds. |
| | 2017 | Recipient of the 2016-2017 Jack Hirsh Award for Outstanding Academic Achievement in the Department of Medicine in the Faculty of Health Sciences at McMaster University. This award identifies one senior faculty member in the Department of Medicine whom has exemplified excellencein research and academic endeavours. |
| Ashkan Shoamanesh | 2017 | Heart and Stroke Foundation of Canada Emerging Research Leaders Initiative Award |
| | 2017 | Executive Committee (Chair), Canadian Hemorrhagic Stroke Trials Initiative (CoHESIVE) |
| | 2016 | In the top 10 per cent of the abstracts presented at the 2016 International Stroke Conference (2 abstracts: Stroke. 2016:47:A120, and Stroke. 2016;47:A49) |
| Jessica Spence | 2017 | Outstanding Resident Award: Hamilton Health Sciences Medical Staff Association for Excellence in clinical and academic practice |

Number of current PHRI studies (June 2017) by Type



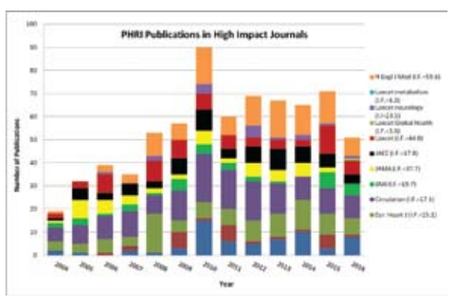

Number of current PHRI studies (June 2017) by Program

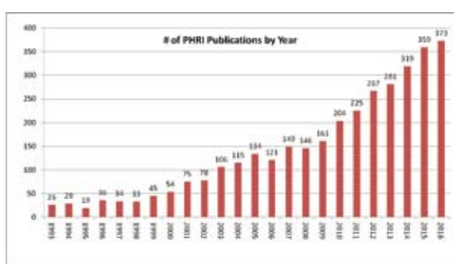





# $500,000

Towards a new chair in the School of Nursing in honor of Dr. Heather Arthur






## THROMBOSIS & ATHEROSCLEROSIS RESEARCH INSTITUTE (TAARI)

The Thrombosis & Atherosclerosis Research Institute (TaARI), occupies three floors of the David Braley Research Building at the Hamilton General campus. This state-of-the-art research institute has facilitated the melding of basic and clinical research, thereby enabling a seamless "bench to bedside and back again" approach to complex health care problems. TaARI's mission is *to reduce death and disability from thrombotic disease by conducting research into the pathogenesis, prevention, diagnosis and treatment of thrombosis and vascular death.*

TaARI's core of faculty-level investigators consist of clinician-scientists and scientists who span the spectrum from new to well-established investigators. Projects range from in vitro and in vivo basic research to regional, national and/or international Phase II or III clinical trials to health outcomes research and the development of innovative approaches to knowledge translation.

Partnerships with other research institutes enable TaARI researchers to collaborate in research on genetic and environmental influences on venous and arterial thrombosis at the regional, national and international level and to further explore the utility of new antithrombotic drugs for prevention and treatment. As well, there are well-established research links with the Ontario Clinical Oncology Group, which provides a platform for collection and analysis of clinical trial data, and enables TaARI researchers to access the front lines of research on the pathogenesis, diagnosis and treatment of thromboembotic events in patients with cancer.

Dr. Jeffrey Weitz, executive director, continues to provide leadership to the core research programs at TaARI which include:

**Experimental Thrombosis and Atherosclerosis (ETA) Program**, which under the directorship of Dr. Weitz, conducts fundamental research on the interplay among thrombosis, atherosclerosis, diabetes, obesity, cancer, and inflammation.

PROGRAM LEADERS

DR. JEFFREY WEITZ
EXPERIMENTAL THROMBOSIS & ATHEROSCLEROSIS (ETA) PROGRAM

DR. SAM SCHULMAN
CLINICAL THROMBOEMBOLISM PROGRAM (CTP)

ROBIN ROBERTS
BIOMETRICS GROUP

**Clinical Thromboembolism Program (CTP)**, is led by Dr. Sam Schulman and performs research that informs optimal prevention, diagnosis and treatment of patients with thrombotic problems, as well as research in knowledge translation aimed at optimal transfer of this information to the bedside and the community. This city-wide program includes all Hamilton Health Sciences hospital sites, as well as St. Joseph's Healthcare Hamilton, and provides clinical care to patients in the hospital and in the community who have, or are at risk for, thrombotic disorders.

**Comparative Medicine Program**, which is under the directorship of Dr. Shawn Petrik and focuses on the translation of basic research findings into clinically relevant models prior to evaluation in humans.

**Biometrics Group**, which is led by Professor Robin Roberts and provides biostatistical support for all faculty and students in the various TaARI programs. Professor Roberts also leads the statistical core for the Neonatal Research Program, which is led by Dr. Barbara Schmidt.

TaARI's priorities continue to include (a) creating translational research rounds to foster collaboration between basic and clinical researchers, (b) targeted recruitment to build critical mass, (c) create an Endowed Chair as a vehicle for succession planning, (d) explore new avenues of funding to build collaborations and to diversify research investments. In 2016, the Royal College of Physicians of Canada approved a Certificate of Special Competence in Adult Thromboembolism. The Director of this certificate program is Dr. V. Bhagarath from TaARI's Clinical Thromboembolism Program.

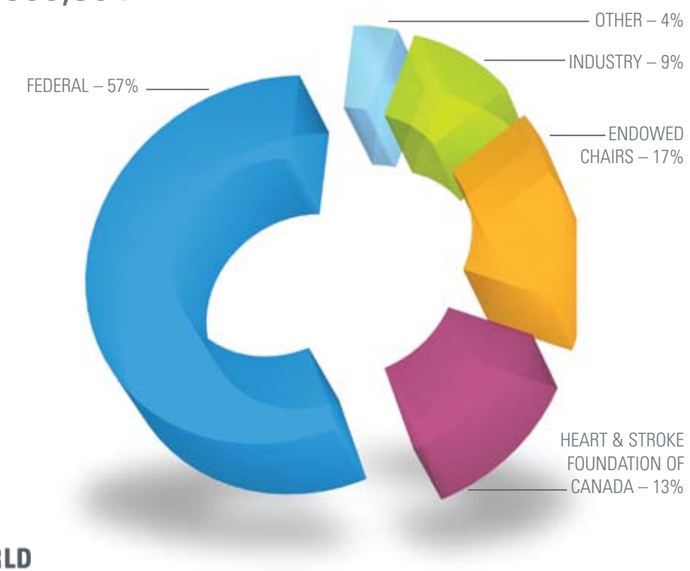
TaARI has been referred to as an "education engine" and is one of its strengths. Consistent with its academic mission of providing an excellent environment for learners, during 2016-17, TaARI had nine postdoctoral fellows, 10 Ph.D.

candidates, 28 M.Sc. candidates and 31 undergraduates, summer students and volunteers. Some of these students are still in training. With state-of-the-art laboratories, TaARI provides an environment conducive to learning. In fact, the environment is so collaborative and positive that many M.Sc. students continue on with TaARI principal investigators to pursue a Ph.D.

TaARI investigators design and teach medical science courses; supervise clinical and research students; participate in transfer, selection and thesis defense committees; and serve as thesis and research supervisors. In doing so, they make important contributions to developing the next generation of undergraduate and postgraduate students in medicine, medical sciences, biochemistry, bioengineering and allied health education and training. In addition to formal education activities, TaARI offers (a) seminar series for presentations by visiting scholars and experts, (b) a weekly seminar series that provides postdoctoral fellows masters and doctoral candidates with the opportunity to present their work to their peers, (c) a monthly trainee-led journal club and (d) am annual research day that provides learners with the opportunity to showcase their research. Clinician-scientists at TaARI are also involved in the design, implementation and assessment of resident training programs, both locally and through membership on professional and government bodies, nationally and internationally.

During 2016-17, seven of TaARI researchers were endowed chair holders. TaARI also held research funding at both McMaster University and Hamilton Health Sciences at just over $5 million from a variety of sources. Over half (57%) of TaARI's research support was derived from federal funding (CIHR, Canada Research Chair), 13% from the Heart & Stroke Foundation of Canada, 17% from Endowed Chairs, 9% from industry, and the remainder from international/regional courses. Hamilton Health Sciences and McMaster University continue to provide valuable support to help fund faculty and students, as well as operational funding for infrastructure. ■

## 2016-17 RESEARCH FUNDING BY SOURCE $5,006,364




## FIRESTONE INSTITUTE FOR RESPIRATORY HEALTH

*Dr. Martin Kolb of the Firestone Institute for Respiratory Health*

The Firestone Institute for Respiratory Health (FIRH) has been a world-renowned centre for the investigation and treatment of respiratory diseases for more than four decades. FIRH scientists and clinicians have, and continue, to contribute to ground-breaking respiratory research with global impact. FIRH faculty members have been at the centre of developing the Aerochamber for inhaled drug delivery to the respiratory system, the methacholine challenge test to assist in the diagnosis of asthma, and the exploration of sputum eosinophilia as biomarker for asthma management.

FIRH provides comprehensive inpatient and outpatient respiratory care as the regional respiratory centre for the City of Hamilton and the Hamilton Niagara Haldimand Brant Local Health Integration 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 health care professionals to treat, research, teach, and lead. The strength of FIRH continues to be its focus on improving patient outcomes.

FIRH's patient-centred focus on care is achieved through the tremendous efforts of allied health care professionals, including nurses, respiratory therapists and technicians, and through the efforts of FIRH's administrative staff. In 2016-2017, Firestone had 35,543 registrations including Sleep and Tuberculosis clinic patients. Over 21,000 of these patients underwent over 35,000 clinical tests during their visits with their physicians. The remaining patients seen in the clinic were referred from the community for pulmonology or allergy testing, without specialist consult. The total number of procedures performed, as testing may involve multiple procedures, is well in excess of 75,000.

In 2016-2017, the Firestone Institute for Respiratory Health proudly hosted numerous successful educational programs including the Michael T. Newhouse Lecture, the Frederick E. Hargreave Lectureship, the Aerosol School and various preceptorships in collaboration with industry partners. These educational programs and lectures were extremely well received and provide current and up-to-date information for healthcare professionals in the discipline of respirology.

The Firestone faculty and staff are very proud to have participated in Hamilton's Around the Bay Race and the Paris to Ancaster Race. Team FIRH raised $13,593 and received 1:5 match funding from the Ontario Graduate Scholarship Program bringing our total to $81,558! This funding will be used to support graduate students at McMaster University.

In 2016-2017, the McMaster University Adult Respirology Training Program in association with FIRH provided

LEADERSHIP AND STRATEGIC DIRECTION

PAUL O'BYRNE
DEAN & VICE PRESIDENT OF THE FACULTY OF HEALTH SCIENCES

STEWART PUGSLEY
CLINICAL DIRECTOR

GERARD COX
CLINICAL DIRECTOR

MARTIN KOLB
RESEARCH DIRECTOR, DIVISION DIRECTOR OF RESPIRATORY MEDICINE

REBECCA AMER
PROGRAM DIRECTOR FOR ADULT RESPIRATORY RESIDENCY TRAINING

LORI WHITEHEAD
INTERNAL MEDICINE RESIDENCY TRAINING PROGRAM

training to seven Respirology residents, 24 residents (on rotation), 30 electives, 20 medical students and six clinical fellows. FIRH research faculty supervised 10 full-time graduate students (candidates for Masters and for PhD) along with five postdoctoral fellows. In addition, FIRH hosted numerous placements for nursing students, respiratory therapist students, undergraduate and post-secondary work placements as well as countless hours of high school students earning mandatory community service hours.

FIRH conducts research to increase understanding of respiratory health and disease across the life cycle through collaborative basic and clinical investigations with the expectation of improving patient care. The proximity of research teams to clinical services has allowed conduct of highly relevant and well-powered clinical studies, and ensured rapid incorporation of new knowledge into the care of patients. This integration also strongly influences the education of physicians and allied health care professionals.

FIRH research is wide-ranging, from studies of smooth muscle physiology and intracellular signalling through experimental disease models to clinical trials and extends to population health and policy. The research productivity of FIRH is attested to by the high quality and impact of the peer-reviewed publications. In 2016, FIRH faculty were listed as authors on 186 peer-reviewed publications,

"The proximity of research teams to clinical services has allowed conduct of highly relevant and well-powered clinical studies"

— Dr. Martin Kolb

## FIRESTONE INSTITUTE'S PATIENT-CENTERED FOCUS

21,000 of these patients underwent over

**35,543**
Total number of clinic patients

**35,000**
clinical tests

**75,000**
Total number of procedures performed

including several in high-impact international publications. Since 2009, current FIRH faculty were listed as an author on over 600 peer-reviewed publications and presented their research at over 100 conferences and events throughout the world.

Firestone Institute for Respiratory Health continues to excel in diverse areas of research. Dr. Malcolm Sears is the director of the Canadian Healthy Infant Longitudinal Development study (CHILD), which has enrolled almost 3,000 infants across Canada. The Hargreave Sputum Laboratory at the Firestone Institute for Respiratory Health, under the leadership of Dr. Param Nair as medical director, is world renowned and attracts many clinical trials that aim at personalized medicine to treat severe asthma and COPD. Peptide immunotherapy for allergic diseases and asthma is another major research area, led by Dr. Mark Larché. Additionally, our researchers continue to investigate the basic mechanisms of airway and vascular smooth muscle cells in airway disease. The labs of Drs. Ask, Janssen and Kolb explore the cellular and molecular biology of pulmonary fibrosis with a substantial translational research. The addition of Dr. Nathan Hambly will enhance FIRH research in the area of pulmonary fibrosis and pulmonary hypertension. Dr. Jeremy Hirota joined the Firestone Institute in 2016 and will focus his research on mucosal immunology and is focused on lung health and disease. Funding for these research programs is provided by CIHR, CFI, the OTS, the NIH and other public agencies. Substantial support is also obtained through collaborative research with the pharmaceutical industry.

The Firestone Institute for Respiratory Health (FIRH) and the Guangzhou Institute for Respiratory Disease/ State Key Laboratory of Respiratory Disease (GIRD/SKLRD) in Guangzhou, China continue their formal collaboration which began in 2012. This collaboration has afforded unique opportunities for Canadian and Chinese researchers to present and collaborate on research projects in the areas of Asthma, COPD and interstitial lung diseases.

Providing leadership and strategic direction for the Firestone Institute in 2016-2017 were Dr. Martin Kolb, research director, and Dr. Stewart Pugsley and Dr. Gerard Cox, clinical directors. Members of the FIRH faculty hold important administrative posts locally including Dr. Paul O'Byrne, dean and vice president of the Faculty of Health Sciences; Dr. Martin Kolb, division director of Respiratory Medicine; Dr. Rebecca Amer, program director for Adult Respiratory Residency Training; Dr. Lori Whitehead, director, Internal Medicine Residency Training Program at McMaster University.

FIRH would also like to recognize the particular achievements of our faculty; Dr. Malcolm Sears who was a co-recipient of the J. Allyn Taylor International Prize in Medicine for his contributions to clinical research. Additionally, Dr. Param Nair was honoured with the 2016 Leadership Award for Health Research and Bastable-Potts Asthma Research Award.

Faculty and staff wish to acknowledge and thank those who continue to support the efforts of the Institute. In particular, we thank the St. Joseph's Healthcare Hamilton and its Foundation and the many people who contributed to support our clinical, research and educational initiatives this past academic year. ■

# AllerGen NCE INC.

AllerGen NCE Inc. (AllerGen), the Allergy, Genes and Environment Network is a national research network established in 2004 by Innovation, Science and Economic Development Canada (formerly Industry Canada) through the Networks of Centres of Excellence (NCE) Program.

AllerGen is hosted at McMaster University and led by Scientific Director and CEO Dr. Judah Denburg, William J. Walsh Chair in Medicine, professor of Medicine and director, Division of Clinical Immunology and Allergy.

AllerGen gratefully acknowledges ongoing support from McMaster University and especially Dr. Paul O'Byrne, dean & vice-president, Faculty of Health Sciences; Dr. Rob Baker, vice-president, Research; Dr. Stephen Collins, director, Farncombe Institute; and Dr. Patrick Deane, President and Vice-Chancellor, and a member of AllerGen's Board of Directors.

Led by internationally recognized Canadian researchers with expertise across a wide range of disciplines AllerGen's mission is to reduce the morbidity, mortality and socioeconomic burden of allergy, asthma and anaphylaxis for the benefit of Canadians and the global community.

Since 2005, the Network has invested in 193 research projects and strategic initiatives to promote earlier diagnosis, disease interception, better treatment, and optimal outcomes for Canadians with allergic diseases.

In 2016–2017, AllerGen invested in 34 research projects, and engaged 98 Network investigators and collaborators; 368 students, new professionals, research associates and technicians; and 142 partner organizations across academia, industry, not-for-profit and government.

AllerGen research teams focus their discovery, commercialization and knowledge mobilization efforts on:

THREE LEGACY PROJECTS

- The Canadian Healthy Infant Longitudinal Development (CHILD) Study;
- The Clinical Investigator Collaborative (CIC);and
- The Canadian Food Allergy Strategic Team (CanFAST).

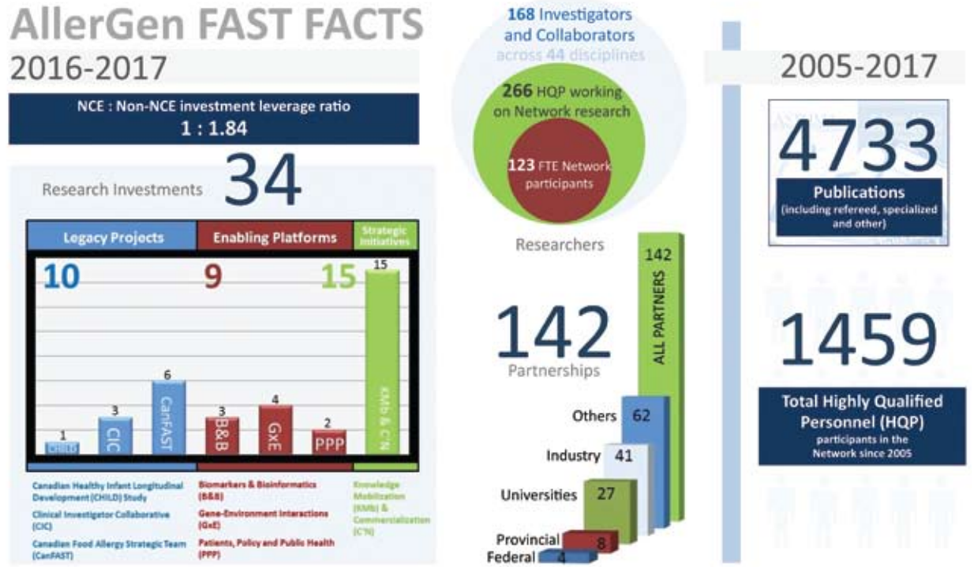
THREE ENABLING PLATFORMS

- Gene-Environment Interactions;
- Biomarkers and Bioinformatics;and
- Patients, Policy and Public Health.

**368** Students, new professionals, research associates and technicians engaged with Allergen

**142** Network investigators and collaborators engaged with Allergen

**98** Partner organizations across academia, industry, not-for-profit and government agencies collaborated




## ALLERGEN LEGACY PROJECT #1
## THE CANADIAN HEALTHY INFANT LONGITUDINAL DEVELOPMENT (CHILD) STUDY

Co-led by Dr. Malcolm Sears, professor, and Dr. Padmaja Subbarao, adjunct professor, McMaster University

The CHILD Study is an internationally recognized birth cohort study that is following 3,500 Canadian children and their families from pre-birth to school age and beyond.

Launched in 2008 with $12 million from AllerGen and the Canadian Institutes of Health Research (CIHR), the CHILD Study offers an unprecedented pool of early-life human genetics, epigenetics and microbiome data. It is the only Canadian study (and one of a few in the world) that allows us to study the early life origins of asthma, allergy, and other chronic diseases, and to link these findings to children's health outcomes and development, including obesity, diabetes, other metabolic disorders, neurodevelopment, school performance, and mental health.

Additional CHILD Study researchers from McMaster University include Drs. Judah Denburg, Paul O'Byrne, Sonia Anand, Russell de Souza, Joseph Macri and Michael Cyr.

*2016-17 research based on CHILD Study data showed that delayed introduction of allergenic foods increases risk of food allergies, and a family owning a cat or dog may protect their baby from allergies and obesity.*

## ALLERGEN LEGACY PROJECT #2
## THE CLINICAL INVESTIGATOR COLLABORATIVE (CIC)

Co-led by Dr. Paul O'Byrne, professor, and Dr. Gail Gauvreau, professor, McMaster University

**The CIC is a multi-centre Canadian-based Phase II clinical trials group that evaluates potential drug candidates for the treatment of allergic diseases in the upper or lower airways.**

The CIC offers a unique partnership with pharmaceutical and biotechnology companies. The CIC conducts Phase II "proof of mechanism" clinical trials using potential drug candidates that are in clinical development for treatment of allergic and severe asthma.

The CIC is unique in its ability to:

- conduct complex studies using human models of asthma in a multi-institutional setting; and
- use a globally unique allergen inhalation challenge model and proprietary standard operating procedures to ensure uniform results across our six Canadian sites.
- Additional researchers and McMaster University faculty involved in the CIC include Drs. Parameswaran Nair, Mark Larché, Paul Keith, Susan Waserman, Helen Neighbour and Roma Sehmi.

*Since 2005, the CIC has undertaken **27 clinical trials** and attracted nearly **$25 million in R&D** investment.*

## ALLERGEN LEGACY PROJECT #3
## THE CANADIAN FOOD ALLERGY STRATEGIC TEAM (CANFAST)

**CanFAST is a national, multi-centred, transdisciplinary research consortium that produces new knowledge about food allergy and translates it into clinical and public health practice.**

Based on their 2015 publication—the largest survey to date on food allergy prevalence in Canada—CanFAST researchers estimate that 2.7 million Canadians are affected by food allergy.

In 2016-17, CanFAST researchers generated new findings that will inform future clinical management and public health policies for food allergies.

CanFAST is co-developing, with multiple stakeholders, a National Food Allergy Strategy (NFASt): a research and knowledge mobilization platform that will position Canada as a global leader in improving the management of food allergy across environments and settings.

McMaster University allergy specialists involved in the CanFAST research program are Drs. Susan Waserman and Manel Jordana.

*In 2016-17, CanFAST studies found that long-lasting "memory" cells are responsible for the lifelong persistence of some food allergies; and the **risk of recurrent anaphylaxis among children is 18%.***

Further information, including copies of AllerGen's Success Stories and ResearchSKETCHES, publications that makes Network research accessible to the public, is available at allergen-nce.ca. ■



## FARNCOMBE FAMILY DIGESTIVE HEALTH RESEARCH INSTITUTE

*The Institute Executive (from left): Drs. Michael Surette, Stephen Collins, Elena Verdú and Paul Moayyedi.*

The Farncombe Family Digestive Health Research Institute was established in 2008 and the majority of its members, including non-clinicians, belong to the Department of Medicine. The focus of the Institute's research is primarily, but not exclusively, on the role of the intestinal microbiota in the maintenance of health and in the expression of diseases within and beyond the gastrointestinal tract. It's research ranges from preclinical studies in microbiology and animal models to human work including trials and involvement in cohort studies. Our work straddles the life span with investigation of the impact of diet and antimicrobial exposure on the microbiome in early life to the inflammation-promoting microbiota associated with aging. There is of course a large focus on common chronic intestinal diseases such as Irritable Bowel Syndrome, Inflammatory Bowel Diseases and dietary-induced disease including gluten -induced enteropathies (such as celiac disease) and these involve both preclinical and clinical research. Beyond the gut, our studies investigate the impact of the microbiota on brain function and psychiatric disease, on insulin sensitivity and obesity, and on airway diseases such as cystic fibrosis. Other work addresses the molecular basis for the control of colonic motility and on high-resolution techniques for investigating motility disorders that include refractory constipation in children. Institute members have published a total of 52 papers in the past 12 months.

The funding of the Institute's research comes from a variety of sources including CIHR, NIH and Crohn's Colitis Canada. The Institute has one CIHR Foundation grant and leads a large CIHR SPOR grant on chronic gastrointestinal disease that involves most of the academic GI divisions in Canada. Substantial private-sector support comes from Nestlé Switzerland.

This year, the Institute co-hosted an international symposium on the microbiome together with the Gairdner Foundation, and attracted over 300 participants including speakers from six countries. With the support of the Farncombe family, the Institute has developed a formal collaborative relationship with the Centre for Addiction and Mental Health (CAMH) in Toronto to investigate the role of the microbiota in psychiatric disease. ■

farncombe.mcmaster.ca

Peer-reviewed papers published by Farncombe Institute members

**52**

# 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 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 (Department of Medicine and Epidemiology), Dr. Joseph Beyene (Department of Epidemiology), Dr. Russell deSouza (Department of Epidemiology), Dr. David Meyre (Department of Epidemiology), Dr. Guillaume Pare (Department of Pathology and Molecular Medicine), and Dr. Zena Samaan (Department of Psychiatry).

### ASSOCIATE FACULTY INCLUDE:

Dr. Judah Denburg (Medicine), Dr. Phil Britz-Mckibbin (Department of Chemistry), Dr. Mark Loeb (Department of Pathology and Molecular Medicine), Dr. Andrew Mente (Department of Epidemiology), Dr. Malcolm Sears (Department of Medicine), Dr. Jennifer Stearns (Department of Medicine), Dr. Mike Surette (Department of Medicine), Dr. Gita Wahi (Department of Pediatrics).

**80**

Peer-reviewed papers published by PGP faculty

## Current Research Projects at the Chanchlani Research Centre:

- Aboriginal Birth Cohort (ABC), PIs: Dr. Sonia Anand, Dr. Gita Wahi
- Canadian Alliance for Healthy Hearts & Minds (CVCD Alliance), PIs: Dr. Sonia Anand, Dr. Russ de Souza
- Diet and Gene Interaction Study (DIGEST), PI: Dr. Russ DeSouza
- GENOA (Genetics of Addiction), Dr. Zena Samaan
- Dengue Population Genomics study, Dr. Gui Pare, Dr. Mark Loeb
- South Asian Heart Risk Assessment Project (SAHARA), PIs: Dr. Sonia Anand
- South Asian Birth Cohort (START), PIs: Dr. Sonia Anand and Dr. Russ de Souza
- The Nutrition and Genetic Interactions Birth Cohort (NutriGen) Alliance, PIs: Dr. Sonia Anand, Dr. Russ de Souza, Dr. David Meyre, Dr. Joseph Beyene, Dr. Gui Pare
- DoHad Team Grant- Deciphering the metabolic signatures of the metabolic syndrome (MetS) in young children: J. Beyene, P. Britz-McKibbin, R. de Souza, G. Pare, P. Subbarao, S. Atkinson, R. Heslegrave, S. McDonald, D. Meyre, K. Morrison, M. Sears, K. Teo, P. Ritvo, J. Stearns, M. Surette, G. Wahi, M. Zulyniak
- GENEIUS (Genetic and EnviroNmental Effect in weIght evolution in University Students), PI: Dr. David Meyre
- IMAGE (EpIgenomics of Metabolic AGEing), PI: Dr. David Meyre, co-I: Dr. Jean-Louis Gueant
- DESI-GDM Qualitative Study - A DiEt and phySIcal activity intervention in South Asian women at risk of Gestational Diabetes: A feasibility study and pilot randomized trial (DESI-GDM): K. Adamo, J. Beyene, H. Gerstein, S. Lear, S. McDonald, P. Ritvo, D. Sherifali, G. Wahi, and M. Zulyniak
- Identification of the shared biological and sociodemographic factors underlying cardiovascular disease and dementia risk, PI: Dr. Guillaume Pare

## Grants and Awards:

In 2015-17, faculty within the CRC supervised a total of six junior faculty, four clinical fellows, 17 post-doctoral fellows, 19 PhD, 21 masters, four BHSc, and 87 undergraduate students.

In 2015-16 (Jan 2015-Oct 2016) PGP Faculty have published 80 papers in peer – reviewed journals

## Global Health Research Award:

In addition to their generous gift for the Centre, the Chanchlani Global Health Research Award was created by the Chanchlani Family and McMaster University in 2012 to recognize a leading scholar in the area of Global Health. The Scholar is selected based on their scholarly contributions to Global Health. Each year a discipline within Global Health (i.e. Determinants of Health, Policy Development, Innovative Solutions) is chosen, and an internal review committee at McMaster reviews leading candidates.

## RESEARCH INSTITUTES

**57** Classroom attendees

OMICS and Epidemiology Conference in partnership with CISCO Systems

**26** On-line attendees

## Past Recipients include:

2017: Dr. John Ioannidis, C. R. Rehnborg Chair in Disease Prevention at Stanford University, professor of Medicine and Health Research and Policy presented "Improving Research Practices: A Global Challenge" on February, 6, 2017.

2016: Dr. Vikram Patel– Centre for Global Mental Health presented "The Black Dog: Why we don't care" on February 23, 2016.

2015: Professor Ab Osterhaus, an esteemed Virologist, and head of the Department of Virology of the Erasmus MC Rotterdam presented his lecture entitled "From Zoonosis to Pandemic in a Changing World" on February 25, 2015.

2014: Dr. Hans Rosling, PhD, MD professor of International Health, Karolinska Institute, co-founder & chairman, Gapminder Foundation


## 2012: First Annual Chanchlani Global Health Research Award Recipients:

Dr. Madhukar Pai, MD, PhD
associate professor of Epidemiology, McGill University
"The freakonomics of TB control in India"

Dr. Nikika Pant Pai, MD, MPH, PhD
associate professor of Medicine, McGill University
"Point-of-care tests for HIV: innovation, synergy and impact"

## Conferences:

In May 2017 – the Centre organized the 'OMICS and Epidemiology Conference in partnership with CISCO Systems. The conference was held in Toronto on May 25th and 26th 2017 with approximately 57 Classroom attendees and 26 on-line through CISCO's Webex facilities. The conference featured PGP Faculty and guest speakers. ■



## GERIATRIC EDUCATION AND RESEARCH IN AGING SCIENCES (GERAS) CENTRE

*The GERAS Centre is a collaboration of researchers, clinicians and educators at St. Peter's Hospital that aim to enhance geriatric care and improve quality of life for seniors.*

Since its foundation in 2013, the GERAS Centre has emerged as an international leader for aging research. Our research is guided by our learning community of seniors, caregivers, families, and health care professionals and is dedicated to improving the lives of older adults living with complex medical needs, and their family caregivers. The GERAS Centre is part of Hamilton Health sciences (HHS), is located within St. Peter's Hospital, and is well aligned with the HHS mission and values. Being embedded within HHS provides GERAS the opportunity for direct and immediate access to a wide variety of patient populations throughout the spectrum of care and strong partnerships across the many interdisciplinary health care professionals and learners that work with these patient populations. This ecosystem is unique and cannot be created elsewhere. Through our living lab, our team of geriatricians, research scientists, and cross-disciplinary researchers work together with patients, families and community/industry partners to co-create practical innovations, interventions and clinical instruments that enhance patient care and quality of life. With our rapidly aging population, and with more and more people living with chronic disease, our work has never been more important.

## Strategic Plan

The strategic mission of the GERAS Centre is "to advance care for older adults by translating evidence-informed research into clinical geriatric practice and education." Our vision is "to optimize aging with dignity and independence". The two overarching research themes at the Centre are 'Mobility & Independence' and 'Cognitive Health'. These are addressed through three strategic directives: 1) Research to Improve Quality of Life, 2) Our Living Lab: Accelerating Innovative Solutions, and 3) Supporting Seniors and Families.

## Leadership and Team

Dr. Alexandra Papaioannou leads the GERAS Centre as the executive director. She is a professor of Medicine at McMaster University, a Geriatrician at HHS, and the Canadian Institutes of Health Research (CIHR) Eli-Lilly Research Chair. GERAS also benefits from the guidance of two Associate Scientific Directors, Dr. Courtney Kennedy, assistant professor (PT), McMaster University; and Dr. George Ioannidis, associate professor (PT), McMaster University. Both are accomplished research scientists. Other key members of the Centre include:

- Dr. Sharon Marr, associate professor of Medicine at McMaster University; division director of Geriatric Medicine for the Regional Geriatric Program (RGP)
- Dr. Brian Misiaszek, chief of Geriatric Medicine at SPH of HHS; associate professor of Medicine at McMaster University
- Dr. Christopher Patterson, professor of Medicine at McMaster University; chief of Geriatric Services at HHS
- Dr. Tricia Woo, asociate professor of Medicine at McMaster University, Geriatrician at HHS

The GERAS Centre provides education and training to graduate students (in Master and PhD programs) and post-graduate trainees, as well as mentorship to a number undergraduate students from different backgrounds, including medicine, rehabilitation medicine, gerontology, life sciences, business, and communications.

## A Sample of Research Affiliates

- Dr. Johnathan Adachi, professor of Medicine at McMaster University, director of the Hamilton Arthritis Centre at St. Joseph's Healthcare Hamilton (SJHH)
- Dr. Sharon Kaasalainen, associate professor, School of Nursing, McMaster University
- Dr. Lora Giangregorio, associate professor, Department of Kinesiology. University of Waterloo
- Dr. Andy Kin On Wong, co-director of CaMos BQS & MQS

## Special Projects

The GERAS Centre is proud to conduct innovative research and knowledge translation activities within its core themes. Some project highlights from 2016-17 activities are shared below.

## Mobility & Independence

### RECOMMENDATIONS FOR PREVENTING FRACTURE IN LONG-TERM CARE

Dr. Papaioannou led the first clinical practice guidelines focusing on preventing fractures among the frail elderly in long-term care. A full toolkit to support long-term care homes in implementing the recommendations is available on the GERAS website, and is continually updated with targeted resources, such as videos, checklists, and other materials.

www.gerascentre.ca www.gerascentre.ca/fracture-prevention-toolkit

### TAPESTRY TRIAGE

In partnership with Health TAPESTRY, GERAS is leading the TRIAGE pilot study examining a multi-faceted frailty prevention strategy that builds on a successful program delivered in Australia (the Frailty Intervention Trial), and is the first study of its kind in primary care. TRIAGE has been featured by HHS multiple times for helping one participant skate again, and helping another to be able to go to a dance.

hhsshare.ca/news/triage-skater hhsshare.ca/news/triage-study

### FRACTURE RISK SCALE

In cooperation with InterRAI, and with University of Waterloo, the GERAS team has created and validated an algorithm that will automatically identify long-term care residents at risk for hip fracture falling within the next year using RAI-MDS data. It will be implemented internationally, and allow long-term care homes to customize interventions for preventing fractures and improve the quality of life of residents.

### FIT HIPS

In collaboration with the Regional Joint Assessment Program, the Hamilton Arthroplasty Group, and the Young Men's Christian Association (YMCA) of Hamilton, Fit Hips introduces a multi-modal intervention for persons undergoing hip surgery both pre- and post-operation. Reducing patients' frailty is expected to improve surgery outcomes for this Quality-Based Procedure.

### TAP-CARING

Contributing factors to caregiver stress are being identified in this study to inform future interventions that support formal and informal caregivers in the community.

## Cognitive Health

### DANCE

This work aims to improve the cognitive and physical function of older adults who are frail/pre-frail and/or have mild cognitive impairment. The dance intervention is delivered in partnership with the YMCA of Hamilton, and is funded by the Labarge Optimal Aging Initiative and the Alzheimer Society. Following the pilot study, DANCE has also received additional funding from the Canadian Centre for Aging and Brain Health Innovation to implement the intervention in 12 YMCA's across Ontario.

### NEEDS OF CAREGIVERS FOR PERSONS WITH DEMENTIA

By engaging the caregivers of persons with dementia through in-person interviews, GERAS has identified gaps in education and resources for caregivers of persons with dementia. Preliminary results are informing a new project, iGeriCare, and final results are pending.

### IGERICARE

Led by GERAS Member and HHS Geriatrician Dr. Richard Sztramko, iGeriCare will provide an online platform for dementia resources and social support to fill the needs gap, the content of which will be determined by geriatricians, caregivers of persons with dementia, and other clinical and community experts. This initiative has received from the Canadian Centre for Aging and Brain Health Innovation, Hamilton Health Sciences Foundation, Regional Geriatric Program Central, and Alzheimer Society of Brant, Haldimand Norfolk, Hamilton Halton.

### GERIATRIC CERTIFICATE PROGRAM (GCP)

Led by Dr. Sharon Marr, the GCP program aims to improve our aging population's quality of care through a unique combination of online and in person educational programs that include a focus on cognition and mobility. ■

# Reports: Endowed Chairs

## 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.

This year, in collaboration with the Canadian Rheumatology Association, resource materials were distributed to all rheumatology training programs to facilitate awareness of our specialty.

The chair participated in assessing human resource distribution across the country. Dr. Cividino has been the chair of the Human Resources Committee of the Canadian Rheumatology Association.

Educational activity at the Division of Rheumatology has been recognized by The Arthritis Society with a grant from the Rheumatic Disease Units annual competition.

In continuing the commitment to education in Rheumatology, Dr. Cividino co-chaired the first 'Annual Clinical Day in Rheumatology'. The event was very well received and attended by over 200 family physicians and allied health professionals. Funds raised will help support ongoing research activity in the Division of Rheumatology.

On an international level, our program has attracted attention from the Italian Rheumatology Association. Planning is underway to have an educational exchange with ten rheumatologists from Italy this fall.

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Endowed Chairs or Professorships

## ACTAVIS CHAIR IN RHEUMATOLOGY FOR BETTER BONE HEALTH

Dr. Jonathan D. Adachi

The Actavis Chair in Rheumatology for Better Bone Health has been used to further our research interests in both the effective transfer of guidelines to practice, and osteoporosis through the support of George Ioannidis and Dr. Andy Kin On Wong in their research endeavors in rheumatology.

Dr. George Ioannidis has continued his work with CaMos, GLOW, and collaboration with the geriatric team to identify those who are at high risk for hip fracture. In the past year, he has been part of a team, led by Dr. Alexandra Papaioannou, which has examined osteoporosis care in the long-term care setting, the impetus for the development of guidelines. His primary focus is to develop and further improve upon methods for disease diagnosis and disease progression evaluation, identify risk factors that are predictive of disease and disease progression, and to examine the effectiveness of drug therapies and interventions that improve patient health outcomes and health related quality of life. He has studied healthcare utilization following a fracture and the association between glucocorticoids and fractures. Finally, he has taken part in the validation the Canadian FRAX tool in the Canadian population and compared the FRAX tool with the Canadian Association of Radiologists and Osteoporosis Canada (CAROC) tool. These two instruments are the leading tools that are used across Canada to assess individual fracture risk. His second area of research focus is geriatrics and my goal is to improve the quality of living for older adults with chronic diseases. Specifically, he is interested in screening strategies and the identification of individuals who are in the early stages of frailty; trajectory recognition of frail older adults; and the investigation of modifiable risk factors for frailty that consist of life-style, social, and nutritional factors. In addition, he has evaluated vitamin D levels in older adults living in long term care. In addition to his research, Dr. Ioannidis has contributed to the education of interns, residents, undergraduate as well as graduate and post graduate students.

Dr. Andy Kin On Wong, a past Vanier award winner, has focused his research work on bone structure and, more recently, on the effects of muscle and fat on bone structure and fractures. Andy has been responsible for the successful CIHR grant on bone quality that was awarded to our group. His work has focused on improving the reliability of pQCT-derived muscle area and density measures using a watershed algorithm for muscle and fat segmentation. A trimodality comparison of volumetric bone imaging technologies using pQCT, HRpQCT and pMRI was conducted. Short-term precision and validity, 1-yr change, long-term precision, and least significant change were established and their association with fragility fractures has been published. ■

## AMGEN CANADA CHAIR IN NEPHROLOGY

Dr. Richard C. Austin

Established in 2005 via a generous gift from Amgen Canada Inc., the goal of the Amgen Canada Chair in Nephrology is to focus on the field of clinical research in nephrology and to contribute signficantly to clinical work, teaching and research in nephrology at McMaster. The chair and the Division of Nephrology have a particular interest in expanding biomedical research into the pathogenesis (causes) and treatment of atherosclerosis (hardening of the arteries) in patients with kidney disease. In addition, the chair will mentor new researchers and inspire them to achieve insights and innovations that will reduce the risk of renal disease and its complications.

The overall goal of Dr. Austin's research program is to better understand the underlying cellular stress pathways that contribute to cardiovascular disease and vascular calcification. His other interests include the identification of genetic and cellular factors that contribute to diabetes and obesity. This has led to the discovery of several novel cellular factors that influence the development of vascular calcification, the underlying cause of cardiovascular disease in patients with end stage renal disease. Some of the major discoveries in Dr. Austin's laboratory include: (i) defining the role of endoplasmic reticulum (ER) stress in atherosclerotic lesion growth and rupture, (ii) demonstrating a causal role of TDAG51 in lesion development, plaque rupture and vascular calcification, and (iii) establishing a causal relationship between the ER stress response and vascular calcification. Furthermore, Dr. Austin and his research team have shown that attenuation of ER stress can suppress many of the downstream pathways that contribute to cardiovascular and renal diseases.

Dr. Austin and his research team have utilized state-of-the-art biochemical and molecular approaches as well as established mouse models of atherosclerosis and renal disease to better explain the underlying mechanisms responsible for end stage renal disease and vascular complications. A number of the findings from Dr. Austin's laboratory have been published in high impact scientific journals. Importantly, many of these discoveries have become the cornerstone for the development of novel therapies and detection methods aimed at reducing the risk of cardiorenal disease and its complications.

Dr. Austin's major research goals for the upcoming year are to further investigate how vascular calcification arises in end stage renal disease and to develop novel therapies that inhibit this major complication. Given that vascular calcification is the major cardiovascular complication in patients with chronic kidney disease, and there is currently no treatment strategy, the identification of the underlying mechanisms will allow for the development of novel therapeutics for this disease.

My role as research director is to further our interaction between basic 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 have been planned to identify important and relevant research areas in nephrology that directly impact patient care and treatment. This will allow both clinician scientists and biomedical researchers to develop a dynamic and relevant research program that will tackle the major issues relevant to cardiorenal function and pathology. This translational and cooperative approach will allow for the development of novel therapeutic strategies that focus on our major scientific achievements and discoveries. ■

## 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. With respect to clinical activities, we have established and maintained a position as a premier clinical site in Canada for the treatment of ALS, and patients come to the clinic from South Central Ontario, and indeed, all of Ontario and beyond. The clinic has grown, and we now follow about 350 patients with motor neuron diseases, which places us among the largest ALS clinics in Canada. We remain grateful to Hamilton Health Sciences for their ongoing support of the clinic. The ALS team is multi-disciplinary, and 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. Jane Allan. Ms. Shelley Curry provides the logistic and secretarial support, and Dr. Daniela Trapsa is the research coordinator. We have close collaborations with Dr. Bruno Salena and Dr. John Cunnington for gastrointestinal and respirological issues, respectively, and Dr. Peter Varey for Physiatry. With respect to education, medical students, neurology residents, and fellows rotate through the clinic. With respect to research, we are participating in research trials on two experimental drugs sponsored by Cytokinetics, another on Withania, with trials on masitinib and pimozide due to start in October, and another fact-finding trial (ONDRI). We have undertaken two in-house trials looking at the activity of certain compounds in CSF from ALS patients and controls, and a genetic mutational analysis of ALS patients. Our basic research continues to evolve and we are working on the possibility that ALS terminally involves de-differentiation of motor neurons, which may open additional therapeutic options. We have been successful, in collaboration with Drs. Yingfu Li and Bruno Salena, in securing research funding from the Weston Foundation to investigate the potential of DNA/RNA hybrids as a diagnostic probe for ALS and this work is ongoing. ■

## ASTRAZENECA CHAIR IN RESPIRATORY EPIDEMIOLOGY

Dr. Malcolm Sears

In 2015, Dr. Sears discontinued clinical practice to focus fully on epidemiologic research, as Principal Investigator and director of the Canadian Healthy Infant Longitudinal Development (CHILD) Study, a large national longitudinal epidemiological study involving 3,495 families and over 30 investigators across Canada. He also continues to participate in analyzing and publishing data from his first longitudinal birth cohort study of 1000 children in New Zealand, commenced in 1972-1973. The Dunedin Multidisciplinary Health and Development Research study is now undertaking follow up assessment at age 45 years.

The CHILD Study was initiated in 2008 with funding by CIHR and the Allergy, Genes and Environment (AllerGen) Network of Centres of Excellence. CHILD was designed 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 including not only indoor and outdoor air, but psychosocial environment including maternal stress, infections and nutrition, has allowed expansion of the scope of the study to include the early origins of obesity, metabolic diseases including diabetes, cardiovascular disease and neurodevelopment. The eldest children are now aged eight years, and the assessments of five-year-olds will be complete in late 2017.

The CHILD cohort provides a solid platform for multidisciplinary research into the Developmental Origins of Health and Disease (DOHaD). Several novel CIHR-funded studies have been added to the core CHILD study, including studies of the infant microbiome and immune development. The relative absence of four bacteria from the gut of infants was predictive of development of wheezing with atopic sensitization, indicating a potential pathway to asthma, and even more importantly, opportunity for intervention and even primary prevention. Other work has identified early introduction of milk, egg and peanut as effective in reducing sensitization to these foods and potentially reducing the risk of the "atopic march" in children. To date, the CHILD Study has generated 36 peer-reviewed publications and over 160 abstracts presented at national or international meetings.

The CHILD Study has forged linkages with several other cohort studies, and is the major contributor of study subjects to the McMaster based NutriGen Alliance which is examining the relationships between maternal and child nutrition, genetics and health outcomes especially related to metabolic diseases including obesity and diabetes.

Plans are evolving for continuation of the CHILD Study beyond five years, with assessment of the cohort at ages eight, 11, and 14 years involving multiple disciplines. These ages will provide critical data on health and development in immediate pre-pubertal, pubertal and post-pubertal children. The scope of assessment has been increased substantially to incorporate other chronic non-communicable diseases (NCDs) that may have developmental origins in utero or early childhood. ■



## 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 is rising rapidly. It is estimated that almost one per cent 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 my 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.

We published the first randomized trial in the world that evaluated transplanting healthy stool into patients with ulcerative colitis 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 four-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 240 times and is the top 0.1% 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 and this will be achieved through the IMAGINE network.

**IMAGINE network**

17 centres across Canada and multidisciplinary researchers (gastroenterologists, paediatricians, epidemiologists, immunologists, microbiologists, psychiatrists and psychologists)

# $12.5

Million dollar CIHR grant to study how gut bacteria as well as how diet might interact to cause ulcerative colitis and Crohn's disease.

Dr. Moayyedi has 360 publications that have been cited over 37,400 times. This places him as the fourth most cited author in gastroenterology in the Google Scholar database. He published 28 peer-reviewed papers and with a total of 4,112 citations in 2017. He gave nine international lectures in Malaysia, Australia, US, Mexico and Poland last year. He also gave five presentations at national meetings.

He was director of the Division of Gastroenterology 2006-2017 and is currently the coordinating editor of a Cochrane 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. In 2017, this includes Canadian guidelines on how to manage Crohn's disease in adults and a separate guideline for pediatric Crohn's disease. He is also VP for Quality Affairs in the Canadian Association of Gastroenterology. This improves the quality of care we give to patients, and we have completed guidelines on how to give best quality care to IBD patients. We hope these will be the first such guidelines worldwide and will improve the care of all IBD patients in Canada.

In the coming year we plan to:

1. Continue to develop the IMAGINE network to co-ordinate 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. Continue to support Canadian and US guidelines on the management of IBD and other GI diseases.
3. Further develop quality measures that will improve the care of IBD patients across Canada. ■

## BORIS FAMILY CHAIR IN EDUCATION AND INTERNAL MEDICINE

Dr. Akbar Panju

It gives me great pleasure to provide a report of the activities with regards to the Boris Family Chair in Education and Internal Medicine for the Department of Medicine Annual Report 2016-2017.

I continue to be the division director of General Internal Medicine (GIM) at McMaster University. The Division of General Internal Medicine is a vibrant division providing clinical, educational, and research activities.

Over the last 12 months a major focus has been to strengthen our ambulatory care services in the Division of GIM. In that regard, we now have a fully functioning Ambulatory Care CTU where our learners focus in the management of outpatient disease management. We are in the process of acquiring a dedicated Point-of-Care Ultrasound and we thank the Boris Family for donating the machine to be used for both clinical purposes and research activities in an out-patient setting. We are in the process of implementing novel ideas particularly in regards to implementation of Competence by Design.

The division continues to provide exemplary in-patient activities on our Clinical Teaching Units and the feedback we get from our learners has been extremely positive.

In my position as the Boris Family Chair in Education and Internal Medicine, I have been able to recruit exemplary and high-caliber individuals both in the clinician-educator stream and clinician-research stream. With the help of our research director for general internal medicine, we have been able to co-ordinate our research activities in GIM. The focus of our research has been in end of life care communications, information technology, Point-of-Care Ultrasound, and simulation. The Division of General Internal Medicine is carrying out some exciting research in those areas.

In addition, the Division of GIM has been involved in global health initiatives in Namibia, Guyana and Uganda and our members have initiated internal medicine programs in those countries. As part of our contribution, our members have traveled to those countries and we have also had individuals from those countries come and spend time doing educational activities at McMaster University.

Lastly, I have been successful in coordinating and chairing the Internal Medicine Review Course which attracts over 850 physicians across Canada and around the world to attend a three-day course which occurs every year in the Spring.

In conclusion, the Boris Family Chair in Education and Internal Medicine has enabled me to accomplish a great deal in the last 12 months. ■

## 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 last couple of 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 2016-2017, a number of articles were published in peer-reviewed journals. As well, we have twice weekly phone calls with trainees to intensely help with their research. In the coming years we will continue to place a strong emphasis on continuing with the very rigorous training program. ■

## ELI LILLY CANADA CHAIR IN OSTEOPOROSIS

Dr. Alexandra Papaioannou

Dr. Papaioannou is a professor in the Department of Medicine at McMaster University with joint appointment in the Division of Rheumatology. She is an associate member in the Department of Health Research Methods, Evidence and Impact; and the Medical Sciences Graduate program. Dr. Papaioannou is a geriatrician at Hamilton Health Sciences and the executive director of the Geriatric Education and Research in Aging Sciences (GERAS) Centre at Hamilton Health Sciences and McMaster University. The GERAS Centre's focus is on research and education to improve the lives of older adults with frailty, falls, and fractures. Dr. Papaioannou is a member of the Gilbrea Advisory Board and the McMaster Institute for Research on Aging (MIRA). She is a member of the Scientific Advisors of Osteoporosis Canada and International Osteoporosis Foundation (Elected), past chair of the Scientific Advisory Council of Osteoporosis Canada and past chair of the Board. Dr. Papaioannou was the lead author of the Osteoporosis Canada Guidelines published in Canadian Medical Association Journal 2015 and 2010. She has authored 300 peer-reviewed publications. She is the co-director of the Canadian Multi-Centre Osteoporosis Study (Hamilton). Dr. Papaioannou received the Ronald Cape Distinguished Service Award in April 2017 to recognize an individual who has made outstanding contributions to the health care of older adults in Canada. Other awards include: Service Award for Geriatric Excellence in the category of Executive/Senior Leadership from the Regional Geriatric Program central, McMaster University Department of Medicine Postgraduate Teaching Award, Ontario College of Family Physicians certificate of recognition, YWCA Hamilton Women of Distinction Award – Health and Wellness, and Lindy Fraser Award from Osteoporosis Canada.

Dr. Papaioannou and the GERAS scientists, undergraduate, graduate, and postgraduate students are leading a program of research "Expanding the Frailty-Sarcopenia Collaborative" funded by the Hamilton Health Sciences RFA program. Building on expertise of geriatric medicine on frailty in acute care, the team was funded by the Hamilton Academic Health Sciences Organization to improve outcomes of older adults receiving joint replacement; "Getting Fit for Hip Replacement: The Fit-Hips Pilot Randomized Controlled Trial of Multi-model Intervention in Frail Patients with Osteoarthritis". The GERAS team was funded by the Labarge Optimal Aging Initiative Opportunities Fund to study the impact of DANCE on cognition and frailty in partnership with the YMCA and Alzheimer's Society. Dr. Papaioannou is also co-investigator on a number of CIHR-funded projects such as "Teams Advancing Patient Experience – Strengthening Quality (TAPESTRY) with a focus on primary care and older adults and preventing frailty, co-investigator on "Improving Palliative Care in Long Term Care Homes Using Participatory Action Research" funded by the Technology Evaluation in the Elderly Network. Dr. Papaioannou is project lead for the Ontario Osteoporosis Strategy for Fracture Prevention and developed the fracture risk assessment tool that predicts fractures in frail older adults, being implemented worldwide in long-term care homes with the ultimate goal of improving quality of living for older adults. ■

## 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.

This year, I was a co-applicant on successful grant applications to the CIHR for a study examining the utility of a new diagnostic strategy in pregnant women with suspected deep vein thrombosis, to the CanVECTOR Pilot Trial competition for a study assessing the feasibility of a randomized trial in women with antiphospholipid antibody syndrome and recurrent pregnancy loss, and to the Foundation for Women and Girls with Blood Disorders for a study examining the minimal clinically important difference for the use of antepartum low-molecular-weight heparin and aspirin versus aspirin alone among both women with antiphospholipid antibody syndrome and prior pregnancy loss, as well as specialists in the field. I was co-author on an individual patient data meta-analysis that showed that low-molecular-weight heparin does not appear to reduce the risk of recurrent placenta medicated pregnancy complications in at risk women, as well as another publication outlining the management of pregnant women with antithrombin deficiency.

I had the opportunity to present educational sessions on thrombosis and women's reproductive issues at the annual meetings of the British Society on Haematology and Thrombosis Canada, as well as to present on "Women's Health Research: Where are We Going" at the Federation of Medical Women of Canada's Annual General Meeting and Education Session and to deliver a lecture on gender inequities in health research for the Masters of Science program in Global Health.

I continued my work as chair of an international panel developing evidence-based guidelines on the diagnosis, prevention and treatment of venous thromboembolism in pregnancy for the American Society of Hematology. The latter document should be published in late 2017 or early 2018. I was invited to join the Society of Obstetric Anesthesia and Perinatology's Venous Thromboembolism Task Force that developed a consensus statement to assist and inform obstetric anesthesia providers caring for pregnant women receiving anticoagulant therapy. The resultant manuscript has been accepted for publication. I continued to serve on the Medical Advisory Committee of the Foundation for Women and Girls with Blood Disorders. ■

## FARNCOMBE FAMILY CHAIR IN MICROBIAL ECOLOGY AND BIOINFORMATICS

Dr. Jennifer Stearns

Dr. Stearns is a newly appointed assistant professor in the Department of Medicine and a member of the Farncombe Family Digestive Health Research Institute. As a postdoctoral fellow in the field of human microbiome research, Dr. Stearns contributed to the development of the methods for molecular profiling microbial communities now in widespread use. Since her appointment to the department in 2016, her research has focused on how microbial colonization and succession proceed in early life and what impact the microbiome has on health outcomes and disease risk. To study these questions, she is combining microbial ecology, basic microbiology, bioinformatics and epidemiology in close collaboration with several clinical researchers at McMaster University. Dr. Stearns is also an active contributor to microbiome research into metabolic disease, dietary interventions and women's health, in addition to establishing her research program on the infant gut microbiome. In the field of host microbe interactions and microbiome research, Dr. Stearns has over 2,000 citations (H-factor of 14) and is invited to speak to both the scientific community and the public about how to study the microbiome and the impact of microbes on human health. ■

## FREDERICK HARGREAVE / TEVA INNOVATION CHAIR IN AIRWAY DISEASES

Dr. Parameswaran Nair

In the second year of this Endowed Chair, our research program has continued to grow and attract funding from governmental agencies and biotechnology and pharmaceutical industry. A major achievement has been the establishment of a Pulmonary Imaging Research program with the support of the Robarts Institute at the University of Western Ontario. 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 $1M, recruitment of one international trainees, salary support awards for two trainees, 26 peer-reviewed publications including in major medical journals such as the *New England Journal of Medicine* and the *Lancet*, 38 national and international invited lectures, and the filing of an international patent. ■

## GLAXOSMITHKLINE CHAIR IN GASTROENTEROLOGY

Dr. Stephen Collins

The chair supports research on the intestinal microbiome and its impact on gut and brain function in health and in disease. The laboratory is supported by a CIHR Foundation grant. This year, three important papers have been published and each is a "first" of its kind. Two of these papers focused on the Irritable Bowel Syndrome (IBS) - the commonest and least understood GI condition in our society characterized by chronic intestinal symptomatology and psychiatric comorbidity including anxiety and depression. We have addressed the hypothesis that the intestinal microbiota plays a role in the expression of IBS. In a paper published in Science Translational Medicine, we were able to adoptively transfer both the intestinal and behavioural changes seen in IBS patients by colonizing germ-free mice with microbiota from these patients. This is a first step towards establishing a functional role for the microbiota in this common complex disease, and rationalizes the use of microbiota-directed therapies in this condition. The second paper, published in our field's top journal Gastroenterology, built on this observation and showed for the first time, in a placebo-controlled pilot study, that an intestinal probiotic bacterium Bifidobacterium longum produced sustained improvement in depression in IBS patients, while providing only short-term benefit to GI symptoms. This improvement was accompanied by attenuation of stress-induced changes in brain activity, assessed by fMRI, in the limbic system that is associated with emotion. This study has attracted considerable media attention and has provided the basis for our ongoing work on the role of the microbiota in primary psychiatric disorders that include generalized anxiety disorder and major depression.

For many years, the intestinal microbiota have been considered uncultivable and the identification of specific resident bacteria depended on DNA sequencing. In collaboration with Dr. Mike Surette, the Farncombe Institute has developed the anaerobic culture conditions required for the culture of over 90% of the human microbiota in the laboratory. This provides the long awaited opportunity to manipulate these bacteria in culture and to characterize their microbial chemistry. In turn, this will lead to the development of novel therapeutic targets for the treatment of a variety of conditions in which the microbiota have been implicated. ■

## 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 Neuromuscular Clinic. We have recently published in the area of CMT. Specifically, we investigated, by retrospective review of our database, whether CMT patients who self-select an active lifestyle with regular exercise preserve strength to a greater extent compared to CMT patients who are relatively sedentary. We found that indeed more active CMT patients preserve strength (Djordjevic D, Fell S, Baker SK. CJNS. 44(5):572-576). This is a very important finding as it had been convention to admonish neuromuscular patients to avoid exercise in the past. Here at McMaster we have long supported a model of therapeutic exercise to assuage physical impairments.

Additionally, we are examining whether a home-based series of balance exercises in CMT patients can improve both static and dynamic balance. Finally, we are measuring strength differences between CMT1 and CMT2.

Chronic inflammatory demyelinating polyneuropathy (CIDP) continues to be a focus for the Peripheral Nerve Clinic. I am collaborating with Dr. Emily Mathey from the University of Sydney, Australia investigating novel antibodies that are proving to be pathogenic (i.e., NF-186, NF-155, CNTN1). A manuscript is being submitted to the *Journal of Neuroimmunology* wherein two of the three anti-CNTN1 patients came from my PNC. This work is contributing to the eventual development of antibody arrays which will facilitate the diagnosis and treatment of CIDP. Dr. Adrian Opala, a PGY5 resident working under my supervision, has analyzed 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.

In November 2016, due to my involvement as a panelist with the Canadian Working Group Consensus update on prevention and management of statin

adverse effects and intolerance (led by Dr. John Mancini from UBC), I received a certificate for highly cited research from the *Canadian Journal of Cardiology.*

In collaboration with Dr. Manuela Neuman (U of T) I have identified that vascular endothelial growth factor receptor 2 may be an earlier serological marker for the devastating disorder called POEMS as opposed to the traditionally measured VEGF levels. I am also collating a series of seropositive cases of anti-glycine receptor-associated PERM (progressive encephalomyelitis rigidity and myoclonus syndrome). Dr. Saleem Mahammad, PhD, is compiling these reports in collaboration with Dr. Pierre Bourque from the University of Ottawa who has three cases. This will be the largest case series of PERM reported in Canada.

Collaborations with Dr. Matthew Miller regarding novel compound heterozygous mutations in distinct genes that have DNA helicase activity and are likely to have manifested as a congenital demyelinating neuropathy are being planned. Additionally, Dr. Gianni Parise and I will address the effects of statins on skeletal muscle satellite cell function. ■

## 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 and 2015. 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, including Drs. Paul Kim and Colin Kretz.

With this chair, the thrombosis group has expanded over the past five years with the recruitment of Drs. Menaka Pai, Vinai Bhagirath, Paul Kim, Deborah Siegal, Colin Kretz, and Noel Chan. The increase in critical mass has expanded our 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

### AREAS OF RESEARCH

1. Causes of vascular disease, diabetes and obesity
2. Global health and the role that ethnic, environmental and cultural diversity plays in the causal pathway
3. Identifying better methods of preventing and treating heart disease and stroke

### ADMINISTRATIVE ROLE

1. Executive Director of the Population Health Research Institute
2. Chief Scientist – Hamilton Health Sciences

**research impact**

Research led by Dr. Salim Yusuf found many people in the world who need essential heart medicine do not get it, even in wealthy countries. He suggested a radical shift is required in how such medicines are provided and how preventive care is organized in health care systems.

About 360 scientists, research fellows, statisticians, project managers, IT specialists, and other staff work at the PHRI and Dr. Yusuf supports and facilitates the research of several of them through the chair and a range of other funds.

### HIGHLIGHTS INCLUDE:

1. Wilfred G. Bigelow Lecture, Canadian Society of Cardiac Surgeons, October 2016
2. Honorary Fellow of the Cardiological Society of India, December 2016
3. Prof. Roy Chaudhury Memorial Oration, Delhi, India, April 2017
4. Honorary Member of the Peruvian Society of Cardiology, April 2017

**PUBLICATIONS:** 37 in total (July 1, 2016 – June 30, 2017) including:

O'Donnell et al. Global and regional effects of potentially modifiable risk factors associated with acute stroke in 32 countries (INTERSTROKE): a case-control study INTERSTROKE Lancet 2016.

Healey et al. RE-LY Atrial Fibrillation Registry and Cohort Study Investigators. Occurrence of death and stroke in patients in 47 countries 1 year after presenting with atrial fibrillation: a cohort study. Lancet 2016

Lamy et al. CORONARY Investigators. Five-year outcomes after off-pump or on-pump coronary-artery bypass grafting. N Engl J Med 2016 ■

**Dr. Salim Yusuf and Dr. Gordon Guyatt**

appeared in a European Union endorsed list of the 25 most cited scientists of all time.

## 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. DeGroote Chair in Population Health Research at McMaster University in 2008, and it was renewed in 2013. 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 genetics 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, Aboriginal 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 study funded by the Canadian Partnership Against Cancer and the Heart and Stroke Foundation. This study has recruited > 8,000 adults from across Canada to understand the community and individual level determinants of cardiovascular disease and cancer and includes eight Nations Communities. ■

## J. BRUCE DUNCAN CHAIR IN METABOLIC DISEASES

Dr. Greg Steinberg

Dr. Steinberg's research studies the fundamental mechanisms regulating energy metabolism and how this can contribute to common chronic diseases including type 2 diabetes, cardiovascular disease and cancer. Three Highlights from 2016-17 that were supported by the endowed chair were:

1. The discovery that inhibiting a key rate limiting enzyme in the liver responsible for making fatty acids and cholesterol, called ATP-citrate lyase, was effective for treating non-alcoholic fatty liver disease (NAFLD), diabetes and cardiovascular disease in mice. These findings have laid the foundation for testing a new drug in people with elevated cholesterol who are at high risk of having a stroke or heart attack.
2. The cancer metabolism research group identified one of the reasons why people with obesity and diabetes are at greater risk for developing lymphoma may be because downregulation of the energy sensing enzyme AMP-activated protein kinase (AMPK) causes tumors to grow more rapidly. These data help explain why exercise may exert protective effects against many cancers and suggest that therapies designed to increase the activity AMPK may be effective to delay cancer development.
3. Lastly, in collaboration with Drs. Hertzel Gerstein and Guillaume Paré, we discovered that the leading type 2 diabetes medication metformin increases serum levels of the protein growth differentiating factor 15 in people with high glucose levels. These findings may explain the pleiotropic beneficial effects of metformin on cardiovascular disease and cancer and may possibly illuminate why this commonly used medication exerts protective effects against aging. ■

## JACK HIRSH PROFESSORSHIP IN THROMBOSIS

Dr. Clive Kearon

Dr. Kearon's research focuses on clinical trials designed to optimize the diagnosis and treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE), which are collectively referred to as venous thromboembolism (VTE).

Two ongoing CIHR-funded diagnostic studies are evaluating new ways to use D-dimer blood tests to help rule out DVT and PE, with the goal of reducing the number of ultrasound and CT pulmonary angiogram examinations that are required. Instead of using the same cut-off value to categorize D-dimer results as positive or negative, these studies are testing the safety of ruling-out thrombosis using a higher D-dimer value when clinicians decide that the clinical suspicion for thrombosis is low. A third study is determining if one of the new and very convenient anticoagulant drugs is an effective way to treat superficial vein thrombosis.

Dr. Kearon and the Ontario Clinical Oncology Group were responsible for study design and data management of a recently completed NIH-funded trial that evaluated catheter-based thrombus removal for prevention the "post-thrombotic syndrome" after DVT. The same network of Canadian and US investigators is now about to start a trial evaluating catheter-based treatments for established post-thrombotic syndrome.

Dr. Kearon also leads an international panel that develops guidelines for the treatment of VTE and he is program director for McMaster University's Clinician Investigator Program. ■

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

Dr. John Eikelboom

Dr. Eikelboom is currently associate professor in the Department of Medicine, McMaster University, and haematologist in the Thrombosis Service, Hamilton General Hospital, Ontario, Canada. He originally trained in Internal Medicine and Haematology in Perth, Australia and subsequently moved to Hamilton to take up a Tier II Canada Research Chair in Cardiovascular Medicine. He currently holds the Jack Hirsh/PHRI Chair in Thrombosis and Atherosclerosis Research and a Mid-Career Investigator Award from the Heart and Stroke Foundation. His research, supported by the Canadian Institutes for Health Research, the Heart and Stroke Foundation and the National Health and Medical Research Council of Australia, focuses on the efficacy and safety of antithrombotic therapies, outcomes after blood transfusion and bleeding, and the mechanisms of variable response to antiplatelet drugs. Dr Eikelboom has published more than 500 peer-reviewed manuscripts including first- or senior-authored papers *New England Journal of Medicine, Lancet, Journal of American Medical Association, Annals of Internal Medicine and British Medical Journal.* His h index is 71 and his publications are cited on average 49 times each. On Google Scholar his h index is 91 and i-10 index is >300. In 2014, 2015 and 2016 he was listed by Thomson Reuters among the top 1% of most cited researchers in clinical medicine. Dr. Eikelboom has presented Plenary and State-of-the-Art lectures at Leading International Conferences in North America and Europe (International Society on Thrombosis and Haemostasis, American Heart Association, American College of Cardiology, European Society of Cardiology) and has given numerous invited presentations at national and regional meetings. ■

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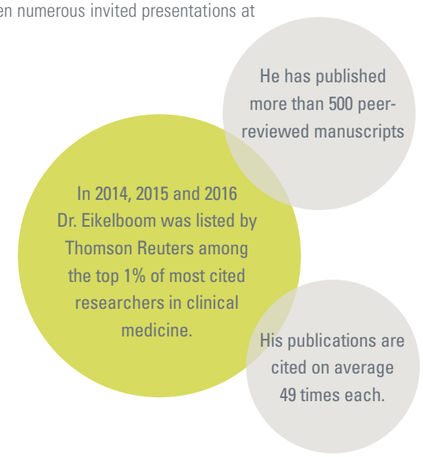


## JOHN G. KELTON CHAIR IN TRANSLATIONAL RESEARCH

Dr. Donald M. Arnold

Dr. Donald M. Arnold is the inaugural chair holder of the John G. Kelton Chair in Translational Research. He is the director of the McMaster Centre for Transfusion Research (MCTR).

Dr. Arnold's team focuses on clinical and translational research in blood transfusion and bleeding disorders. Priority research areas including guidance on optimal utilization of blood products and novel tools to identify trends in blood product use or overuse in our hospitals. MCTR is at the forefront of big data in Transfusion Medicine to foster a vein-to-vein research platform. Dr. Arnold and his research group have established collaborations within the University in Bioinformatics, and with the Ministry of Health to develop novel blood transfusion surveillance systems with clinical and research applications. This year, Dr. Arnold has become the project sponsor for the Southwestern Ontario branch of the Ontario Regional Blood Coordinating Network (ORBCoN), a branch of the Ministry of Health. Ultimately, this multi-disciplinary research program will allow for more targeted transfusion therapies tailored to individual patient needs.

Research in bleeding disorders is focused on translational studies in immune-mediated platelet diseases. Dr. Arnold is lead investigator of the McMaster Immune Thrombocytopenia (ITP) Registry, the largest of its kind in Canada, which includes clinical data and a biorepository of patient samples to address basic mechanistic questions. Scientific discoveries resulting from this research have influenced guidelines, and have commercialization potential. Research in this area is on novel biomarkers in ITP, the role of immune cells in the development of thrombocytopenia, and correlation with clinical endpoints including treatment response and bleeding. In addition, Dr. Arnold's group is leading a multicentre randomized trial in ITP therapeutics, which will have direct clinical impact on patient care. This year, Dr. Arnold was awarded a $1.1 million grant from Canadian Blood Services to support the activities of MCTR. Dr. Arnold's group is funded by Canadian Institutes of Health Research, Canadian Blood Services, the Ontario Ministry of Health and Health Canada. ■

## JOSEPH E. DESROCHES CHAIR IN BONE MARROW TRANSPLANTATION

Dr. Irwin Walker

Dr. Irwin Walker is the inaugural Chair of the Joseph E. DesRoches Chair in Bone Marrow Transplantation. This chair was instituted in 2016 to promote research in the field of Hematopoietic Cell Therapy (HCT) which includes both transplantation and other cellular based treatments. The major focus has been on chronic graft-vs-host disease (CGVHD), the commonest and most serious long-term complication of transplantation.

The first publication from this Chair was a CIHR-funded, McMaster led, multi-centre randomized controlled trial (Dr. Irwin Walker) demonstrating that antithymocyte globulin (ATG) is effective in preventing CGVHD and improving quality of life. The results were published in *Lancet Oncology* accompanied by an editorial indicating that ATG now represents a "standard of care for GVHD prophylaxis". Indeed, ATG has become, in Canada and many centres worldwide, a standard part of many preparative regimens, particularly when unrelated donor grafts are used. Also accepted for publication is a randomized trial (TRIST) of blood transfusion triggers (Dr. Irwin Walker), in collaboration with Dr. Jason Tay, Calgary.

Ongoing studies include collaborative studies of photophoresis for the treatment of steroid-resistant CGVHD (Drs. Irwin Walker and Ronan Foley), an international randomized trial comparing T cell deplete and T cell replete grafts for haploidentical transplantation (Drs. Irwin Walker and Ronan Foley), two international trials (REACH 2 and 3) of ruxolitinib for the treatment of steroid resistant acute and chronic CGVHD (Dr. Brian Leber), and a randomized trial (PATH) comparing platelet transfusion with tranexamic acid for prophylaxis against bleeding in patients undergoing autologous marrow transplantation (Dr. Irwin Walker).

The Chair expresses appreciation to those individuals who are part of the research team, particularly Tammy Degelder, Pamela O'Hoski, Amiee Hill, Erin Jamula, Anna Macdonald, Josephine Hallas, and Fran Jackson. ■

## LEO PHARMA CHAIR IN THROMBOEMBOLISM RESEARCH

Dr. Mark Crowther

Dr. Crowther is currently chair and professor in the Department of Medicine. He also holds the positions of chair, Research Advisory Committee, the Heart and Stroke Foundation of Ontario; chair, Scientific and Standardization Subcommittee on Control of Anticoagulation, The International Society on Thrombosis and Haemostasis; and chair, American Society of Hematology's (ASH's) Quality Committee (he also oversees ASH's guideline development program). 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 one of 17 McMaster faculty (and one of 18 researchers in Canada) identified by the Clarivate Analytics 2016 list of the most highly cited researchers. ■

## 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 antithrombotic 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 academic year, have shown i) improvements in the predictive ability of the Framingham Stroke Risk Profile for incident ischemic stroke through the inclusion of four circulating biomarkers, ii) a high prevalence of cerebral microbleeds in young inner city stroke patients largely in association with modifiable risk factors, iii) a higher risk for poor functional outcomes in ischemic stroke patients with microbleeds who receive thrombolytic therapy, iv) high yield clinico-radiologic diagnostic criteria for the rare inflammatory subtype of cerebral amyloid angiopathy and v) higher risk of incident dementia and mortality in community-dwelling elderly persons with microbleeds participating in the Framingham Heart Study.

Dr. Shoamanesh's ongoing work within the Secondary Prevention of Small Subcortical Strokes (SPS3) trial has demonstrated that lacunar stroke patients with cerebral microbleeds represent a more aggressive form of CSVD with higher risk of stroke recurrence and in need of efficacious therapeutic strategies. Within the Antihypertensive Treatment of Acute Cerebral Hemorrhage II (ATACH-II) trial, he has shown that contrary to concerns arising from observational studies, randomization to aggressive blood pressure lowering does not contribute to the high incidence of small remote ischemic brain lesions detected on MRI in acute intracerebral hemorrhage patients. Moreover, his novel observations in a number of trial participants suggest that at least a fraction of these hyperintense and restricted lesions visualized on diffusion-weighted imaging, are subacute microhemorrhages captured in evolution, rather than ischemic in nature.

He currently serves as principal investigator of the Non-Vitamin K Antagonist Oral Anticoagulants for Stroke Prevention in Patients with Atrial Fibrillation and Previous Intracerebral Hemorrhage (NASPAF-ICH) randomized controlled trial assessing optimal antithrombotic therapy in patients with atrial fibrillation and previous intracerebral hemorrhage at recruitment sites across Canada and is founding co-principal investigator of the Canadian HEmorrhagic Stroke trIals initiatiVE (CoHESIVE); a Canada-wide multidisciplinary network of collaborators devoted to the development, and successful and efficient execution of hemorrhagic stroke trials. He is the Publications Committee coordinator of the Rivaroxaban Versus Aspirin in Secondary Prevention of Stroke and Prevention of Systemic Embolism in Patients With Recent Embolic Stroke of Undetermined Source (NAVIGATE ESUS) trial, and Adjudication Committee co-chair of the INVestIgation of rheumatiC AF Treatment Using Vitamin K Antagonists, Rivaroxaban or Aspirin, Studies (INVICTUS). ■

## 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 Hamilton in March 2008. This chair was renewed in 2013 for a further five-year term. Funding in 2016-2017 to support research activities associated with this chair comes from CIHR (one CIHR Project grant awarded during this reporting period); the National Institutes of Health (USA), the Immune Tolerance Network (USA) and Adiga Life Sciences Inc. Active areas of research within the laboratory are

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);
2. mechanisms of peptide-induced immune tolerance (with Dr. Elena Tonti, NIH, Adiga Life Sciences);
3. the development of novel allergen challenge models (together with Dr. Helen Neighbour, AllerGen NCE, Immune Tolerance Network);
4. the pathogenesis and treatment of scleroderma (systemic sclerosis, with the Hamilton Scleroderma Group); (
5. development of peptide immunotherapy for peanut allergy (together with Dr. Manel Jordana, Elizabeth Simms and Dr. Susan Waserman);
6. pathogenesis and treatment of rheumatoid arthritis (with Dr. Maggie Larché, Dr. Derek Haaland & Dr. Elena Tonti; CIHR, Adiga Life Sciences);
7. the role of complement proteins in the pathogenesis of pulmonary fibrosis in graft versus host disease.

Collaborative projects are currently underway with other faculty at McMaster University and St. Joseph's Healthcare Hamilton within the Firestone Institute for Respiratory Health, the Division of Nephrology, the Division of Hematology & Thromboembolism, the Division of Gastroenterology, the McMaster Immunology Research Centre within the Department of Pathology & Molecular Medicine, and the Department of Chemical Engineering at McMaster University. During this period formal collaborations were established with the laboratory of professor Jing Li at the Guangzhou Institute for Respiratory Diseases in China to identify systemic biomarkers of allergen exposure and the effects of allergen immunotherapy on these biomarkers. ■

## MCMASTER UNIVERSITY / ST. JOSEPH'S HEALTHCARE REGIONAL ACADEMIC CHAIR IN CRITICAL CARE MEDICINE

Dr. Deborah Cook

Since the inception of the Canadian Critical Care Trials Group in 1989, Hamilton has been a hub of activity for clinical investigations relevant to the care of critically ill patients. Research capacity has grown considerably in the city recently, particularly at the Juravinski Hospital (with the teamwork of Drs. Bram Rochwerg and Tim Karachi). Each ICU at Hamilton Health Sciences (the General and Juravinski sites) and St. Joseph's Healthcare Hamilton are actively enrolling patients into observational studies (quantitative and qualitative) and randomized trials, and are engaging patients, families and clinicians in audits and surveys.

In addition to the diverse methodologies characterizing this science, clinical research in our ICUs is done in collaboration with, or led by, physiotherapists, nurses, pharmacists, and surgeons. We are fortunate to have some very experienced research coordinators in our midst, and several formally trained critical care research methodologists in junior faculty roles or current or future clinical scholar roles (Drs. Waleed Alhazzani, Bram Rochwerg, Wieslaw Oczkowski, Emilie Belley-Côté, and Eric Duan). Our investigations are also heavily contributed to, if not led by, students, residents and research trainees. Fostering the academic experience of young investigators has been central to clinical research in Hamilton for many years since the days of Dr. David Sackett, and the ICU faculty continue this mission.

Examples of some recent peer-review studies in our ICUs follow. Randomized trials have tested the effect of resuscitation with balanced fluid solutions on mortality and renal failure (an individual patient RCT - FISSH, and cluster-cross-over RCT - FLUID), the influence of probiotics on infections (PROSPECT), and the impact of acid suppression on bleeding and infections (REVISE). In terms of advance life supports which are the mainstay of so much critical care treatment, we have been evaluating the impact of dialysis timing on renal recovery (STAART-AKI), and the consequences different approaches to weaning from mechanical ventilation (FAST and SENIOR). The repercussions of in-bed cycling on physical recovery (CYCLE) is also an inter-professionally relevant field of inquiry. Renewed interest in thanatology has prompted studies about the scientific parameters of the dying process and timing of death (DEPART), as well as patient and family-centered dignity-conserving care (3 Wishes). A robust new national research program of great public importance led by Dr. Maureen Meade is focusing on the processes of care and outcomes of organ donation (DONATE). ■

## MICHAEL G. DEGROOTE CHAIR IN INFECTIOUS DISEASES

Dr. Mark Loeb

Dr. Loeb has completed the first 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. Using data from his previous Hutterite study comparing live attenuated vaccine to inactivated vaccine Dr. Loeb, in collaboration with Dr. Mathew Miller, is assessing mucosal and serological IgA and IgG response to both vaccines. This is of great public health policy interest, particularly in the U.S. where the live vaccine is no longer recommended on the basis of a poor response. 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 involving collaboration from colleagues at PHRI. Work as taskforce lead of the WHO Working Group on Pregnancy and Influenza has been completed. Dr. Loeb received contracts from WHO to develop a list of antibiotics for the Essential List of Medicines. Dr. Loeb continues in his role as chair of the Data Safety and Monitoring Board of an important NIH vaccine trial on influenza H7N9. Dr. Loeb is completing a four-year randomized trial of probiotics to reduce respiratory infections in residents of long-term care facilities. The analyses for a dengue genetic epidemiology study is being completed. ■

## 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 associated with cognitive, motor and possibly psychiatric manifestations. The first of two large MRI sub-studies in trials of vascular prevention COMPASS MIND will soon be complete. Over the last year, his team has completed the analysis of over 1,700 baseline MRIs and are in the process of analyzing the follow up MRIs with accompanying cognitive and functional tests. Results will be reported in January of 2018. COMPASS MIND studies in a stroke-free population, while NAVIGATE MIND recruits a population soon after stroke. Baseline recruitment is complete in NAVIGATE MIND with final scans to be performed next year. In acute stroke prevention, they are close to completion of the pilot trial DATAS II to demonstrate the safety and feasibility of the use of novel oral anticoagulants in early secondary prevention. This experience has helped him to design the next generation of trials in this area which will explore other novel pathways to improve safety and efficacy of antithrombotics in this critical area of stroke prevention. Dr. Sharma continue to serve as the chair of the Canadian Stroke Consortium and will be the co-chair of the World Stroke Congress in 2018, in addition to speaking committments. ■



## MICHAEL G. DEGROOTE PROFESSORSHIP IN STROKE MANAGEMENT

Dr. Demetrios (James) Sahlas

Dr. Sahlas has continued to promote inter-professional collaboration with respect to quality improvement research in stroke prevention and carotid revascularization pathways. Interdisciplinary projects have involved improvement in access to stroke prevention clinics by eliminating conventional triaging of referrals, screening for cognitive impairment, and implementation of best practice guidelines for admission of transient ischemic attacks. Additional research evaluating differences in the management of carotid artery disease in cases of near occlusion will serve as pilot data for an upcoming multicenter clinical trial.

The stroke research group based at the Hamilton General Hospital has continued to expand in order to co-ordinate an increasing level of clinical trial activity. Dr. Sahlas and his colleagues are presently recruiting into several multicenter trials, involving a growing team of research coordinators and nurses. Platforms include acute stroke trials, stroke prevention trials, and vascular cognitive impairment trials. In addition, he has provided mentorship to many of the postgraduate neurology trainees and stroke fellows who have presented their work at several international conferences. ■

## 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. TGFβ 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 and also the efficacy of novel drugs in the preclinical setting. Further, Dr. Kolb leads activities in biomarker development for lung fibrosis and he participates as principal investigator and Steering Committee members in numerous clinical trials on interstitial lung disease. Dr. Kolb has over 130 peer-reviewed publications in journals such as *New England Journal of Medicine, 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. 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 deputy editor for *Respirology*, the official journal of the Asian Pacific Society for Respirology between 2008-2017 and associate editor for *Thorax*, journal of the British Thoracic Society from 2015-2017. In early 2017, he was appointed as incoming chief editor for the *European Respiratory Journal*, ranked number three amongst more than 50 specialty journals in respiratory medicine globally. ■

## POPULATION HEALTH INSTITUTE CHAIR IN DIABETES RESEARCH AND CARE

Dr. Hertzel 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:

a) an international PI and leader of the 10,000 person REWIND trial of a GLP-1 analog on serious health outcomes in people with diabetes;

b) proteomic and (together with Dr. Pare) genomic analyses of 8000 participants followed for up to nine years in his ORIGIN trial and ORIGINALE follow-up study, that is identifying novel mechanisms, causes and risk factors for cardiovascular outcomes in people with dysglycemia, and that has identified a novel biomarker for metformin action;

c) ongoing analyses of epidemiologic and genetic data from the NIH-funded 10,000 person ACCORD study of the short and long-term role of glucose, blood pressure and lipid management in people with type 2 diabetes;

d) epidemiologic and ancillary analyses of data collected in a variety of these and other completed global trials and epidemiologic studies addressing various aspects of dysglycemia; and

e) conceptualization and chair of three trials of novel approaches to inducing a diabetes remission.

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 cancer, cognitive decline, and cardiovascular diseases. Dr. Gerstein's research is currently funded by CIHR and industry, and his clinical research is conducted through the Population Health Research Institute, where he is deputy director.

During the 2016-2017 academic year, Dr. Gerstein published more than 15 articles and editorials in major peer-reviewed journals; produced and released a widely-viewed novel music video to destigmatize diabetes for patients and their families; was interviewed by various national and international news outlets; and presented data and perspectives as an invited guest speaker, commentator or faculty member at 22 national and international meetings. In December 2016, ExpertScape ranked Dr. Gerstein as the 10th ranked diabetes expert in the world (expertscape.com/ex/diabetes+mellitus). ■

## POPULATION HEALTH RESEARCH INSTITUTE 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 arrhythmia services at Hamilton Health Sciences, and is a senior scientist at the Population Health Research Institute, where he holds the chair in Cardiology Research. 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 the past co-chair of the Canadian Cardiovascular Society's Atrial Fibrillation Guidelines committee and past chair of the Cardiac Care Network of Ontario's Heart Rhythm working group.

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. Thomson-Reuters recognized ASSERT as the 38th most-cited scientific publication in 2012. He went on to demonstrate that study sub-clinical atrial fibrillation in 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 is also studying the worldwide variation in patient outcomes related to atrial fibrillation in a 15,000-patient cohort study, and published the main outcomes of this study in the *Lancet* in 2016.

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. ■

## RICHARD HUNT / ASTRAZENECA CHAIR IN GASTROENTEROLOGY

Dr. Premysl Bercik

Gut microbiota has been recognized as a major player in health and disease, shaping the host's immune system, protecting against pathogens, harvesting nutrients from our diet, metabolizing drugs, and influencing the absorption and distribution of body fat. It also affects distant organs, including the central nervous system. Dr. Bercik has a long-standing interest in the microbiota-gut-brain axis, a bidirectional communication between the digestive system and the brain, and its role in chronic gastrointestinal diseases.

His research in animal models has shown that gut microbiota composition determines behavioral phenotype and brain chemistry of the host, that gut bacteria play a key role in abnormal behavior induced during the early life stress and that many aspects of gut dysfunction seen in patients with Irritable Bowel Syndrome (IBS), as well as comorbid anxiety, can be transferred into gnotobiotic mice by microbiota transplantation. Dr. Bercik's research is highly translational, providing proof of concept studies, from bench to bedside. Work in his lab demonstrated that the probiotic bacterium *Bifidobacterium longum*, that normalized anxiety-like behavior and neurotrophin levels in animal models, also improves depression scores and brain activity patterns in patients with IBS. His research is supported by the Canadian Institutes for Health Research Foundation and the National Institutes of Health (USA) grants. He is also co-principal investigator of a large patient-oriented grant funded by the CIHR SPOR network investigating the role of gut microbiota in patients with chronic gastrointestinal illnesses, including Inflammatory Bowel Disease and IBS. Dr. Bercik's clinical interest lies in functional bowel disorders, intestinal dysmotility and celiac disease. He is director of McMaster Clinical Motility Laboratory, and specialized Celiac and Complex Motility clinics, providing care to patients with dysphagia, gastroparesis and severe constipation. ■

## SALIM YUSUF CHAIR IN CARDIOLOGY

Dr. P.J. Devereaux

The Salim Yusuf Chair in Cardiology supports the activities of the director of the Division of Cardiology at McMaster University, currently Dr. P.J. Devereaux. The divisional educational and research activities are covered in the Cardiology Division report. This report will focus on divisional clinical activities.

### Clinical Activities:

In 2016, the arrhythmia service implanted their first leadless pacemaker in a Hamilton Health Sciences (HHS) patient. Our echocardiography program at the HHS has expanded. Our echo technicians are now performing echocardiography at the West Lincoln Memorial Hospital three days a week, and our cardiologists are reading these echocardiograms. Dr. Catherine Demers took over the leadership of the stress laboratory at the HGH site. Our interventional cardiology program is an integrated program between the cardiac catheterization laboratories at the HHS and the Niagara Health System - St. Catharines site. This past year, Dr. Mike Tsang was appointed the site lead for the Niagara Heart Investigation Unit (HIU). Our MitraClip Program, under the leadership of Dr. Shamir Mehta, has now received official ministry funding. The interventional program also developed an integrated Hypertrophic Cardiomyopathy Program under the leadership of Drs. Nick Valettas, Allan Kitching, and Richard Whitlock). In 2016, a substantial synergy occurred when Dr. Tej Sheth joined the Transcatheter Aortic Valve Replacement (TAVR) program both as an interventional cardiologist and an expert in cardiac CT. Dr. Sheth has advanced the safety of TAVR through the incorporation of cardiac CT data into the computing technology used in the TAVR procedure rooms. This has facilitated improved positioning for valve deployment, which has substantially lowered the risk of complications (e.g., heart block). Patients now undergo the procedure percutaneously while awake, and many patients are discharged home the day after the procedure. In the fall of 2016, a new state of the art 128 slice scanner was added to the MUMC site. This scanner has not only increased our capacity for cardiac CT scanning, this scanner can complete cardiac scans at very low radiation doses (i.e., 1.5-3 mSV). ■

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

Dr. Sharon Marr

The chair's focus and passion has been to improve the quality of care for older adults by promoting educational programs for health care clinicians, quality improvement research, and system integration and coordination initiatives. She has been committed to the development of evidence-based inter-professional geriatric educational programs and efforts to increase human resources and training across Canada including Indigenous communities. The chair has proudly continued to support many educational programs such as the Geriatric Certificate Program (GCP©) and its development of e-modules. With over 525 clinicians registered across Canada and more than 145 graduates, the chair and the GCP educational leaders will promote its educational programs to health care professionals with a focus on non-regulated health care professionals over the next year. The chair with its planning committee has continued to promote and support the 2016 Update in Geriatrics Education Day and Life Long Achievement Award. The recipient was Dr. John G. Kelton, executive director of the Michael G. DeGroote Initiative for Innovation in Healthcare at McMaster University. As the dean of the Faculty of Health Sciences and vice-president for Health Sciences, he concurrently held the role of dean of the University's Michael G. DeGroote School of Medicine. Dr. Kelton has truly been an inspirational leader who advanced innovation in industry, learning communities, and life long learning.

The Chair has funded two - *Internal Medicine Dr. Christopher Patterson awards for Excellence in Geriatric Research Grant in Seniors' Care.* This year's recipients of the award were as follows: Dr. Christina Reppas' study on sleep and the impact of keeping active during the postoperative period (supervisor Dr. Christopher Patterson); Dr. Malik Farooqi's study on frailty and mortality in older adults at high risk of CVD (supervisor Dr. Darryl Leong). The chair has supported the development of geriatric specialists in pharmacology. Dr. Justin Lee, clinical scholar currently in the PhD Health Research Methods program at McMaster University and supported by the chair, Department of Medicine and Divisions of Geriatric Medicine and Clinical Pharmacology, was awarded the prestigious CIHR New Investigator Fellowship Award for his scholarly work on drug safety and effectiveness. In addition, the chair with others such as the Department of Medicine, Dr. R. Schlegel, RGP Central, have supported Dr. Joanne Ho's scholarly work on "GeriMedRisk", a geriatric pharmacology consultation program.

### Acknowledgement:

It has been an honour and privilege for the chair to be supported, mentored and guided by following: St. Peter's Hospital Foundation/Hamilton Health Sciences; Dr. Paul O'Byrne, Dr. John Kelton, the Department of Medicine administration; Division of Geriatric Medicine; Mr. Kevin Sulewski; Estate of Lindsay Thompson; Dr. Ron Schlegel; Ms. Sharon Pierson; Dr. Alexandra Papaioannou; Mr. Ryan Liddell; Ms. Lynn Pacheco; Ms. Lily Consoli; Ms. Anisha Patel; and Ms. Jane McKinnon-Wilson.

## WILLIAM J. WALSH CHAIR IN MEDICAL EDUCATION

Dr. Ameen Patel

The 2016-2017 academic year saw the Department and the global medical community lose a giant with the passing of Dr. William J. Walsh. His impact will continue to be felt for generations through all the healthcare professionals he mentored and through his contributions to medical education as one of the founding members of the Michael G. DeGroote School of Medicine. I am indebted to Dr. Walsh, the DeGroote family and Drs. Panju and O'Byrne for the privilege of holding the William J. Walsh Chair in Medical Education. The support of the Chair allows me to continue to pursue my scholarly work.

During the 2016-2017 academic year, I was very active in clinical supervision and teaching delivered to postgraduate trainees from multiple disciplines, undergraduate physician assistants and medical students from McMaster and medical students from throughout Canada and internationally. I was an active contributor to non-clinical teaching in the undergraduate and postgraduate programs as a student advisor, tutor, CASPer assessor, lecturer/presenter, mentor and research supervisor. I was intimately involved in the admissions process for the core Internal Medicine and General Internal Medicine Training Programs as a file reviewer, interviewer and CaRMS ranking member.

In addition to continuing all my hospital, university and national administrative roles, I also took on the role as the director for International Electives for the Undergraduate MD Program. In the past year, the international electives team has explored strategies to increase elective opportunities in all disciplines. I have also continued my role as the Lead for PGY4 trainees completing their final year of Internal Medicine. During the 2016-2017 academic year, I had three trainees in the program; all of whom successfully passed their Royal College examinations and two of whom have secured community positions while the third is pursuing additional training in Stroke Medicine. In my role as the Department Education coordinator and deputy chair, Education, I have continued to oversee the Department's education academic contribution forms and teaching awards. I am also a member of multiple departmental committees including the Internal Career Awards and Tenure and Promotion committees. Professionally, I continued to be an active participant in the Royal College of Canada, Canadian Society of Internal Medicine (CSIM) and the Ontario Chapter of the American College of Physicians. I am a member of the Canadian Society of Internal Medicine Council, Membership and Education committees. A significant amount of my time is devoted to the *Canadian Journal of Internal Medicine* (the CSIM journal) as a manuscript reviewer and in providing editorial and infrastructure support through my role as the liaison between the journal and the society.

I had six peer-reviewed publications and one peer-reviewed book chapter. I am a named member on several grants and currently a site PI for two major international trials. I supervised several medical students and postgraduate trainees in quality improvement projects. My trainees have had good success

in presenting their research at peer-reviewed conferences (Canadian Society of Internal Medicine Annual Meeting and the International Conference on Residency Education) and in publishing the work in peer-reviewed journals.

I was a member of the Planning Committee for the highly successful McMaster University Annual Review Course in Internal Medicine chaired by Dr. Akbar Panju. I devoted considerable time in the 2016-2017 academic year to leading, together with Dr. P.J. Devereaux, the formation of an international multidisciplinary perioperative group with representation from Medicine, Anesthesia and Surgery. We assembled a Planning Committee with representatives from all disciplines from across the country and the United States and led this group in putting on the inaugural Perioperative Care Congress in Toronto in June 2017. The first congress was highly successful with almost 200 registrants from Canada, the USA, South America, Africa and Asia. The field of Perioperative Medicine is growing field and I, together with others, believe it represents an opportunity for improved outcomes for patients with a collaborative care model involving all the disciplines rather than the individual disciplines working in silos.

This past academic year, I was privileged to be recognized for my teaching by the core Internal Medicine program and to receive a Laureate Award from the Ontario Chapter of the American College of Physicians. I was also selected as the recipient of the Stephen Garnett Distinction Award presented to a physician who demonstrates clinical and administrative excellence and is an ambassador for Hamilton Health Sciences.

In November 2016, I travelled to Namibia with Drs. Paul O'Byrne, Akbar Panju, Christian Kraeker and Tim O'Shea to do an external review of the University of Namibia, School of Medicine, Medicine Program. During this visit, I had opportunity to review the clerkship written and OSCE examination and participate as an oral examiner for the OSCE. We also met with the dean and Minister of Health to discuss expanding the relationship between the Departments of Medicine at McMaster and the University of Namibia.

In July 2017, I will step down as the director of the Clinical Teaching Unit at the Juravinski Hospital. All my other roles and responsibilities will remain unchanged in 2017-2018. ■

**600**

High-profile peer-reviewed papers are published in more than 600 separate publications annually.

## 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 one of the largest and most intensive specialist academic internal medicine practices in Canada. Specializing in immune aspects of disease affecting many organ systems, Dr. Denburg sees patients, most with complex medical problems, through his referral-based outpatient and inpatient consultations. He also continues his involvement in clinical trials studying these disorders. In recognition of his contributions to the promotion of health science, Dr. Denburg was inducted as a Fellow into the Canadian Academy of Health Sciences in September, 2016.

Dr. Denburg's primary research thrust examines 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. This inquiry includes an exploration of the growth and differentiation of human basophil and eosinophil precursors, with the development of in vitro assays to monitor clinically relevant fluctuations in these cells during allergic responses in allergic rhinitis, nasal polyposis and asthma. His research has established the biological importance of hemopoietic mechanisms in allergic inflammation and emphasizes important, now globally-recognized links, among rhinitis, asthma and other allergic disease manifestations ("allergy as a systemic disease"). Findings have been published in high-impact journals, and are the subject of ongoing peer-reviewed and industrial grants.

As founder, scientific director and CEO of AllerGen NCE Inc. for the past 12 years, Dr. Denburg has forged a strong national research and training community in allergic disease, uniting academics, researchers and students from 46 disciplines and 23 affiliated Network universities and hospitals in multi-sectoral partnered teams, now with international connections and visibility in several continents. The William J. Walsh Chair has been a critically important asset in support of Dr. Denburg's role in developing and maintaining AllerGen's activities. For a summary of AllerGen's major accomplishments over the past year, see the report included in this publication. ■

# 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 for a further seven years. Dr. Larché's group is based at both McMaster University Medical Centre and St. Joseph's Healthcare Hamilton.

For the 2016-2017 period, the group consisted of approximately 20 researchers including postdoctoral fellows, project managers, technicians, graduate students, undergraduate co-op/thesis students, clinical study coordinators and five associated faculty members. The laboratory continues to investigate the pathogenesis and treatment of a variety of chronic inflammatory diseases including allergic rhinitis and asthma, peanut allergy, rheumatoid arthritis, scleroderma, 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), Immune Tolerance Network (USA), and Adiga Life Sciences Inc. During 2016-17, a three-year CIHR Project grant was awarded focusing on the role of IL-8 in the pathogenesis of allergic diseases. Dr. Larché continued to develop and evaluate peptide therapies for allergic disease in close collaboration with Adiga Life Sciences, a joint venture between McMaster and UK-based Circassia Pharmaceuticals PLC. The results of mechanistic studies performed in collaboration with colleagues at UBC and Queen's University will inform design of future interventions and may identify biomarkers of efficacy.

Dr. Larché's group continues active collaborations 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. During this time, formal collaborations were established with the laboratory of professor Jing Li at the Guangzhou Institute for Respiratory Diseases in China. ■

8 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. 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 cardiometabolic traits among South Asian and Aboriginal people.

In 2013, Dr. Anand and her colleagues received a grant from CIHR Institute of Nutrition, Metabolism and Diabetes aimed at understanding the early origins of chronic diseases by studying the nutritional, genetic, epigenetic, and microbiome associations with cardio-metabolic phenotypes and allergic disorders among 5,500 newborns from the CHILD, FAMILY, START and ABC birth cohort studies. In 2016 they received funding from CIHR to continue this DoHAD research with a Team Grant focused on dietary intake and metabolomics in early life and pregnancy. Initial results on dietary patterns and infant gut microbiome have been published in 2016-17.

- de Souza RJ, Zulyniak MA, Desai D, Shaikh M, Campbell NC, Lefebvre DL, Gupta M, Wilson J, Wahi G, Atkinson SA, Teo KK, Subbarao P, Becker AB, Mandhane PJ, Turvey SE, Sears MR, **Anand SS** for the NutriGen Alliance Investigators. Harmonization of Food-Frequency Questionnaires and Dietary Pattern Analysis in 4 Ethnically Diverse Birth Cohorts. Nutr. J 2016 Nov;146(11):2343-2350.
- Stearns J, Zulyniak M, de Souza R, Campbell N, Fontes M, Shaikh M, Sears M, Becker A, Mandhane P, Subbarao P, Turvey S, Gupta M, Beyene J, Surette M, **Anand SS** for the NutriGen Alliance. Ethnic and diet-related differences in the healthy infant microbiome. Genome Medicine 2017 Mar 29;9(1):32. ■

### research impact

Research led by Dr. Sonia Anand suggested the risk of developing Type 2 diabetes for South Asians – a group long known to suffer from substantially higher rates of both diabetes and heart disease – begins immediately at birth.

## CANADA RESEARCH CHAIR IN INFLAMMATION, MICROBIOTA AND NUTRITION

Dr. Elena F. Verdú

Dr. Verdú's CRC program explores the mechanisms underlying gluten-related disorders, including celiac disease and non-celiac gluten/wheat sensitivity, and investigates the potential role of intestinal microbiota as modifier of disease risk.

During 2016-17, Dr. Verdú has published 21 peer-reviewed papers (14 original papers, including one meta-analysis and seven reviews) in top journals of her field (*Gastroenterology*, IF:18,18) as well as in general journals (*Science*, IF: 37.2; *Science Reports*, IF:5.2). Of these, the primary work supported by her CRC tenure includes the discovery that bacteria in the small intestine metabolize gluten differently, to increase or decrease its immunogenicity. This interaction between microbes and gluten could help determine the risk for autoimmune enteropathy in genetically susceptible individuals and may underlie the reported association between dysbiosis and celiac disease.

Dr. Verdú's group investigated gluten metabolism by opportunistic pathogens and commensal duodenal bacteria, and characterized the capacity of specific peptides to activate gluten-specific T-cells from patients with celiac disease. They also used gnotobiotic mouse models to study gluten metabolism in vivo. Gluten peptides produced by bacterial metabolism were characterized by liquid chromatography tandem mass spectrometry in collaboration with Dr. Nathan Magarvey, and their immunogenic potential was evaluated using peripheral blood mononuclear cells from patients with celiac disease after a 3-day gluten challenge. They found that *Pseudomonas aeruginosa*, an opportunistic pathogen isolated from patients with celiac disease, had elastase activity and produced gluten metabolites that better translocated the mouse intestinal barrier. *P. aeruginosa* produced, through its elastase activity, shorter gluten peptides that were often highly immunogenic to celiac patients, inducing responses as strong as the parent 33-mer. In contrast, Lactobacillus spp. from the duodenum of individuals without celiac disease degraded gluten peptides produced by human and *P. aeruginosa* proteases, reducing their immunogenicity. The results suggest pathogens such as *P. aeruginosa* in the small intestine may contribute to development of celiac disease through their pattern of metabolism of gluten. Recent unpublished work in Dr. Verdú's lab has discovered that proteases, such as microbial elastase, also stimulate innate immune responses in the host. Activation of this pathway in the duodenum of individuals with genetic risk for celiac disease is key for progression to enteropathy and reveals the previously unknown trigger for the activation of intraepithelial lymphocytes in these patients. The results have translational importance as they can be targeted therapeutically to prevent food sensitivities like celiac disease. Work is currently being performed in Dr. Verdú's lab, to exploit the microbiota metabolic capacity to either promote dietary gluten detoxification or, microbial (serpin) inhibition of proinflammatory bacterial elastase.

### research impact

Dr. Verdú found that bacteria in the gut may contribute to the body's response to gluten, an important finding that could lead to new treatments for celiac disease.

In 2017, Dr. Verdú has been invited to present key note addresses at the University of Calgary GI Research day, Microbiome Symposium R&D in The Netherlands, Gut Microbiota for Health Summit in Paris, and at several Gastroenterology Societies in Canada, South America and Europe. She is the president of the North American Association for the study of Celiac Disease (www.nasscd.org) and Visiting Research Professor (Canadian Gastroenterology Association) 2017. She continues to be funded by CIHR, CCC and by a combined CIHR/ French National Research Institutes grant.

www.nasscd.org ■

## 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 research program addressing the mechanisms by which the microbiota contribute to human health and disease. This work is focused primarily on the respiratory and gastrointestinal tracts. Specific projects investigate cystic fibrosis respiratory infections, asthma, allergy, pneumonia, sepsis, ulcerative colitis, irritable bowel syndrome, metabolic syndrome, and the influence of the microbiome on psychological disorders. Additional research is focused on characterizing the development of the microbiome in infants, and changes that occur with aging. His lab has expertise on developing culture-independent and culture based approaches to characterize and exploit the microbiome. It is widely assumed that most of the human associated microbiota is not culturable in the lab, but the Surette lab has challenged that view and in the current reporting period published that >99.9% of the human gut microbiome could be cultured (Lau et al Genome Medicine 2016). This complements their previous work on culturing the respiratory tract microbiota. 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.

During the reporting period the Surette lab contributed 21 papers. His research is supported by operating grants from Canadian Institutes of Health Research, Cystic Fibrosis Canada and Crohn's and Colitis Canada, and is a co-applicant on several team grants. His lab is also coordinating the microbiome studies for the IMAGINE SPOR network. In addition to his research program, Dr. Surette is co-director of the McMaster Genome Center. ■

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

**21**

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

Dr. Gregory Steinberg

Dr. Steinberg's research studies the fundamental mechanisms regulating energy metabolism and how this can contribute to common chronic diseases including type 2 diabetes, cardiovascular disease and cancer. A common connection between all three diseases is non-alcoholic fatty liver disease (NAFLD) Non-alcoholic fatty liver disease (NAFLD) is characterized by lipid accumulation >5% of liver weight in the absence of excessive alcohol intake and is a highly prevalent non-communicable disease impacting over 30% of adults in Canada and globally. NAFLD is an important risk factor for developing type 2 diabetes (T2D), cardiovascular disease (CVD), chronic kidney disease, non-alcoholic steatohepatitis (NASH), cirrhosis and hepatocellular carcinoma (HCC). Currently, there are no pharmacotherapies for NAFLD and while weight loss is effective, durability in the absence of bariatric surgery is limited by reductions in resting energy expenditure (EE). Identifying new strategies for treating NAFLD is an urgent priority that will also impact T2D, CVD, NASH and HCC. Three research highlights from this year were:

1) We discovered that one of the ways to treat NAFLD may involve inhibiting a key rate limiting enzyme in the liver responsible for making fatty acids and cholesterol, called ATP-citrate lyase. Specifically, we found that treating mice with a small molecule that inhibited the activity of ATP citrate lyase was effective for treating NAFLD, pre-diabetes (insulin resistance) and atherosclerosis in mice; findings which have laid the foundation for stage 3 clinical testing of a new drug in people with elevated cholesterol who are at high risk of having a stroke or heart attack.

2) The cancer metabolism research group identified one of the reasons why people with obesity and diabetes are at greater risk for developing lymphoma may be because downregulation of the energy sensing enzyme AMP-activated protein kinase (AMPK) causes tumors to grow more rapidly. These data help explain why exercise may exert protective effects against many cancers and suggest that therapies designed to increase the activity AMPK may be effective to delay cancer development.

3) In collaboration with Drs. Hertzel Gerstein and Guillaume Paré, we discovered that the leading type 2 diabetes medication metformin increases serum levels of the protein growth differentiating factor 15 in people with high glucose levels. These findings may explain the pleiotropic beneficial effects of metformin on cardiovascular disease and cancer and why this commonly used medication may exert protective effects against aging. ■

## CANADA RESEARCH CHAIR OF RESEARCH TRANSFER IN INTENSIVE CARE

Dr. Deborah Cook

Emerging studies show that the human microbiome is deranged by critical illness, exacerbated by the ubiquitous acid suppression and antimicrobials in the ICU. Microbiome modification with the goal of improving health has been identified as an important field of study for patients on life support. One postulated mechanism to this end is probiotic administration. Probiotics are defined by the WHO as 'microorganisms which when ingested confer health benefits to the host'. In collaboration with the Canadian Critical Care Trials Group, I have been leading a multicenter randomized trial testing the probiotic Lactobacillus rhamnosus GG, testing the effect on infections such as pneumonia and Clostridium difficile, diarrhea and antimicrobial use in the ICU. This low cost 'natural health food product' appears promising in trials of children and adults in the out-patient setting and in some healthcare institutions. In the ICU, based on small trials at risk of bias, some guidelines suggest that probiotics be used today as a cost-effective way to prevent pneumonia. However, before the knowledge available to date is prematurely encoded into practice, our community is responsibly and rigorously evaluating probiotics in critical illness in 30 centres around the world, led by colleagues at St Joseph's Hospital (Drs. Erick Duan, Mark Soth and myself), the Hamilton General Hospital (Dr. Maureen Meade) and the Juravinski Hospital (Drs. Tim Karachi and Bram Rochwerg).

Critical illness requiring life support raises common existential questions about meaning, purpose, relationships and destiny; however, the austere ICU setting is not usually considered an ideal venue for expressions of spirituality. With the globalization of society, the world grows increasingly spiritually and culturally diverse. The WHO identifies spirituality as 'a core dimension of health', potentially sustaining people in times of distress. Spiritual support is one of seven end-of-life care quality domains. Professional policy statements consider identifying (but not necessarily addressing) spiritual needs to be a core ICU competency. Families, however, report that ICU practitioners, especially physicians, are inadequate in this aspect of their practice, especially for dying patients. At St. Joseph's Healthcare Hamilton, bedside nurses, other clinicians, the intensivist team (Drs. Jill Rudkowski, Waleed Alhazzani, Roman Jaeschke, Tania Ligori, Eric Duan, Mark Soth and myself) and our palliative care colleagues (Drs. Anne Boyle and Anne Woods) have expanded our 3 Wishes Program for dying patients. Bedside practitioners and the 3 Wishes team elicit and implement wishes from the patient when possible as well as their families and other clinicians — to dignify the patient's death, honour and celebrate the patient's life, and foster humanism in practice. Interviews with over 200 family members and clinicians illustrate how spirituality is considered an integral part of a life narrative before, during, and after a death. Eliciting wishes stimulates conversations about responding to death in personally meaningful ways, facilitating continuity and closure, and easing emotional trauma. Soliciting wishes identifies positive aspirations which provide comfort in the face of death. Wishes may be grounded in spiritual goals such as peace, comfort, connection and

reconnection - the latter being a poignant wish of persons separated by distance or discord. Frequent secular wishes are for a spiritually-enhanced environment. Others are for religious rituals. Soliciting wishes can help to revive lapsed spiritual supports, while respecting preferences of those avowedly non-religious or holding private views. The act of soliciting wishes brings clinician humanity to the fore and has been an important opportunity for experiential education for residents in our unit. The 3 Wishes Project helps to realize the experiences and expressions of spirituality for those dying, living, and working in the ICU. ■

## 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. Dr. Hirota was recruited from UBC in November 2016, where he currently maintains an associate professor title. Dr. Hirota is in the process of recruiting graduate students and postdoctoral fellows. Presently, Dr. Hirota's research group includes two graduate students and one undergraduate co-op student, supported by a research technician. All staff are based at St. Joseph's Research Institute within the Firestone Institute for Respiratory Health. Dr. Hirota has also integrated into McMaster's Immunology Research Centre (MIRC).

The focus of Dr. Hirota's work is understanding how transport mechanisms in the respiratory mucosa contribute to lung health and chronic disease. Funding from SickKids Hospital and Cystic Fibrosis Canada will explore the relationship between ATP Binding Cassette Transporter C4 (ABCC4) and Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) as a potential means for improving treatment in cystic fibrosis patients. Additional funding from the British Columbia Lung Association is exploring ABCF1 as a novel anti-viral sensor in the respiratory mucosa that may be defective in individuals with chronic obstructive pulmonary disease (COPD). In early 2017, a Mitacs-industry partnered project with Qu Biologics (Vancouver, BC) was completed with the publication of a second manuscript demonstrating the potential role for site-specific immunomodulators in chronic lung disease. Ongoing industry partnered research is being performed with Aspect Biosystems (Vancouver, BC) to develop a novel printable scaffold that can be used for 3D printing of human airways in a project funded by Vancouver Coastal Health Research Institute. Lastly, Dr. Hirota filed a provisional patent at McMaster University for novel ABCC4 inhibitors that were discovered and validated in collaboration with the Centre for Drug Research and Development (Vancouver, BC).

Looking forward, Dr. Hirota will continue to build his research program at McMaster University, by integrating with the Departments of Mechanical Engineering, Chemical Engineering, Chemistry, Biochemistry & Biomedical Science, and Pathology & Molecular Medicine. Furthermore, Dr. Hirota will apply to federal infrastructure (John R. Evans Leaders Fund – Canadian Foundation for Innovation), staff salary (Ontario Early Researcher Award), and operating (CIHR Project, NSERC Discovery, CHRP Grant, SickKids New Investigator Research Award) grants. ■

## 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 prompted the successful Canadian Institutes of Health Research Team Grant in Venous Thromboembolism that was awarded to Dr. Weitz and the McMaster Thromboembolism Group in 2006. Providing $4.2 million over seven years, the Team Grant funded new initiatives in thrombosis research that span the spectrum from basic science, to clinical trials, to research in knowledge translation, and created new collaborations at Queen's University, McGill University, the University of Toronto, and the University of Michigan. These interactions have facilitated successful grant-in-aid applications to the Canadian Institutes of Health Research, the National Institutes of Health and the Heart and Stroke Foundation. In addition, this chair was the impetus for the successful $35 million Canadian Foundation for Innovation Award for the Large Scale Institutional Endeavor that provided one-third of the funding for the David Braley Research Institute at the Hamilton General Hospital site. ■

Canadian Foundation for Innovation Award for the Large Scale Institutional Endeavour — $35M