

# Research Matters



Annual Report 2009-2010



L'Institut de recherche  
du Centre universitaire de santé McGill  
The Research Institute  
of the McGill University Health Centre

## on the cover

Cover and inside cover photo: Denise Grant Photography



Ashley Donelle

Three months after receiving the gift of a double-lung transplant, 25-year-old Ashley Donelle looks down as her 2-year-old daughter Leila vies for attention during a photo shoot. Ashley, a cystic fibrosis patient diagnosed at birth, has benefited from the MUHC's pediatric and adult services throughout her life. She and her daughter are living proof of why research matters. Referred to Toronto in July 2009 where wait times are shorter, Ashley received new lungs at the Toronto General Hospital on November 8, 2009. Three months later, she returned to Montreal. That event is one example of how research impacts patient care.

# Index

<b>Message from the Director, Research Institute of the MUHC</b> .....	<b>2</b>
<b>Message from the Chairman of the Board, Research Institute of the MUHC</b> .....	<b>3</b>
<b>Message from the Director General and CEO, MUHC</b> .....	<b>4</b>
<b>Message from the Chairman of the Board, MUHC</b> .....	<b>5</b>
<b>Awards and Recognition</b> .....	<b>6</b>
<b>Personnel Awards</b> .....	<b>7</b>
<b>Research Axes</b>	
Cancer .....	<b>10</b>
Cardiovascular Diseases and Critical Care .....	<b>12</b>
Endocrinology, Diabetes, Nutrition and Kidney Diseases .....	<b>14</b>
Health Outcomes .....	<b>16</b>
Human Reproduction and Development.....	<b>18</b>
Infection and Immunity .....	<b>20</b>
Medical Genetics and Genomics .....	<b>22</b>
Mental Illness and Addiction .....	<b>24</b>
Musculoskeletal Disorders.....	<b>26</b>
Neurosciences.....	<b>28</b>
Respiratory Health .....	<b>30</b>
<b>New Recruits</b> .....	<b>32</b>
<b>Students</b> .....	<b>33</b>
<b>Business Development</b> .....	<b>34</b>
<b>Representative Publications</b> .....	<b>35</b>
<b>Support from Foundations and Auxiliaries</b> .....	<b>39</b>
<b>Core Facilities</b> .....	<b>40</b>
<b>Funding by Source</b> .....	<b>42</b>
<b>Financials – Quick Stats</b> .....	<b>43</b>
<b>Internal Committees</b> .....	<b>44</b>
<b>Acknowledgements</b> .....	<b>45</b>



## Message from the Director, The Research Institute of the MUHC



Ask any investigator at The Research Institute of the McGill University Health Centre (RI-MUHC) why they do what they do and you will get the same answer: *Research Matters*. Of course, you might say this would be analogous to anyone's response as to the importance of his profession, but to our Institute's investigators there is another layer of meaning to this statement—particularly as their workplace is an academic health centre where excellence in patient care, research and teaching co-exist for one reason and one reason alone: improving the outcomes of people facing the most complex medical challenges of our time while making advances that can allow others to enjoy greater health and well-being at every stage of their lifespan. At The RI-MUHC, curiosity and determination come together to tackle these challenges, some of which have dodged treatments and cures for years while others are just now emerging.

Like forces of nature, our investigators have made discoveries that have shattered our knowledge and understanding of human biology and medicine. These discoveries don't occur every day.

Still, thanks to individual and collective ingenuity, expertise and enthusiasm, our investigators continue to stretch daily the angles of our current references and thus play a significant role in the international scientific community. Sometimes, the impact of their efforts is local while on other occasions, it is felt around the world. That is the power and beauty of research. With highly qualified personnel and \$130M in funding, the RI-MUHC is also a strong economic engine for Montreal, Quebec and Canada.

The RI-MUHC's efforts—indeed successes—in 2009-2010 and every year would not be possible without our talented investigators, staff and students, the support of our Board and management, the generosity of our foundations and granting agencies, and the belief of our patients and their families that research is tantamount to the circle of life.

It is a privilege to lead and contribute to the RI-MUHC.

**Vassilios Papadopoulos, D.Pharm., Ph.D.**

Director, The Research Institute of the MUHC, Associate Executive Director of Research at the MUHC



## Message from the Chairman, The Research Institute of the MUHC



By any measure, the past year was enormously successful for The Research Institute of the McGill University Health Centre (RI-MUHC) and its talented investigators. The RI-MUHC recruited top international researchers into its ranks and the investigator community attracted record levels of peer-reviewed grants to support their studies. All of this was achieved against a backdrop of an increasingly constrained financial environment in which it seems all research organizations must operate given these challenging times.

The RI-MUHC continues to thrive and prosper in large part because of the unwavering commitment of the McGill University Health Centre to the central role research plays in building and maintaining a world-class teaching hospital. The theme of this year's report is *Research Matters*, and it reminds us that medical research is not an abstract pursuit of knowledge in an ivory tower. The vibrant research activities of the RI-MUHC and its

members are vital to the greater MUHC community, bringing to the clinical care and teaching missions of the hospital the latest medical understanding, interventions, techniques and devices for the benefit of current and future patients.

On behalf of the Board of Directors of the RI-MUHC, I congratulate Dr. Papadopoulos and his team on a highly productive year, and look forward to ongoing success in the future.

### **Brian Baxter**

Chairman, Research Institute Board, The Research Institute of the MUHC

## Message from the Director General and CEO, McGill University Health Centre



These are exciting times for the McGill University Health Centre (MUHC) and the Research Institute of the MUHC. Last spring we broke ground at the Glen Campus and entered into a long-term partnership with the McGill Health Infrastructure Group. Led by Quebec powerhouse SNC-Lavalin and United Kingdom-based Innisfree, the team has over 95 years of construction, design and maintenance experience as well as award-winning architecture.

Together, we will create the future-ready facilities that our professionals need to pursue our goal of bridging the gap between our investigators' discoveries, clinical practices and the health prospects of people throughout their lifespan, at home and around the world.

Whilst these state-of-the-art facilities are being built, however, our investigators continue to forge ahead with their important work. The publications, success stories, awards and recognition you see here within the 2009-10 Annual Report only represent a fraction of the volume of research-intensive energy that propels our institution but they demonstrate the breadth and depth of what is being accomplished within our walls and through international collaboration.

It is not by chance that the theme *Research Matters* was chosen. These words speak volumes to the promise of a better future and to our vision as one of the world's foremost academic health centres.

**The Hon. Arthur T. Porter, P.C. MD**

Director General and CEO, McGill University Health Centre

## Message from the Chairman of the Board, McGill University Health Centre



I find it a pleasant challenge to try to separate the outstanding accomplishments of the McGill University Health Centre (MUHC) from those of our Research Institute. Indeed, the MUHC's global visibility is enhanced by the fundamental and clinical research conducted by our world-class team of investigators in such areas as cancer, cardiovascular diseases and respiratory medicine.

This past year, many of our Institute's leaders were honoured by provincial, national and international organizations and their peers for their significant contributions to their fields and the scientific community as a whole. From Young Investigator and Lifetime Achievement awards to Fellowships and special distinctions, such recognition illustrates the strength of our team and its future potential.

After all, world-class researchers attract powerful grants that support meaningful research and, of course, more world-class researchers to carry on our tradition of excellence.

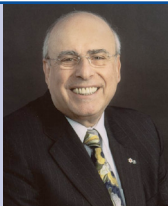
With our eyes fixed now, more than ever before, on a bright future for research at the Glen Campus, I wish to thank all those who contributed to this remarkable year. Your tireless dedication to outstanding research is helping us to deliver the *Best Care for Life*.

**The Hon. W. David Angus, Q.C., Ad. E.**

Chairman, MUHC Board of Directors



# Awards and Recognition



**Dr. Phil Gold, Infection and Immunity**, inducted into The Canadian Medical Hall of Fame. In 1965, Dr. Gold co-discovered the carcinoembryonic antigen (CEA), the first clinically useful human tumour marker (found in 70% of cancer patients) that revolutionized the diagnosis and management of cancer. This marker was developed into a blood test that remains the world's most frequently used oncologic test and the standard against which other human tumour markers are measured. Through this work, Dr. Gold is credited for developing the field of Human Tumour Marker Biology. His subsequent demonstration that CEA was in embryonic and fetal tissue initiated the field of oncodevelopmental biology.

**Dr. Marcel Behr**, Infection and Immunity, was elected a member of the American Society for Clinical Investigation. Dr. Behr's election underscores the excellence and international impact of his innovative work in the field of mycobacteria.

**Dr. Sasha Bernatsky**, Musculoskeletal Disorders, received the 2010 Canadian Rheumatology Association Young Investigator Award in recognition of her extraordinary productivity and the high quality of her research.

**Dr. Maala Bhatt**, Health Outcomes, received the Terry Klassen Young Investigator Award from the Pediatric Emergency Research Group of Canada. This new award recognizes investigators who have demonstrated excellence in pediatric emergency medicine research within the first seven years of their career.

**Dr. Miguel Burnier**, Neurosciences, was named a Fellow of The Association for Research in Vision and Ophthalmology. This is one of the highest honours given to researchers in this field.

**Dr. James Brophy**, Cardiovascular Diseases and Critical Care, was appointed the first Research Chair in Technology Assessment and Evidence-based Medicine by the Fonds de la recherche en santé du Québec, the ministère de la Santé et des Services sociaux du Québec and the McGill University Health Centre.

**Dr. Marcelo Cantarovich**, Infection and Immunity, was elected to the Council of the Transplantation Society, which provides the focus for global leadership in transplantation research, clinical practice, scientific communication, continuing education and ethics.

**Dr. Stella Daskalopoulou**, Cardiovascular Diseases and Critical Care, was selected as the recipient of the 2009 Canadian Society of Internal Medicine New Investigator Award.

**Dr. Mostafa Elhilali**, Neurosciences, received in 2009 the first-ever American Urological Association Lifetime Achievement Award. He was also appointed an Officer of the Ordre national du Québec.

**Dr. Liane Feldman**, Health Outcomes, was named the James IV Travelling Fellow for 2010. The James IV Association is one of the most prestigious international surgical groups.

**Vincent Giguère**, Cancer, was elected a Fellow of the Royal Society of Canada. Dr. Giguère, an international leader in the field of nuclear receptors, identified several members of the super-family of nuclear receptors and revealed mechanisms demonstrating how these proteins work at the molecular level.

**Dr. Richard Hamilton**, Health Outcomes, was honoured by The Hospital for Sick Children with an annual fellowship in his name. The Dick Hamilton Award is awarded to a Fellow in recognition of excellence in clinical care, education and research in the tradition established by Dr. Hamilton, a founder of SickKids' gastroenterology division.

**Dr. Ed Harvey**, Musculoskeletal Disorders, was appointed Co-editor-in-chief of the Canadian Journal of Surgery and appointed Chairman of the Research Committee of the Orthopaedic Trauma Association, a worldwide organization that promotes excellence in care for the injured patient.

**Dr. Robert Kiss**, Cardiovascular Diseases and Critical Care, was awarded the Jonathan Ballon Award, which is presented to a researcher who achieves the highest rating for a first scientific research project submitted to the Heart and Stroke Foundation of Quebec.

**Dr. Jean-Martin Laberge**, Human Reproduction and Development, was elected President of The Canadian Association of Pediatric Surgeons.

**Dr. Brenda Milner**, Neurosciences, was shortlisted for the National Sciences Engineering and Research Council's Herzberg Gold Medal. She was also promoted to Grand Officer of the Ordre national du Québec.

**Dr. Vassilios Papadopoulos**, Human Reproduction and Development, was awarded the distinction of Fellow by the American Association for the Advancement of Science, and elected a lifetime member of the prestigious Académie Nationale de Médecine de France.

**Dr. I. Barry Pless**, Health Outcomes, was appointed to the editorial board of Chronic Diseases in Canada, the official journal of the Public Health Agency of Canada. Dr. Pless was also elected to the National Board of Directors of the Society for the Advancement of Violence and Injury Research; he is the only Board member from outside the U.S.

**Dr. Constantin Polychronakos**, Endocrinology, Diabetes, Nutrition and Kidney Diseases, received the 2009 Canadian Pediatric Society Research Award. This award honours the best current Canadian child and youth health research, judging its impact on knowledge, practice and policy as well as the originality and rigour of the research.

**Dr. Judith Ritchie**, Health Outcomes, was selected by the Canadian Health Services Research Foundation to receive its 2010 Excellence Through Evidence award, which recognizes the critical role of leadership in successfully implementing evidence-informed innovations in health care.

**Dr. Simon Rousseau**, Respiratory Health, was awarded the 2010-2011 Robbie Promising New Research Award, which recognizes the outstanding contributions of an established cystic fibrosis investigator.

**Dr. Maya Saleh**, Cancer, received the 2009 Burroughs Wellcome Fund's Investigators in the Pathogenesis of Infectious Disease Award.

**Dr. Charles R. Scriver**, Medical Genetics and Genomics, received the 2010 Howland Medal, the highest award of the American Pediatric Society. Dr. Scriver also received the PKU Hero Award at the National PKU Alliance Inaugural Annual Meeting, the Folling Award from the European Phenylketonuria Group, the Pollin Prize in Pediatric Research, and the 2010 John Howland Medal from the American Pediatric Society.

**Dr. Robert Sladek**, Medical Genetics and Genomics, was awarded the Young Investigator Award by the Canadian Society of Endocrinology and Metabolism. Dr. Sladek's work focuses on the development of new technologies for identifying genes conferring risk for type 2 diabetes and for studying the dynamics of gene transcription networks in living cells.

**Dr. Allan Sniderman**, Cardiovascular Diseases and Critical Care, was elected a Fellow of the Royal Society of Canada. Dr. Sniderman introduced apoB into clinical practice worldwide as the key index for treating elevated cholesterol levels, thus saving many lives.

**Dr. Seang Lin Tan**, Human Reproduction and Development, received the Singapore Lecture Gold Medal at the 7th International Scientific Meeting of the Royal College of Obstetricians and Gynaecologists of the United Kingdom.

**Dr. Michael Tanzer**, Musculoskeletal Disorders, was awarded the Hip Society's prestigious 2009 John Charnley Award for the best clinical research encompassing important advances in the management of hip disorders.

**Dr. Gloria Tannenbaum**, Endocrinology, Diabetes, Nutrition and Kidney Diseases was elected to Council of The Endocrine Society, a distinguished international society dedicated to meeting the needs of diverse constituencies including basic scientists, clinical investigators and clinicians-in-practice.

**Dr. Mark A. Ware**, Neurosciences, received the 2009 Neuropathic Pain Research Award from Pfizer Canada.

# Personnel Awards

## Canada Research Chairs

Tier 1 (Renewal)

Dr. David Colman, Neurosciences  
Dr. Eric Fombonne, Mental Illness and Addiction  
Dr. William Muller, Cancer  
Dr. Tommy Nilsson, Endocrinology, Diabetes, Nutrition and Kidney Diseases  
Dr. Vassilios Papadopoulos, Human Reproduction

Tier 2 (Renewal)

Dr. Brian Chen, Human Reproduction (New)  
Dr. Jean-Francois Cloutier, Neurosciences  
Dr. Alyson Fournier, Neurosciences  
Dr. Arnold Kristof, Cardiovascular Diseases and Critical Care  
Dr. Keith Murai, Neurosciences  
Dr. Christopher C. Pack, Neurosciences  
Dr. Salman T. Qureshi, Cardiovascular Diseases and Critical Care  
Dr. Andrew J. Reader, Neurosciences  
Dr. Edward Ruthazer, Neurosciences

## Salary Awards

**CIHR Clinician Scientist, Phase II – Renewal**  
Dr. Dao Nguyen, Respiratory Health

**CIHR New Investigator**

Dr. Nitika Pai, Infection and Immunity  
Dr. David Stellwagen, Neurosciences

**FRSQ Chercheurs Nationaux**

Dr. Marcel Behr, Infection and Immunity  
Dr. Louise Pilote, Health Outcomes

**FRSQ Chercheur Boursier—Senior**

Dr. Christina Haston, Health Outcomes  
Dr. Elham Rahme, Health Outcomes

**FRSQ Chercheur Boursier—Junior 2**

Dr. Sasha Bernatsky, Musculoskeletal Disorders  
Dr. Nandini Dendukuri, Health Outcomes  
Dr. Momar Ndao, Infection and Immunity  
Dr. Peter Siegel, Cancer

**FRSQ Chercheur Boursier—Junior 1**

Dr. Ines Colmegna, Musculoskeletal Disorders  
Dr. Vidal Essebag, Cardiovascular Diseases and Critical Care  
Dr. Monzur Murshed, Musculoskeletal Disorders

**FRSQ Chercheur Boursier Clinicien—Senior**

Dr. Marina Klein, Infection and Immunity

**FRSQ Chercheur Boursier Clinicien—Junior 2**

Dr. Jean Ouellet, Musculoskeletal Disorders  
Dr. Ronald Postuma, Neurosciences

**FRSQ Chercheur Boursier Clinicien—Junior 1**

Dr. Stella Daskalopoulou, Cardiovascular Diseases and Critical Care

## James McGill Awards

Dr. Nancy Mayo, Health Outcomes  
Dr. William Foulkes, Medical Genetics and Genomics

## William Dawson Scholars

Dr. Marcel Behr, Infection and Immunity  
Dr. William Foulkes, Medical Genetics and Genomics  
Dr. Jean-Jacques Lebrun, Endocrinology, Diabetes, Nutrition and Kidney Diseases



*Dr. Arthur Porter, left, and Dr. Vasilios Papadopoulos, right, survey the site where the new facilities of the Glen Campus are being built.*





# Research Axes





## Cancer Axis

Just as its brakes can stop a vehicle when necessary, the active products (proteins) of tumour suppressor genes can stop the growth and reproduction of cancer cells. Unfortunately, many different mechanisms can deactivate these genes, the same way cutting the brake line will render the brakes useless. These genes and proteins are important because they often represent biomarkers that could predict the progression of the cancer or of the target that could be harnessed to stop the progression altogether.

Dr. Mario Chevette has devoted many years of his career to identifying tumour suppressor genes implicated in the progression of prostate cancer. He and his team have identified a gene called CD9 in prostate cancer and shown that, under certain circumstances, introducing it into prostate cancer cells causes these cells to die—a process called mitotic catastrophe.

# Tumour suppressor genes may stop cancer



Dr. Mario Chevette, explains how tumour suppressor genes are implicated in the progression of prostate cancer.

The process induced by CD9 is the same one that causes cancer cells to die when they are irradiated, as in radiotherapy. Dr. Chevette and his team have identified proteins (partners) that interact with CD9 and play a role in this process, as well as evidence that CD9 and its partners can kill ovarian and breast cancer cells in addition to prostate cancer cells. Their task now is to continue studying these proteins, determine how to mimic their actions against cancer cells and explore how universal the CD9 action is against other types of cancer cells.

## **Funded by:**

*Canadian Institutes of Health Research (CIHR)*

*Prostate Cancer Canada*



# Preventing cardiovascular disease



## Cardiovascular Diseases and Critical Care Axis

In the April 2010 edition of *Diabetes Care*, the American Diabetes Association and the American College of Cardiology recommended that levels of a protein called apolipoprotein B (apoB)—an important predictor of cardiovascular disease be considered the key measurement in the success of LDL cholesterol-lowering therapy.

Their recommendation is based partly on the research results of MUHC cardiologist and McGill professor Dr. Allan Sniderman and his colleagues, who have been instrumental in identifying the importance of apoB as a measurement of the risk of heart attack and stroke.

Now, cardiovascular risk is assessed by measuring the levels of LDL (or “bad”) cholesterol and HDL (the “good”) cholesterol in the blood. Measuring the level of LDL particles is not always useful because the mass of cholesterol per





Dr. Jacques Genest examines heart transplant patient, Claire O'Reilly, in clinic.

particle can vary so much. However, measuring the level of LDL cholesterol is not always useful because the mass of cholesterol per particle can vary so much and risk relates more to the number of LDL particles than to the mass of cholesterol they contain.

Recognizing the role of apoB is a major change in how we consider and manage cardiovascular disease, confirms Dr. Sniderman, and using it as a primary test of LDL-lowering therapy would be a significant change from current practice.

The apoB measurement is now included in the new Canadian Guidelines for the Prevention of Coronary Artery Disease.

**Funded by:**

*Canadian Institutes of Health Research (CIHR)*

*Heart and Stroke Foundation of Canada*

*Merck Frosst (Canada)*

*AstraZeneca (Canada)*



# Understanding obesity will lead to better treatments

## Endocrinology, Diabetes, Nutrition and Kidney Diseases Axis

As more and more people become heavier and heavier, particularly in the West, obesity-related illnesses such as diabetes, hypertension and cardiovascular disease are also on the rise. Yet efforts by the medical community to reverse this trend (from promoting a healthier lifestyle to gastric bypass surgery—commonly known as stomach stapling) in the obese, have not altogether been very successful.

Dr. Maia Kokoeva and her team are working on improving results. They are examining how the generation of new cells in the adult brain (influenced by behaviour) influences body weight. They have already shown that the anti-obesity drug, ciliary neurotrophic factor (CNTF), launches large-scale reproduction of these new cells in the hypothalamus, an area of the brain that plays a key role in appetite. These newly created cells are crucial for the CNTF to have a weight-





Dr. Maia Kokoeva describes how the brain responds to appetite and how scientists think that response may contribute to obesity.

reducing effect. However, the researchers have not yet discovered how these cells directly influence appetite/body weight.

Towards this end, they currently characterize adult-born hypothalamic cells with regard to their function and the ways they mesh into the brain's neuronal network. As well, the team is studying whether the body also needs the cells that the hypothalamus produces without the influence of CNTF to maintain a healthy weight. These studies may provide new insight into the causes of obesity and ultimately help develop new strategies for preventing and treating obesity-related diseases.

Dr. Kokoeva's long-term goal is to understand why some humans can maintain a consistent body weight for most of their adult lives while others face gradual or abrupt weight gain.

**Funded by:**  
*Canadian Institutes of Health Research (CIHR)*  
*Canada Foundation for Innovation (CFI)*





# Assessing risk to improve public-health policies

## Health Outcomes Axis

Dr. Mark Goldberg wants to know if exposure to chemicals in the air we breathe can make us ill; and if so, how? As an epidemiologist, Dr. Goldberg studies the factors that may affect public health. His research advises on changes to public-health policies intended to improve the health of all Canadians, as opposed to only those who are ill, by preventing disease.

In the mid-1990s, Dr. Goldberg and colleague Dr. France Labrèche of the IRSST thought that organic solvents and related compounds that people breathe in, such as those found in dry-cleaning fluids, paint thinner and nail polish remover, could be stored in breast tissue and eventually cause mutations in DNA that could contribute to breast cancer. In a study conducted in Montreal, they found that workplace exposure to gasoline by-products, such as carbon dioxide and hydrocarbons, increased the risk of developing postmenopausal breast cancer. These findings were consistent with the general mechanisms they suggested for organic solvents. They are now running a much larger study to confirm these findings.





Dr. Mark Goldberg pauses in the midst of a Montreal summer traffic jam to illustrate the pervasiveness of air pollution.

Dr. Goldberg is also interested in the link between air pollution and people's health conditions. His groundbreaking work to identify who is at higher risk of being hospitalized or dying when air pollution increases, such as those with diabetes and cardiovascular disease, is used by national and international regulatory agencies that set limits on air pollution.

Another study revealed an astonishing finding. Dr. Goldberg and collaborators installed 130 air-pollution monitors around Montreal and created a map that showed how traffic-related air pollution varies across the city. When they linked this map to the home addresses of patients in two breast- and prostate-cancer studies, they found that the risk of developing these cancers increased in areas where there were measurable increases in air-pollution levels. This tied in with the preliminary findings of the earlier study on combustion by-products.

Dr. Goldberg cautions that this is the first time ambient air pollution has been investigated for these two types of cancers and that increased risks could be due to chance or to other factors. If future studies arrive at the same conclusion, however, these findings may have considerable implications on the public's health: everyone breathes in air pollution so reducing the levels could improve the public's health dramatically.

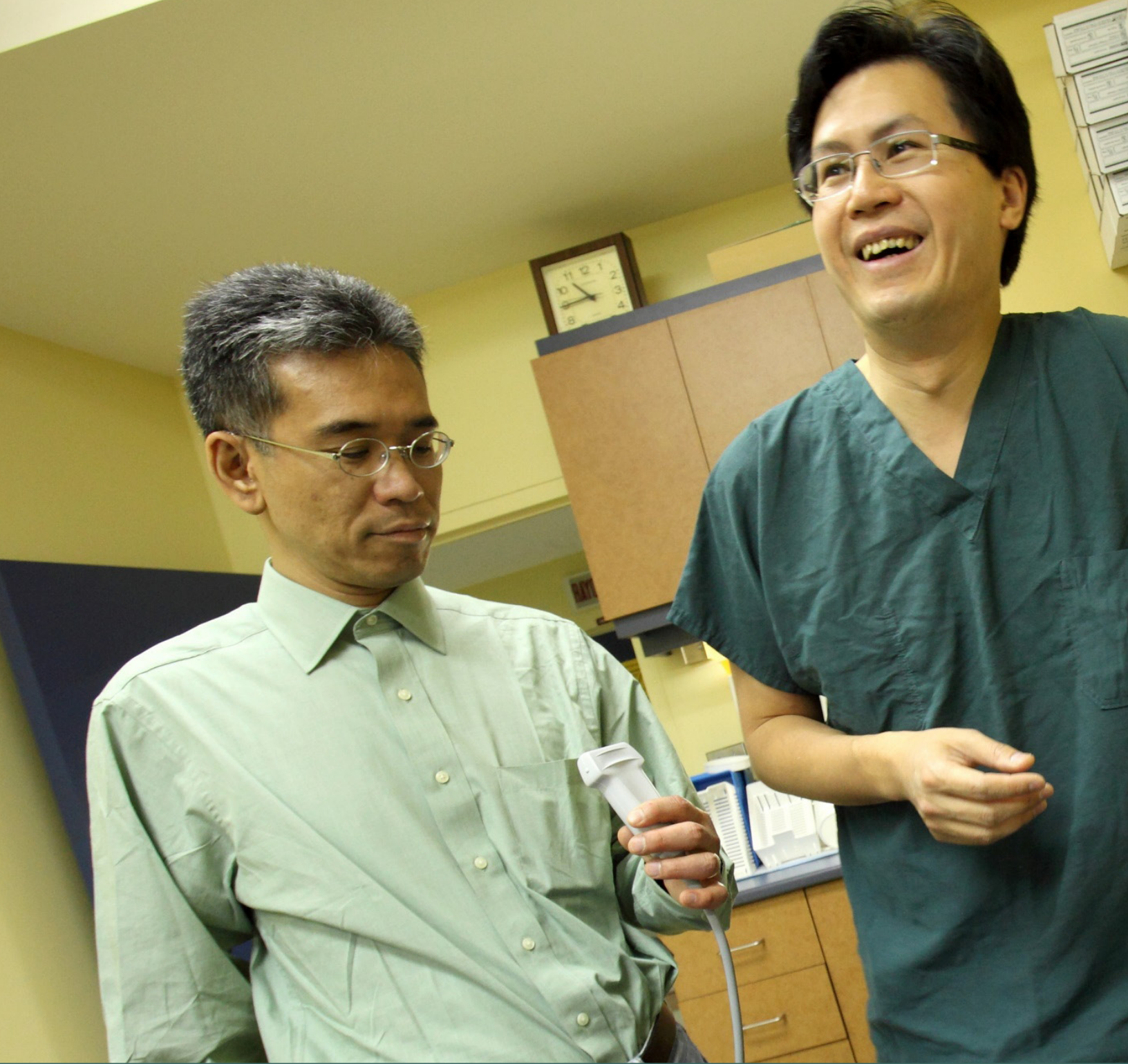
**Funded by:**

***Canadian Institutes of Health Research (CIHR)***

***Quebec Breast Cancer Foundation***

***Health Canada***





## Human Reproduction Axis

We tend to think that certain cancers strike older people. Yet, many cancers, such as testicular cancer, lymphoma and leukemia, often hit young adults - even children. Fortunately, many of these young patients survive thanks to early diagnosis and more effective chemotherapy. They do, however, pay a price. Chemotherapy is extremely hard on the reproductive organs, and many male survivors become infertile as a result.

Dr Peter Chan, Director of Male Reproductive Medicine in the Department of Urology of the MUHC, has been working hard to change that. In a multi-disciplinary project involving oncologists, geneticists, basic scientists, nurses, epidemiologists and psychologists, he is evaluating the effect of chemotherapy on the reproductive health of men with testicular cancer, Hodgkin's and non-Hodgkin's lymphoma. He found that nearly every single patient had less healthy sperm and a lower sperm-count after chemotherapy, and that the health and levels of sperm did not improve in half of these patients. Patients whose sperm do recover are not necessarily healthy. Those sperm may be genetically damaged and, should they fertilize an egg, may contribute to higher rates of miscarriage, fetal anomalies and low birth weight.



# Managing infertility and damaged sperm post chemotherapy



Drs. Makoto Nagano (left) and Peter Chan (right) discuss the impact of cancer treatment on men's fertility.

None of this is good news for young men hoping to start or continue their families. But when people are facing a potentially survivable cancer, they tend to overlook the importance of preserving sperm. Currently, “banking” sperm before chemotherapy is the only feasible option, but that does not help patients too young to actually produce sperm. Nonetheless, patients underuse the technology. Dr. Chan has joined a group of psychologists to find out why and reverse the trend.

Dr. Chan is also collaborating with Dr. Makoto Nagano to explore the possibility of harvesting stem cells—the “seeds” of sperm cells that exist from birth living inside the testicles before chemotherapy. The stem cells would be transplanted back into the testicles after treatment to allow fresh, healthy sperm to repopulate within the testicles to restore fertility.

Young cancer survivors represent a growing segment of the population today. Since many of them will have a long life expectancy and good quality of life, fertility is an important issue in their survival, parent/child relationships and future happiness. To them, Dr. Chan's research represents new strategies that can help them to successfully reproduce.

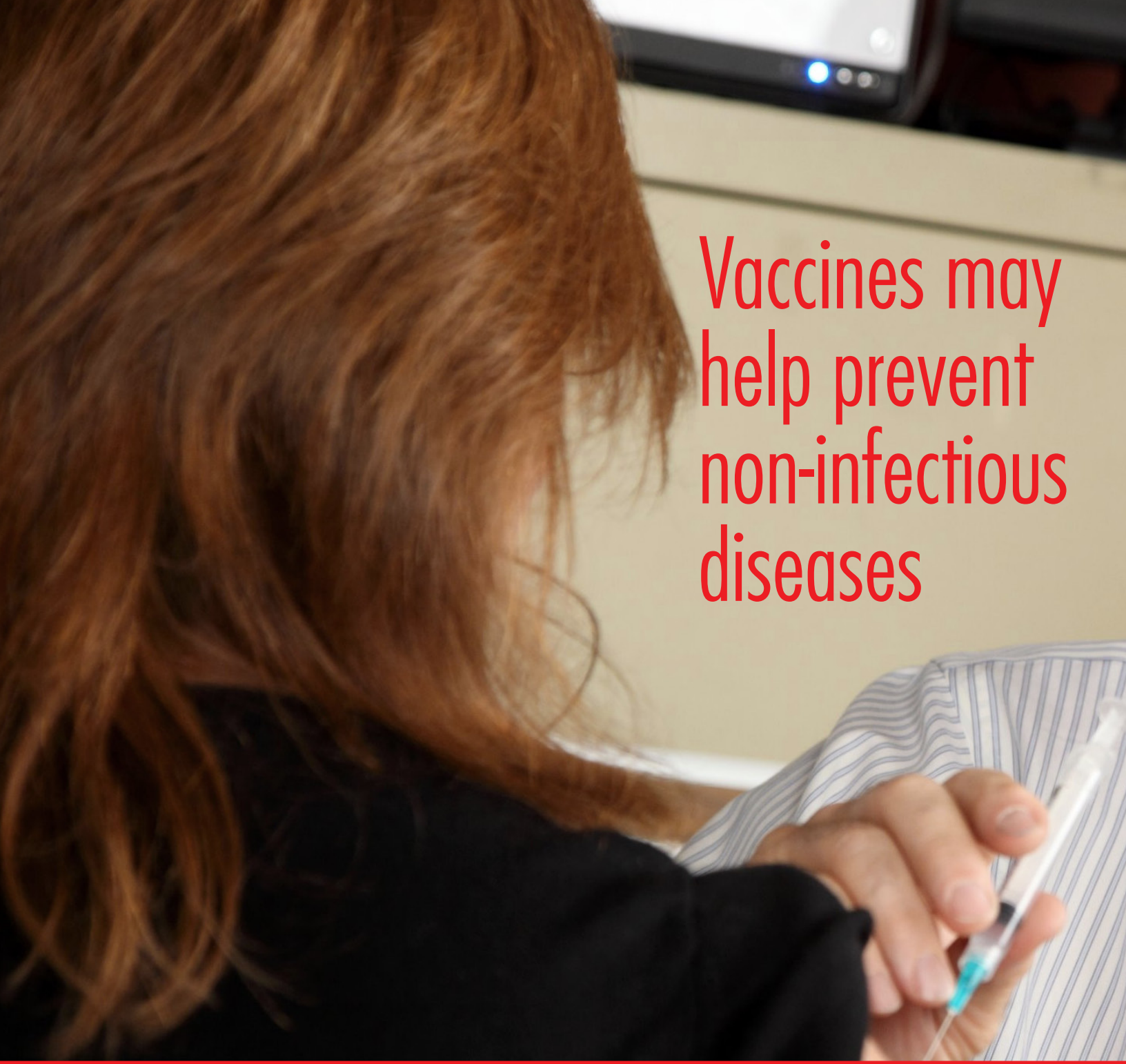
## **Funded by:**

***Canadian Institutes of Health Research (CIHR)***

***Le Fonds québécois de la recherche sur la nature et les technologies (FRQNT)***

***Le Réseau Québécois en reproduction (RQR)***





# Vaccines may help prevent non-infectious diseases

## Infection and Immunity Axis

Few advances have done more for human health than vaccines. Many life-threatening diseases such as measles, smallpox and bacterial meningitis have essentially disappeared in the developed world. Nonetheless, many microbes have frustrated all efforts to develop vaccines (e.g.: Respiratory syncytial virus (RSV), hepatitis C, malaria, dengue, HIV and tuberculosis).

The MUHC's Vaccine Evaluation Centre is among the most active university-based sites in Canada. Researchers are actively involved in studying a wide range of new vaccines including products that exploit microbial genetic material (so-called DNA vaccines), vaccines made in bacteria or plants, novel vaccine-delivery systems ('guns' that hurtle vaccine particles through the skin), as well as adjuvants to stimulate and direct immune responses. The Centre handles candidate vaccines from large pharmaceutical companies, small biotechs and university-based investigators. Projects range from Phase I studies (the first stage of testing in humans) to Phase IV (large-scale trials of licensed products to assess issues such as safety and efficacy in different populations).





Dr. Brian Ward administers a vaccine to Andrea Robertson who is participating in a Phase 1 clinical trial.

Dr. Brian Ward, Co-director of the Centre, and his colleagues are most interested in understanding vaccine-induced immunity (when things go right), immunopathology (when things go wrong) and early-stage (Phase I) studies that focus on safety and how novel products actually work. They are also interested in nanoparticle vaccines that can be delivered by alternative (and needle-free) routes. So far, this work has focused on developing vaccines for respiratory viruses such as measles, RSV and influenza that can be delivered through the nose. Dr Ward is now exploring a number of nanoparticle-vaccine strategies, including packaging viral targets into small protein balls and expressing similar targets on tiny virus-like-particles produced in plants.

Dr. Ward is hopeful that these new vaccinology tools will be applied successfully to non-infectious diseases such as cancer, autoimmune and chronic inflammatory conditions. In

fact, he is convinced that vaccines are poised to revolutionize human health in ways never anticipated before.

### **Funded by:**

***Canadian Institutes of Health Research (CIHR)***

***Canadian Institutes of Health Research – Industry  
(with Medicago Inc of Ste-Foy, QC)***

***Other industrial partners***





# Genetic insights offer brighter futures for children

## Medical Genetics and Genomics Axis

Brain tumours are the leading cause of cancer-related mortality and morbidity in children. Of those, 45% are pediatric astrocytomas (PAs)—tumours so vicious they are often fatal or require treatment that causes permanent brain damage. These tumours are largely unstudied in children, adolescents and young adults.

Dr. Nada Jabado is a pediatric hematologist/oncologist at The Montreal Children's Hospital and the primary physician for children with genetic disorders and brain tumours. The research program she directs focuses on learning more about how PAs develop. She has established an international collaborative network to gather and investigate PAs. Having analyzed the entire genome of high- and low-grade PAs, researchers have found that high- and low-grade PAs involve unique molecular events, and that the adult and pediatric versions are quite different and should be studied separately so that appropriate treatments can be developed for children. She and her team have also found that in high-grade PA the receptor tyrosine kinase (RTK) is processed in a unique way that leads to higher rates of reproduction, survival and invasion of cancer cells. Team members are continuing to investigate the role of genes that affect RTK in the growth and progression of PAs. Another finding that has high potential for diagnosis and





Dr. Nada Jabado researches genetic diseases in children and treats those who are afflicted with them.

treatment is the aberrant activation of the BRAF kinase through several converging genetic events.

Dr. Jabado is also heavily involved in the care of children and adolescents with inherited genetic disorders. She has established another international network where genetic disorders of unknown causes in children are investigated at the clinical, biological and molecular levels. In collaboration with the department of Human Genetics, the McGill University and Genome Quebec Innovation Centre, she is co-running a project called RADICAL to identify genes responsible for these orphan disorders using next-generation exome sequencing. This is a powerful tool that allows researchers to unravel the genetic code of affected children in record time and identify abnormal genes responsible for a disease. The team has already identified two genetic disorders in this way—a medical breakthrough in Canada—which will help better prevent the diseases, provide advice to families and adapt treatments to individual patients.

These novel insights into potential therapeutic targets and causative genes will help develop more effective treatments, and improve survival and treatment-related morbidity of devastating pediatric cancers and inherited disorders.

#### **Funded by:**

***Canadian Institutes of Health Research (CIHR)***

***Cancer Research Society***

***The Cole Foundation***

***Childhood Leukemia Society***

***The Research Institute, MUHC***



## Mental Illness and Addiction Axis

Dual-diagnosis patients are individuals who suffer from both substance abuse and mental illness. These patients are often difficult to treat, possibly because their disorders are more severe than non-dual-diagnosis patients, but also because services are not set up to meet their dual needs.

Since 1997, Dr. Dara Charney, Director of the McGill RUIS Addiction Program, has been involved in more than 12 clinical research projects involving patients with substance abuse and psychiatric disorders at the MUHC Addictions Unit. She has followed a large number of these patients to assess the results of their treatment.

She and her colleague, Dr. Kathryn Gill, have shown that patients with depression and anxiety do not respond to addiction treatment as well as patients without these disorders. However, addiction patients with depression do



# Treating addiction in dual-diagnosis patients



Dr. Dara Charney discusses the challenges of treating dual-diagnosis patients.

considerably better if they receive integrated psychiatric care. Additional interventions may compensate for greater psychopathology among depressed substance abusers. Drs. Charney and Gill are conducting a large clinical trial to see if antidepressants can improve the results of addiction treatment and to attempt to identify patient characteristics that can predict a better response to antidepressants.

Dr. Charney is also working with a team at the MUHC Addictions Unit, the CSSS de la Montagne and Participatory Research at McGill (PRAM), to accelerate the transfer of new research-based treatment strategies to frontline services dealing with substance-abuse patients. Researchers already know, for example, that BIs (Brief Interventions) for substance-use disorders (five sessions or fewer) provide substantial benefit at a relatively low cost. However, this approach

is rarely seen in primary-care settings. The team is now studying the launch of an evidence-based treatment program for substance abuse (including BIs) into three primary-care clinics in Montreal, administered by the CSSS de la Montagne, and will evaluate the effectiveness of the program by measuring changes in services, sustainability and results for patients.

**Funded by:**  
*Canadian Institutes of Health Research (CIHR)*

# Strengthening bone health in an ageing population



## Musculoskeletal Disorders Axis

We are an ageing population, and an active one. Yet, even as we try to keep fit or go about our daily activities, our bones may not be up to the task—sometimes osteoporosis is a factor; sometimes a lack of coordination can cause a fall or an accident. Whatever the reason, current technologies and/or treatments do not serve patients well. Seniors heal poorly from trauma and patients are often not transferred to appropriate postoperative care facilities where they may have the best chance of recovery due to lack of available resources. Fractures, spine injuries and metabolic bone disorders, such as osteoporosis, place a huge burden on the health system.

At the MUHC's Orthopaedic Clinic, Dr. Suzanne Morin and a team of researchers are proposing solutions to increase the knowledge and decrease the care gaps in the post-fracture clinical care in patients with fragility (osteoporosis) fractures. Their efforts and a collaboration with Dr. Ed Harvey's basic science expertise and the JTN Wong Laboratories for Bone Engineering have created novel animal models for bone healing to test medications that could be relevant to patients. As part of this dynamic arrangement, new physician-scientists and other researchers are being trained to think about impaired fracture





Patient Henri Lafleur is examined by Dr. Ed Harvey as colleague, Dr. Suzanne Morin looks on.

healing in seniors. Original solutions, including award-winning work with mesenchymal stem cells and growth factors, to these complex problems have been found.

The fracture clinic is not the only cross-disciplinary clinic in Orthopaedics. Dr. Chantal Seguin and Dr. Harvey run the Avascular Necrosis (AVN is a disease characterized by focal bone death) Clinic—perhaps the only one in Canada tied to basic scientific research. Researchers have isolated successfully a biomarker that could provide an early diagnosis of AVN after steroid use. This discovery has far-reaching implications for monitoring patients who receive steroid therapy.

These collaborations are being used to try a new kind of trans-disciplinary research at the RI-MUHC that blends regenerative (stem cells, biologics) and restorative (novel devices and techniques) medicine and clinical research (technology assessment, new outcome

measurements) to reduce the time needed to bring a theoretical discovery to the actual bedside and improve patients' recovery.

### **Funded by:**

**Canadian Institutes of Health Research (CIHR)**  
**Fonds de la recherche en santé du Québec (FRSQ)**  
**AO Foundation**  
**Orthopaedic Trauma Association**  
**Leukemia & Lymphoma Society of Canada**  
**Leukemia & Lymphoma Society USA**

# Avoiding major consequences of minor head injuries

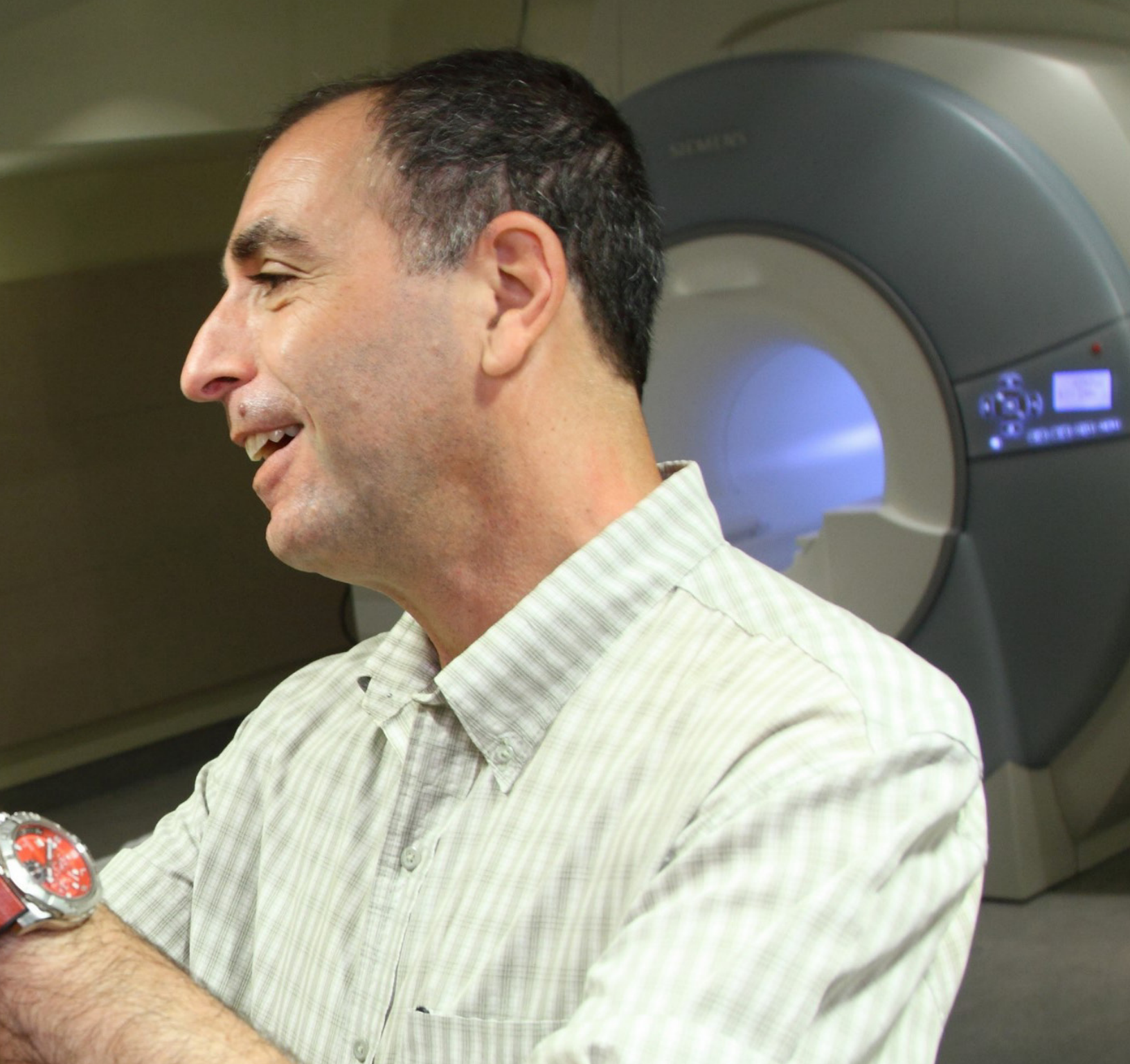


## Neurosciences Axis

Even a minor blow to the head can have devastating consequences. Mild Traumatic Brain Injury (TBI), which includes concussion, can cause long-term brain dysfunctions that may make the simplest, everyday tasks, such as getting dressed, difficult and holding down a job challenging. Yet many people put themselves at risk. In Quebec alone, 11,000 cases of mild TBI were reported in 2008. The cause? Everything from sports to recreational-vehicle accidents. Although most people recover quickly and completely, up to 20% experience significant health problems, persistent symptoms and disability. The Traumatic Brain Injury Group, at the Montreal General Hospital, treats 500 patients annually. The bulk of patients sustaining these injuries are young men.

Dr. Alain Ptito and colleagues are studying the effects of concussion on young athletes. They found that, of the 120 hockey, football and soccer varsity athletes tested, symptoms, including depression, persisted in 25 of them. The problem was significant enough that the researchers went looking for the connection. Conventional CT scans and MRIs showed normal brain structures in almost all the athletes. However, when Dr. Ptito's group used functional MRI (fMRI)—a computerized





Dr. Alain Ptito describes the impact of a mild head injury on the brain as study participant Nicholas Dyer listens.

imaging technique that measures changes to the blood oxygen level in the brain, an entirely different picture emerged.

The researchers tested the athletes before the sports season began to obtain baseline figures. In those athletes who suffered a concussion, fMRIs were repeated at 72 hours, 3 and 6 months after the trauma. Athletes who were both concussed and had depression showed reduced activity in regions of the brain similar to those involved in depression. In fact, their brain-activation patterns resembled those of patients with major depression but no concussion.

Researchers already know that the greater the number of brain injuries sustained, the higher the probability of developing major depression later in life. By identifying potential damage early, Dr. Ptito's group is increasing the likelihood that brain-injured patients who receive early

treatment and appropriate rehabilitation may ultimately avoid the heavy consequences of major depression later on in life. The group has begun using fMRI to study victims of TBI of other origins (for example, survivors of motor-vehicle accidents) across the lifespan (children and adults). This research will focus on how to improve diagnosis, advance research, enhance patient care, rehabilitate and educate.

**Funded by:**  
*Canadian Institutes of Health Research (CIHR)*  
*National Defence Canada*





## Respiratory Health Axis

Chronic obstructive pulmonary disease (COPD), which includes chronic bronchitis and emphysema, is a progressive disease of the respiratory system in which the narrowed airways limit the flow of air to and from the lungs, causing shortness of breath. It can lead to severe respiratory failure. A poorly understood disease, COPD is usually diagnosed after some lung capacity has already been lost. Many people have early stages of COPD without knowing it. COPD is the leading cause of hospitalization and the third leading cause of death in Canada (anticipated at 11,000 in 2010). It affects nearly 3 million Canadians.

Dr. Jean Bourbeau, Director of the Respiratory, Epidemiology and Clinical Research Unit at the Montreal Chest Institute, and Dr. Wan Tan of The James Hogg iCAPTURE Centre for Cardiovascular and Pulmonary Research at the University of British Columbia are lead investigators of an ambitious and innovative pan-Canadian study entitled CanCOLD (Canadian Cohort of Obstructive Lung Disease). Involving researchers at nine sites and over 2,000 patients, CanCOLD aims





# Helping Canadians breathe easier

Dr. Jean Bourbeau emphasizes to Manon Bisson, a patient, the importance of managing COPD.

to provide a better understanding of the causes of COPD, its risk factors and possible treatments.

The challenges are tough. Education is a concern since 70% of COPD patients are under-diagnosed because the general public and physicians do not know enough about the disease and the issues surrounding it. As well, because smoking is a major risk factor, the public feels that it is self-inflicted and is somewhat indifferent to the disease. Part of the researchers' challenge is to change this perception because genetics, history of pulmonary infections during childhood, second-hand smoke and environmental factors are also major contributors.

The importance of the study is such that the federal government and several large pharmaceutical companies are supporting it and helping to accelerate the process of transferring research results into actual treatments for patients affected with this disease.

## **Funded by:**

***Canadian Institutes of Health Research (CIHR)***  
***RX & D Collaborative Research Program (CIHR)***  
***AstraZeneca (Canada)***  
***Boehringer Ingelheim (Canada)***  
***GlaxoSmithKline (Canada)***  
***Pfizer (Canada)***

# New Recruits

## Dr. Waggas Afif, MD Health Outcomes

Dr. Afif completed medical school at McGill University and Internal Medicine and Gastroenterology Fellowships at the McGill University Health Centre. He was the Assistant Chief Resident during his last year of Internal Medicine at the Montreal General Hospital (MGH) and was the Chief Resident during the final year of his Gastroenterology Fellowship. Dr. Afif returned recently from the Mayo Clinic, where he completed an Advanced Fellowship in Inflammatory Bowel Disease (IBD), and is in the process of finalizing a Master's, in Epidemiology. Dr. Afif will be based at the MUHC and will be involved in teaching activities as well as clinical research focusing on the treatment of IBD with immunosuppressive and biologic therapy.

## Dr. Ahsan Alam, MD Endocrinology, Diabetes, Nutrition and Kidney Diseases

Dr. Alam completed his medical degree at McGill University and an Internal Medicine Internship and Residency at the Royal Victoria Hospital (RVH). Following a clinical Nephrology Fellowship at McGill, he pursued clinical research training in Nephrology at the Tufts Medical Center in Boston and completed a Master's in Clinical Epidemiology from the Sackler School of Graduate Biomedical Studies. Dr. Alam has developed a protocol to identify biomarkers of renal progression and cardiovascular complications in patients with chronic kidney disease, and led seminars and educational programs at Tufts in General Nephrology and Renal Pathophysiology. Dr. Alam plans to pursue his research interests at the RI-MUHC, see patients at the RVH and teach.

## Dr. Susan Bartlett, PhD Musculoskeletal Disorders

Dr. Bartlett trained as a clinical psychologist at McGill and Syracuse University and completed postdoctoral studies in obesity and behavioural epidemiology at the Johns Hopkins School of Public Health, where she was Associate Professor for 12 years. She was recruited back to McGill to run the graduate program in the School of Physical and Occupational Therapy. Her research interests include behavioural interventions for chronic diseases and enhancing patient self-management and patient-physician communication.

## Dr. John Bergeron, PhD Endocrinology, Diabetes, Nutrition and Kidney Diseases

Dr. Bergeron is well known to the McGill community, having served as Chair of the Department of Anatomy and Cell Biology from 1996 until 2009. His scientific interests are focused on proteomics and the emerging field of systems medicine. Dr. Bergeron has been remarkably successful in grant funding and is the author of many high-impact publications. His laboratory is located at the Royal Victoria Hospital.

## Dr. Ines Colmegna, MD Musculoskeletal Disorders

Dr. Colmegna is an honours graduate of the Universidad del Salvador, Argentina. After her Internal Medicine residency and Rheumatology Fellowship, she went to the U.S. where she completed additional training at Louisiana State University and Emory. Dr. Colmegna's primary clinical and research activities will be at the Royal Victoria Hospital (RVH). Her laboratory will focus on defining the role of hematopoietic progenitor cells in the pathogenesis of rheumatoid arthritis.

## Dr. Maziar Divangahi, PhD Infection and Immunity

Dr. Divangahi received his PhD from McGill University in 2005, followed by three distinguished postdoctoral Fellowships: the first one in Molecular Immunology at McMaster University, the second in Infectious Diseases at McGill and the third in Immunology at Harvard University. His research is focused on cross-talk between innate and adaptive immunity against two intracellular pulmonary pathogens: influenza and mycobacterium tuberculosis.

## Dr. Eric Ehrensperger, MD Cardiovascular Diseases and Critical Care

Dr. Ehrensperger is a graduate of the University of Western Ontario (MD 1997) and completed his Neurology residency at McGill in 2003. From 2003 to 2005, he was a Fellow in Cerebrovascular Disease, also at McGill, and in 2009, he completed a MSc in Epidemiology and Biostatistics. Dr. Ehrensperger will contribute his expertise in cerebrovascular disease to McGill's cerebrovascular program's clinical and research activities and to the Montreal General Hospital-based Stroke Prevention Clinic.

## Dr. Dao Nguyen, MD Respiratory Health

Dr. Nguyen graduated from McGill medical school in 1997, completed an Internal Medicine residency at Tufts Medical Center, then Respiriology training here at McGill. Following this, she completed a Masters in Epidemiology and Biostatistics at McGill, examining the molecular epidemiology of a unique mono-PZA resistant strain of tuberculosis here as well as the molecular epidemiology of TB among the Inuit in Northern Quebec. She then completed a 4-year postdoctoral Fellowship at the University of Washington, in Seattle, examining pseudomonas aeruginosa biofilms in patients with cystic fibrosis. She held a CIHR Clinician Scientist Phase I award for this Fellowship, which was recently renewed in July 2009 for Phase II. She also holds a prestigious Burroughs Wellcome career award. At McGill she will continue to work on understanding chronic pseudomonas infections in cystic fibrosis.

## Dr. Guilherme Sant'Anna, MD/PhD Respiratory Health

Dr. Sant'Anna received his MD from the Federal Fluminense University and his PhD in Child Health (Pulmonary Physiology) from the Instituto Fernandes Figueira/FIOCRUZ, in Brazil. He completed post-doctoral training in Pulmonary and Cardiovascular Physiology, and Neonatology at McGill University in 2004, and worked as an Associate Professor in Pediatrics at McMaster University from 2005-2009. Dr Sant'Anna joined McGill University as an Associated Professor of Pediatrics in 2009. Research interests are in invasive- and non-invasive assisted ventilation in preterm infants and temperature and cerebral blood flow control in infants with hypoxic ischemic encephalopathy.

## Dr. Ron Sullivan, PhD Neurosciences

Dr. Sullivan received his PhD in Behavioural Neuroscience at McMaster University and completed his postdoctoral training at the Douglas Hospital Research Centre (McGill). He then established a research program in the department of Psychiatry at the University of Montreal (Centre de recherche Fernand-Seguin) before joining McGill in 2010. His fundamental research into stress and emotion regulation has revealed the considerable extent to which such processing is lateralized within the brain. The nature of such processing also varies between sexes, which may be especially relevant to gender differences in depression and anxiety disorders. Dr. Sullivan plans to continue his fundamental research at McGill and incorporate his ideas in clinical collaborations.



# Students

## Training tomorrow's researchers



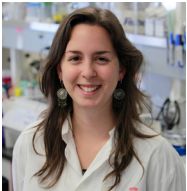
### Patricia Fontela, MD, MSc

Patricia trained in Pediatrics and Pediatric Critical Care at the Pontifícia Universidade Católica do Rio Grande do Sul, in Brazil, where she also completed a Master's in Medicine in 2003. She then undertook a second Fellowship in Pediatric Critical Care at The Montreal Children's Hospital. She started her PhD in Epidemiology at McGill University in 2007 under the supervision of Drs. Robert Platt and Caroline Quach. Her research areas are surveillance and hospital-acquired infections in intensive care units (ICUs) and using simulation techniques to compare different surveillance methods. Patricia is the recipient of a FRSQ Doctoral Training Bursary and a Montreal Children's Hospital Research Institute Fellowship. For her PhD, she is studying the impact of a provincial targeted-surveillance program on the incidence rates of central line-associated bloodstream infections in ICUs.



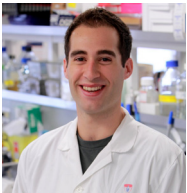
### Rahul Gawri, MD

Rahul earned a Bachelor's of Medicine, Bachelor's of Surgery (M.B.B.S.) degree from R.G. Kar Medical College, University of Calcutta, India, with full scholarship. After receiving his medical licence, he trained in the department of Casualty and Trauma. In January 2009, he began working on a Master's in Experimental Surgery at McGill on human intervertebral disks under the supervision of Drs. Haglund, Mwale and Antoniou. Rahul would like to pursue a PhD and become a clinician-scientist working to bring regenerative therapies into clinical use and contribute to the trend of shifting focus from corrective to regenerative medicine.



### Eugénie Goupil, MSc

Eugénie obtained her Master's in Biochemistry in 2007 from Université de Montréal. Working under the supervision of Drs. Hébert and Laporte in the Royal Victoria Hospital lab, Eugénie's work focuses on understanding the function of G protein-coupled receptor (GPCR) and the prostaglandin F2 (FP) receptor, which is implicated in triggering labour. Unregulated signalling from this GPCR can lead to premature labour and delivery. With the help of a team of physiologists, pharmacologists, biochemists and chemists from McGill University and the Université de Montréal, the researchers have developed a series of new allosteric ligands for the FP receptor that inhibit premature labour in mice. Eugénie's work has uncovered unappreciated effects of these ligands that will help researchers understand how they regulate GPCRs and provide a better insight into mechanisms of premature labour. Eugénie's work may also lead to new drugs aimed at managing premature labour while producing fewer side-effects.



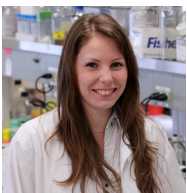
### Jean-Daniel Lalonde, MSc

Jean-Daniel has co-written a review on Crohn's disease and the chronic *Mycobacterium avium* paratuberculosis hypothesis published in the *Expert Review of Clinical Immunology*. The review highlights his research on the interaction between the pathogen recognition receptor NOD2 (which activates the immune response to bacteria) and mycobacteria, specifically during a gastrointestinal infection. Born in Montreal, he obtained his undergraduate degree with honours in Microbiology and Immunology at McGill University in 2009. Under the funding of both Master's level FRSQ and CIHR scholarships, he began his graduate studies in the fall of 2009 under the supervision of Dr. Marcel Behr. His future career goal is to pursue a Master's in Business and Administration.



### Mathieu Maheu-Giroux, MSc Biol., MSc Epi.

Mathieu completed his Bachelor's degree in Biology at the Université de Montréal and two Master's degrees (Landscape Ecology and Epidemiology) at McGill University before coming to the MUHC in 2008. A native of Montreal, Mathieu will start working on a doctorate in September 2010 in the Department of Global Health and Population at the Harvard University School of Public Health with a Fulbright International Science and Technology Award for Outstanding Foreign Student, sponsored by the Bureau of Educational and Cultural Affairs of the U.S. Department of State. His future goal is to pursue a career in global health research in Montreal.



### Sofia Waissbluth, MD

Sofia studied medical laboratory technology at Dawson College, Montreal, before travelling to Chile to pursue her medical education. While at Dawson, the Quebec Ministry of Education, Recreation and Sports offered a tutoring position in organic chemistry at the college for the corresponding semester. Sofia received her medical degree with honours at the Universidad de Chile, where she also won the Best Pediatrics Intern Award in 2008. She is now completing a Master's in Otolaryngology at McGill University and has received the Provost Fellowship Award for 2009-10. Her research at the McGill Auditory Sciences Laboratory at The Montreal Children's Hospital focuses on the damage chemotherapy drugs cause to the ear and how to prevent it. After completing her Master's degree, Sofia would like to pursue an Otolaryngology residency at McGill.

# Business Development

## Bridging funding and technology gaps



Dr. Costas N. Karatzas, Director

Converting a promising scientific discovery into a successful treatment can take over 12 years and involve hundreds of millions of dollars—funding that is difficult to find. The Business Development Office (BDO) at the RI-MUHC assists researchers to bridge the funding and technology gaps that exist between promising discoveries and their transitioning to animal testing and ultimately to clinical studies.

The BDO collaborates with researchers and with McGill University's Office of Technology Transfer (OTT) to assess the technical and commercial potential of new ideas; develop proof of concept and product development studies; network and link our investigators with biotechnology or pharmaceutical companies for the development of partnerships; identify new sources of funding and facilitate the grant submission process; and negotiate and review research agreements in close collaboration with the Legal and the Contracts Office at the RI.

These activities have generated many leads and connected research programs with non-traditional funding opportunities. Recently, the office of BDO worked with Dr. Pnina Brodt, Cancer Axis, the OTT and MSBI. Generous funding support was received through the PSVT program from the Quebec's ministère du Développement économique, de l'Innovation et de l'Exportation (MDEIE). This type of funding is critical in ensuring that important proof-of-concept experiments are completed before Dr. Brodt's novel cancer treatment transitions closer to the clinic and makes it attractive to a commercial partner.

Following an agreement with Ferring International, Drs. S. Chevalier and V. Papadopoulos each won awards of \$225,000 over three years to perform research on the action and effects of drugs with gonadotropin-releasing hormone antagonist activities in benign prostate hyperplasia. Sponsored research agreements such as this allows our researchers to evaluate useful new therapeutic targets and remain at the forefront of scientific breakthroughs.

Says Dr. Karatzas, the Director of the BDO, "Exciting new discoveries are happening faster than ever. We must make sure they become tangible benefits to patients by investing in the necessary resources and expertise."



# Representative Publications (Selected)

## 2009

Barkun J., Aronson J.K., Feldman L.S., Maddern G.J., Strasberg S.M., Altman D.G., Blazeby J.M., Boutron I.C., Campbell W.B., Clavien P.A., Cook J.A., Ergina P.L., Flum D.R., Glasziou P., Marshall J.C., McCulloch P., Nicholl J., Reeves B.C., Seiler C.M., Meakins J.L., Ashby D., Black N., Bunker J., Burton M., Campbell M., Chalkidou K., Chalmers I., de Leval M., Deeks J., Grant A., Gray M., Greenhalgh R., Jenicek M., Kehoe S., Lilford R., Littlejohns P., Loke Y., Madhock R., McPherson K., Rothwell P., Summerskill B., Taggart D., Tekkis P., Thompson M., Treasure T., Trohler U., Vandembroucke J. and/or Balliol Collaboration. **Evaluation and stages of surgical innovations.** *Lancet*, 374 (9695); 1089-1096: 2009.

Coulombe F., Divangahi M., Veyrier F., de Leseleuc L., Gleason J.L., Yang Y., Kelliher M.A., Pandey A.K., Sasseti C.M., Reed M.B., Behr M. A. **Increased NOD2-mediated recognition of N-glycolyl muramyl dipeptide.** *Journal of Experimental Medicine*, 206(8); 1709-1716: 2009.

Bell A.W., Deutsch E.W., Au C.E., Kearney R.E., Beavis R., Sechi S., Nilsson T., Bergeron J.J., and/or HUPO Test Sample Working Group. **A HUPO test sample study reveals common problems in mass spectrometry-based proteomics.** *Nature Methods*, 6(6); 423-430: 2009.

Bernatsky S., Joseph L., Pineau C.A., Belisle P., Boivin J.F., Banerjee D., Clarke A.E. **Estimating the prevalence of polymyositis and dermatomyositis from administrative data: age, sex and regional differences.** *Annals of Rheumatic Diseases*, 68(7); 1192-1196: 2009.

Wang N., Fallavollita L., Nguyen L., Burnier J., Rafei M., Galipeau J., Yakar S., Brodt P. **Autologous bone marrow stromal cells genetically engineered to secrete an igf-I receptor decoy prevent the growth of liver metastases.** *Molecular Therapy*, 17(7); 1241-1249: 2009.

Bagry H.S., Carli F. **Role of statins in peri-operative medicine.** *Current Drug Targets*, 10(9); 850-857: 2009.

Prince J.E.A., Cho J.H., Dumontier E., Andrews W., Cufforth T., Tessier-Lavigne M., Parnavelas J., Cloutier J-F. **Robo-2 controls the segregation of a portion of basal vomeronasal sensory neuron axons to the posterior region of the accessory olfactory bulb.** *Journal of Neuroscience*, 29(45); 14211-14222: 2009.

De Varennes B., Chaturvedi R., Sidhu S., Cote A.V., Shan W. Li Pi, Goyer C., Hatzakorzian R., Buithieu J., Sniderman A. **Initial results of posterior leaflet extension for severe type IIIb ischemic mitral regurgitation.** *Circulation* 119(21); 2837-2843: 2009.

Divangahi M., Balghi H., Danialou G., Comtois A.S., Demoule A., Ernest S., Haston C., Robert R., Hanrahan J.W., Radzioch D., Petrof B.J. **Lack of CFTR in skeletal muscle predisposes to muscle wasting and diaphragm muscle pump failure in cystic fibrosis mice.** *PLoS Genetics*, 5(7); e1000586: 2009.

Gong G., Rosa-Neto P., Carbonell F., Chen Z. J., He Y., Evans A. C. **Age- and gender-related differences in the cortical anatomical network.** *Journal of Neuroscience*, 29(50); 15684-15693: 2009.

McDonald B., Spicer J., Giannais B., Fallavollita L., Brodt P., Ferri L.E. **Systemic inflammation increases cancer cell adhesion to hepatic sinusoids by neutrophil mediated mechanisms.** *International Journal of Cancer*, 125(6); 1298-1305: 2009.

Trempe J-F., Chen C.X.Q., Grenier K., Camacho E.M., Kozlov G., McPherson P.S., Gehring K., Fon E.A. **SH3 domains from a subset of BAR proteins define a Ubl-binding domain and implicate parkin in synaptic ubiquitination.** *Molecular Cell*, 36(6); 1034-1047: 2009.

Li L., Biswas K., Habib L., Kuznetsov S.G., Hamel N., Kirchhoff T., Wong N., Arnel S., Chong G., Narod S.A., Claes K., Offit K., Robson M.E., Stauffer S., Sharan S.K., Foulkes W.D. **Functional redundancy of exon 12 of BRCA2 revealed by a comprehensive analysis of the c.6853A>G (p.I2285V) variant.** *Human Mutation*, 30(11); 1543-1550: 2009.

Karam I., Devic S., Hickeson M., Roberge D., Turcotte R.E., Freeman C.R. **PET/CT for radiotherapy treatment planning in patients with soft tissue sarcomas.** *International Journal of Radiation Oncology, Biology & Physics*, 75(3); 817-821: 2009.

Rashid S., Marcil M., Ruel I., Genest J. **Identification of a novel human cellular HDL biosynthesis defect.** *European Heart Journal*, 30(18); 2204-2212: 2009.

Bousette N., D'Orleans-Juste P., Kiss R.S., You Z., Genest J., Al-Ramli W., Qureshi, S.T., Gramolini A., Behm D., Ohlstein E.H., Harrison S.M., Douglas S.A., Gaiad A. **Urotensin II receptor knockout mice on an ApoE knockout background fed a high-fat diet exhibit an enhanced hyperlipidemic and atherosclerotic phenotype.** *Circulation Research*, 105(7); 686-695: 19 p following 695, 2009.

Deblois G., Hall J.A., Perry M-C., Laganier J., Ghahremani M., Park M., Hallett M., Giguere V. **Genome-wide identification of direct target genes implicates estrogen-related receptor alpha as a determinant of breast cancer heterogeneity.** *Cancer Research*, 69(15); 6149-6157: 2009.

Berger C., Langsetmo L., Joseph L., Hanley D.A., Davison K.S., Josse R.G., Prior J.C., Kreiger N., Tenenhouse A., Goltzman D., and/or CaMos Research Group. **Association between change in BMD and fragility fracture in women and men.** *Journal of Bone and Mineral Research*, 24(2); 361-370: 2009.

Moeller F., Tyvaert L., Nguyen D.K., LeVan P., Bouthillier A., Kobayashi E., Tampieri D., Dubeau F., Gotman J. **EEG-fMRI: adding to standard evaluations of patients with nonlesional frontal lobe epilepsy.** *Neurology*, 73(23); 2023-2030: 2009.

Grover S.A., Kaouache M., Joseph L., Barter P., Davignon J. **Evaluating the incremental benefits of raising high-density lipoprotein cholesterol levels during lipid therapy after adjustment for the reductions in other blood lipid levels.** *Archives of Internal Medicine*, 169(19); 1775-1780: 2009.

# Representative Publications (Selected)

- Tong X.K., Nicolakakis N., Fernandes P., Ongali B., Brouillette J., Quirion R., Hamel E. **Simvastatin improves cerebrovascular function and counters soluble amyloid-beta, inflammation and oxidative stress in aged APP mice.** *Neurobiology of Disease*, 35(3); 406-414: 2009.
- Takeda N., Maghni K., Daigle S., L'Archeveque J., Castellanos L., Al-Ramli W., Malo J-L., Hamid Q. **Long-term pathologic consequences of acute irritant-induced asthma.** *Journal of Allergy and Clinical Immunology*, 124(5); 975-981 e1: 2009.
- Hess R.F., Li X., Mansouri B., Thompson B., Hansen B.C. **Selectivity as well as sensitivity loss characterizes the cortical spatial frequency deficit in amblyopia.** *Human Brain Mapping*, 30(12); 4054-4069: 2009.
- Huynh T., Perron S., O'Loughlin J., Joseph L., Labrecque M., Tu J.V., Theroux P. **Comparison of primary percutaneous coronary intervention and fibrinolytic therapy in ST-segment-elevation myocardial infarction: tressin hierarchical meta-analyses of randomized controlled trials and observational studies.** *Circulation*, 119(24); 3101-3109: 2009.
- Tarafder M.R., Carabin H., Gyorkos T.W., Joseph L. **Diarrhea and colds in child day care centers: impact of various numerator and denominator definitions of illness episodes.** *Epidemiology*, 20(6); 796-799: 2009.
- Julien J.Y., Martin J.G., Ernst P., Olivenstein R., Hamid Q., Lemiere C., Pepe C., Naor N., Olha A., Kimoff R.J. **Prevalence of obstructive sleep apnea-hypopnea in severe versus moderate asthma.** *Journal of Allergy and Clinical Immunology*, 124(2); 371-376: 2009.
- Kramer M.S., Matush L., Bogdanovich N., Aboud F., Mazer B., Fombonne E., Collet J-P., Hodnett E., Mironova E., Igumnov S., Chalmers B., Dahhou M., Platt R.W. **Health and development outcomes in 6.5-y-old children breastfed exclusively for 3 or 6 mo.** *American Journal of Clinical Nutrition*, 90(4); 1070-1074: 2009.
- Kramer M.S., Kahn S.R., Platt R.W., Genest J., Rozen R., Chen M.F., Goulet L., Seguin L., Dassa C., Lydon J., McNamara H., Dahhou M., Lamoureux J., Evans R.W. **Antioxidant vitamins, long-chain fatty acids, and spontaneous preterm birth.** *Epidemiology*, 20(5); 707-713: 2009.
- Magder S. **Bench-to-bedside review: ventilatory abnormalities in sepsis.** *Critical Care*, 13(1); 202: 2009.
- Bouchardy J., Therrien J., Pilote L., Ionescu-Iltu R., Martucci G., Bottega N., Marelli A.J. **Atrial arrhythmias in adults with congenital heart disease.** *Circulation*, 120(17); 1679-1686: 2009.
- Mayo N.E., Fellows L.K., Scott S.C., Cameron J., Wood-Dauphinee S. **A longitudinal view of apathy and its impact after stroke.** *Stroke*, 40(10); 3299-3307: 2009.
- Menzies D., Benedetti A., Paydar A., Royce S., Madhukar P., Burman W., Vernon A., Lienhardt C. **Standardized treatment of active tuberculosis in patients with previous treatment and/or with mono-resistance to isoniazid: a systematic review and meta-analysis.** *PLoS Medicine*, 6(9); e1000150: 2009.
- c-Src associates with ErbB2 through an interaction between catalytic domains and confers enhanced transforming potential.** *Molecular and Cellular Biology*, 29(21); 5858-5871: 2009.
- Lau C.J., Koty Z., Nalbantoglu J. **Differential response of glioma cells to FOXO1-directed therapy.** *Cancer Research*, 69(13); 5433-5440: 2009.
- Verlaan D.J., Berlivet S., Hunninghake G.M., Madore A-M., Lariviere M., Moussette S., Grundberg E., Kwan T., Ouimet M., Ge B., Hoberman R., Swiatek M., Dias J., Lam K.C.L., Koka V, Harmsen E., Soto-Quiros M., Avila L., Celedon J.C., Weiss S.T., Dewar K., Sinnett D., Laprise C., Raby B.A., Pastinen T., Naumova A.K. **Allele-specific chromatin tressing in the ZBP2/GSDMB/ORMDL3 locus associated with the risk of asthma and autoimmune disease.** *American Journal of Human Genetics*, 85(3); 377-393: 2009.
- Cadieux C., Keding V., Yao L., Vadnais C., Drossos M., Paquet M., Nepveu A. **Mouse mammary tumor virus p75 and p110 CUX1 transgenic mice develop mammary tumors of various histologic types.** *Cancer Research*, 69(18); 7188-7197: 2009.
- Asp L., Karlberg F., Fernandez-Rodriguez J., Smedh M., Elsnér M., Laporte F., Barcena M., Jansen K.A., Valentijn J.A., Koster A.J., Bergeron J.M., Nilsson T. **Early stages of Golgi vesicle and tubule formation require diacylglycerol.** *Molecular Biology of the Cell*, 20(3); 780-790: 2009.
- Shio M.T., Eisenbarth S.C., Savaria M., Vinet A.F., Bellemare M-J., Harder K.W., Sutterwala F.S., Bohle D.S., Descoteaux A., Flavell R.A., Olivier M. **Malarial hemozoin activates the NLRP3 inflammasome through Lyn and Syk kinases.** *PLoS Pathogens*, 5(8); e1000559: 2009.
- Lai A.Z., Abella J.V., Park M. **Crosstalk in Met receptor oncogenesis.** *Trends in Cell Biology*, 19(10); 542-551: 2009.
- Grundberg E, Kwan T, Ge B, Lam KCL, Koka V, Kindmark A, Mallmin H, Dias J, Verlaan D J, Ouimet M, Sinnett D, Rivadeneira F, Estrada K, Hofman A, van Meurs JM, Uitterlinden A, Beaulieu P, Graziani A, Harmsen E, Ljunggren O, Ohlsson C, Mellstrom D, Karlsson MK, Nilsson O, Pastinen T. **Population genomics in a disease targeted primary cell model.** *Genome Research*, 19(11); 1942-1952: 2009.
- Ge B., Pokholok D.K., Kwan T., Grundberg E., Morcos L., Verlaan D.J., Le J., Koka V., Lam K. C.L., Gagne V., Dias J., Hoberman R., Montpetit A., Joly M-M., Harvey E.J., Sinnett D., Beaulieu P., Hamon R., Graziani A., Dewar K., Harmsen E., Majewski J., Goring H.H., Naumova A.K., Blanchette M., Gunderson K.L., Pastinen T. **Global patterns of cis variation in human cells revealed by high-density allelic expression analysis.** *Nature Genetics*, 41(11); 1216-1222: 2009.
- Petrides M., Pandya D.N. **Distinct parietal and temporal pathways to the homologues of Broca's area in the monkey.** *PLoS Biology*, 7(8); e1000170: 2009.



Levi D., Polychronakos C. **Regulation of insulin gene expression by cytokines and cell-cell interactions in mouse medullary thymic epithelial cells.** *Diabetologia*, 52(10); 2151-2158: 2009.

Postuma R.B., Gagnon J.F., Vendette M., Montplaisir J.Y. **Markers of neurodegeneration in idiopathic rapid eye movement sleep behaviour disorder and Parkinson's disease.** *Brain*, 132(Pt 12); 3298-3307: 2009.

Al-Nedawi K., Meehan B., Rak J. **Microvesicles: messengers and mediators of tumor progression.** *Cell Cycle*, 8(13); 2014-2018: 2009.

Lin H.J., Neidich J.A., Salazar D., Thomas-Johnson E., Ferreira B.F., Kwong A.M., Lin A.M., Jonas A.J., Levine S., Lorey F., Rosenblatt D.S. **Asymptomatic maternal combined homocystinuria and methylmalonic aciduria (cbIC) detected through low carnitine levels on newborn screening.** *Journal of Pediatrics*, 155(6); 924-927: 2009.

Rousseau C., Benoit M., Lacroix L., Gauthier M-F. **Evaluation of a sandplay program for preschoolers in a multiethnic neighbourhood.** *Journal of Child Psychology & Psychiatry*, 50(6); 743-750: 2009.

Schwartz N., Schohl A., Ruthazer E.S. **Neural activity regulates synaptic properties and dendritic structure in vivo through calcineurin/NFAT signalling.** *Neuron*, 62(5); 655-669: 2009.

Bertrand M.J.M., Doiron K., Labbe K., Korneluk R.G., Barker R.A., Saleh M. **Cellular inhibitors of apoptosis cIAP1 and cIAP2 are required for innate immunity trespassing by the pattern recognition receptors NOD1 and NOD2.** *Immunity*, 30(6); 789-801: 2009.

Weraarpachai W., Antonicka H., Sasarman F., Seeger J., Schrank B., Kolesar J.E., Lochmuller H., Chevrette M., Kaufman B.A., Horvath R., Shoubridge E.A. **Mutation in TACO1, encoding a translational activator of COX I, results in cytochrome c oxidase deficiency and late-onset Leigh syndrome.** *Nature Genetics*, 41(7); 833-837: 2009.

Rung J., Cauchi S., Albrechtsen A., Shen L., Rocheleau G., Cavalcanti-Proenca C., Bacot F., Balkau B., Belisle A., Borch-Johnsen K., Charpentier G., Dina C., Durand E., Elliott P., Hadjadj S., Jarvelin M-R., Laitinen J., Lauritzen T., Marre M., Mazur A., Meyre D., Montpetit A., Pisinger C., Posner B., Poulsen P., Pouta A., Prentki M., Ribel-Madsen R., Ruukonen A., Sandbaek A., Serre D., Tichet J., Vaxillaire M., Wojtaszewski J.F.P., Vaag A., Hansen T., Polychronakos C., Pedersen O., Froguel P., Sladek R. **Genetic variant near IRS1 is associated with type 2 diabetes, insulin resistance and hyperinsulinemia.** *Nature Genetics*, 41(10); 1110-1115: 2009.

Lear S.A., Kohli S., Bondy G.P., Tchernof A., Sniderman A.D. **Ethnic variation in fat and lean body mass and the association with insulin resistance.** *Journal of Clinical Endocrinology & Metabolism*, 94(12); 4696-4702, 2009.

Stroh T., van Schouwenburg M.R., Beaudet A., Tannenbaum G.S. **Subcellular dynamics of somatostatin receptor subtype 1 in the rat arcuate nucleus: receptor localization and synaptic connectivity vary in parallel with the ultradian rhythm of growth hormone secretion.** *Journal of Neuroscience*, 29(25); 8198-8205: 2009.

Sullivan M.J.L., Thibault P., Simmonds M.J., Milioto M., Cantin A-P., Velly A.M. **Pain, perceived injustice and the persistence of post-traumatic stress symptoms during the course of rehabilitation for whiplash injuries.** *Pain*, 145(3); 325-331: 2009.

Young S.W., Chung J.T., Yariv G., Holzer H., Levin D., Chian R.C., Tan S.L. **Comparison of survival rate of cleavage stage embryos produced from in vitro maturation cycles after slow freezing and after vitrification.** *Fertility & Sterility*, 92(3); 956-958: 2009.

Torban E., Goodyer P. **The kidney and ear: emerging parallel functions.** *Annual Review of Medicine*, 60; 339-353: 2009.

Long H., Ou Y., Rao Y., van Meyel D.J. **Dendrite branching and self-avoidance are controlled by Turtle, a conserved IgSF protein in Drosophila.** *Development*, 136(20); 3475-3484: 2009.

Trottier C., Colombo M., Mann K.K., Miller W.H., Jr, Ward B.J. **Retinoids inhibit measles virus through a type I IFN-dependent bystander effect.** *The FASEB Journal*, 23(9); 3203-3212 : 2009.

## 2010

Mantegazza M., Curia G., Biagini G., Ragsdale D.S., Avoli M. **Voltage-gated sodium channels as therapeutic targets in epilepsy and other neurological disorders.** *The Lancet Neurology*, 9(4); 413-424: 2010.

Barkun A.N., Bardou M., Kuipers E.J., Sung J., Hunt R.H., Martel M., Sinclair P. and/or International Consensus Upper **Gastrointestinal Bleeding Conference Group. International consensus recommendations on the management of patients with nonvariceal upper gastrointestinal bleeding.** *Annals of Internal Medicine*, 152(2); 101-113: 2010.

Behr M., Schurr E., Gros P. **TB: screening for responses to a vile visitor.** *Cell*, 140(5); 615-618: 2010.

Trudel E., Bourque C.W. **Central clock excites vasopressin neurons by waking osmosensory afferents during late sleep.** *Nature Neuroscience*, 13(4); 467-474 : 2010.

Constantin E., Tewfik T.L., Brouillette R.T. **Can the OSA-18 quality-of-life questionnaire detect obstructive sleep apnea in children?** *Pediatrics*, 125(1); e162-168: 2010.

Cybulsky A.V. **Endoplasmic reticulum trespassing proteinuric kidney disease.** *Kidney International*, 77(3); 187-193: 2010.

Ghasemlou N., Bouhy D., Yang J., Lopez-Vales R., Haber M., Thuraingam T., He G., Radzioch D., Ding A., David S. **Beneficial effects of secretory leukocyte protease inhibitor after spinal cord injury.** *Brain*, 133(Pt 1); 126-138: 2010.

Schulman S., Angeras U., Bergqvist D., Eriksson B., Lassen M.R., Fisher W. and/or Subcommittee on Control of Anticoagulation of the Scientific and Standardization Committee of the International Society on Thrombosis and Haemostasis. **Definition of major bleeding in clinical investigations of antihemostatic medicinal products in surgical patients.** *J Thromb Haemost*, 8(1); 202-204: 2010.

# Representative Publications (Selected)

- Charest-Marcotte A., Dufour C.R., Wilson B.J., Tremblay A.M., Eichner L.J., Arlow D.H., Mootha V.K., Giguere V. **The homeobox protein Prox1 is a negative modulator of ERR $\alpha$ /PGC-1 $\alpha$  bioenergetic functions.** *Genes & Development*, 24(6); 537-542: 2010.
- Bambico F.R., Nguyen N-T., Katz N., Gobbi G. **Chronic exposure to cannabinoids during adolescence but not during adulthood impairs emotional behaviour and monoaminergic neurotransmission.** *Neurobiology of Disease*, 37(3); 641-655: 2010.
- Zhang Z., Pascuet E., Hueber P-A., Chu L., Bichet D.G., Lee T-C., Threadgill D.W., Goodyer P. **Targeted inactivation of EGF receptor inhibits renal collecting duct development and function.** *Journal of American Society of Nephrology*, 21(4); 573-578: 2010.
- Jacobs J., Zijlmans M., Zelmann R., Chatillon C-E., Hall J., Olivier A., Dubeau F., Gotman J. **High-frequency electroencephalographic oscillations correlate with outcome of epilepsy surgery.** *Annals of Neurology*, 67(2); 209-220: 2010.
- Goto Y., Yang C.R., Otani S. **Functional and dysfunctional synaptic plasticity in prefrontal cortex: roles in psychiatric disorders.** *Biological Psychiatry*, 67(3); 199-207: 2010.
- Guarnieri V., Canaff L., Yun F.H.J., Scillitani A., Battista C., Muscarella L.A., Wong B.Y.L., Notarangelo A., D'Agruma L., Sacco M., Cole D.E.C., Hendy G.N. **Calcium-sensing receptor (CASR) mutations in hypercalcemic states: studies from a single endocrine clinic over three years.** *Journal of Clinical Endocrinology & Metabolism*, 95(4); 1819-1829: 2010.
- Kim Ho C., Mofarrah M., Vassilakopoulos T., Maltais F., Sigala I., Debigare R., Bellenis I., Hussain SNA. **Expression and functional significance of nicotinamide N-methyl transferase in skeletal muscles of patients with chronic obstructive pulmonary disease.** *American Journal of Respiratory Critical Care Medicine*, 181(8); 797-805: 2010.
- Larroque-Lombard A.L., Todorova M., Golabi N., Williams C., Jean-Claude B.J. **Synthesis and uptake of fluorescence-labeled Combi-molecules by P-glycoprotein-proficient and -deficient uterine sarcoma cells MES-SA and MES-SA/DX5.** *Journal of Medicinal Chemistry*, 53(5); 2104-2113: 2010.
- Klein M.B., Yang H., DelBalso L., Carbonneau J., Frost E., Boivin G. **Viral pathogens including human metapneumovirus are the primary cause of febrile respiratory illness in HIV-infected adults receiving antiretroviral therapy.** *Journal of Infectious Diseases*, 201(2); 297-301: 2010.
- Limperopoulos C., Tworetzky W., McElhinney D.B., Newburger J.W., Brown D.W., Robertson R.L., Jr, Guizard N., McGrath E., Geva J., Annese D., Dunbar-Masterson C., Trainor B., Laussen P.C., du Plessis A.J. **Brain volume and metabolism in fetuses with congenital heart disease: evaluation with quantitative magnetic resonance imaging and spectroscopy.** *Circulation*, 121(1); 26-33: 2010.
- Vincent C., Boerlin P., Daignault D., Dozois C.M., Dutil L., Galanakis C., Reid-Smith R.J., Tellier P.P., Tellis P.A., Ziebell K., Manges A.R. **Food reservoir for Escherichia coli causing urinary tract infections.** *Emerging Infectious Diseases*, 16(1); 88-95: 2010.
- Khan F.A., Minion J., Pai M., Royce S., Burman W., Harries A.D., Menzies D. **Treatment of active tuberculosis in HIV-coinfected patients: a systematic review and meta-analysis.** *Clinical Infectious Diseases*, 50(9); 1288-1299: 2010.
- Chamod A.S., Petrides M. **Dissociation within the frontoparietal network in verbal working memory: a parametric functional magnetic resonance imaging study.** *Journal of Neuroscience*, 30(10); 3849-3856: 2010.
- Xu Yong Z., Thuraisingam T., Morais D., Anderson L., Rola-Pleszczynski M., Radzioch D. **Nuclear translocation of beta-actin is involved in transcriptional regulation during macrophage differentiation of HL-60 cells.** *Molecular Biology Cell*, 21(5); 811-820: 2010.
- Prsa M., Holly C.D., Carnevale F.A., Justino H., Rohlicek C.V. **Attitudes and practices of cardiologists and surgeons who manage HLHS.** *Pediatrics*, 125(3); e625-630: 2010.
- Chan J., Deng L., Mikael L.G., Yan J., Pickell L., Wu Q., Caudill M.A., Rozen R. **Low dietary choline and low dietary riboflavin during pregnancy influence reproductive outcomes and heart development in mice.** *American Journal of Clinical Nutrition*, 91(4); 1035-1043: 2010.
- Ruthazer E.S., Aizenman C.D. **Learning to see: patterned visual activity and the development of visual function.** *Trends Neuroscience*, 33(4); 183-192: 2010.
- Dupaul-Chicoine J., Yeretssian G., Doiron K., Bergstrom K.S.B., McIntire C.R., LeBlanc P.M., Meunier C., Turbide C., Gros P., Beauchemin N., Vallance B.A., Saleh M. **Control of intestinal homeostasis, colitis, and colitis-associated colorectal cancer by the inflammatory caspases.** *Immunity*, 32(3); 367-378: 2010.
- Rose A.N., Grosset A.A., Dong Z., Russo C., Macdonald P.A., Bertos N.R., St-Pierre Y., Simantov R., Hallett M., Park M., Gaboury L., Siegel P.M. **Glycoprotein nonmetastatic B is an independent prognostic indicator of recurrence and a novel therapeutic target in breast cancer.** *Clinical Cancer Research*, 16(7); 2147-2156: 2010.



# Foundation and Auxiliary Support

## McGill University Health Centre (MUHC) Foundation

The McGill University Health Centre Foundation exists to support patient care, teaching and research at one of the most comprehensive university health centres in North America. In partnership with the MUHC's site-based foundations, the MUHC Foundation is currently executing *The Best Care for Life* \$300-million campaign. As part of this effort, and in equal partnership with the Fondation du CHUM, the MUHC Foundation is engaged in a joint campaign to solicit funds from Quebec's leading corporations aimed at refurbishing Montreal's healthcare infrastructure.

During the past year, the MUHC Foundation has helped support projects and fellowships in research through generous donations from the Estate of Mary Zilinskas Wallis in aid of research in geriatrics; liver transplantation through the Ernest Avrith Endowment; an oncology fellowship through the generosity of the Kate McGarrigle Fund; and an award in dentistry as a result of the generosity of Dr. Harry Rosen.

## Montreal General Hospital Foundation

The mission of The Montreal General Hospital (MGH) Foundation is to support excellence in patient care, teaching and research at the MUHC. Over the past decade, the Foundation has contributed over \$130 million to the Hospital and Research Institute. Support from The MGH Foundation for research this past year remained steadfast.

In the past year, with the help of over 10,000 donors, the MGH Foundation contributed more than \$11.3 million to the Hospital and Research Institute to support excellence in patient care, teaching and research. Donor support for Research Chairs also contributed to the recruitment and retention of nationally and internationally recognized clinical researchers. During 2009-10 more than 80 clinical researchers received support from the MGH Foundation. Nursing and nursing research were also the beneficiaries of generous ongoing support by the MGH Foundation.

## The Auxiliary of the Montreal General Hospital

The Auxiliary of The Montreal General Hospital is a volunteer group of men and women dedicated to supporting the hospital and promoting its image in the community. Hospitality Corner, a branch of the Auxiliary, runs the Hospitality Café, Restaurant, Gift Shop, Cedar Café and Café des Pins. The Auxiliary also holds annual fundraising events. Money raised by the Auxiliary is used to purchase medical equipment, to sponsor annual research awards, and to support various projects that enhance patient care within the hospitals and in the community. Last year, \$45,315 in "tip money" was donated to the Research Institute by clients of the Hospitality Corner. In the past 15 years, tips left for volunteers in the Hospitality Corner have exceeded \$550,000.

## The Royal Victoria Hospital Foundation

The Royal Victoria Hospital Foundation has always recognized that excellence in patient care begins with excellence in research. They have committed over \$3 million over the past two years alone to research projects touching a wide cross-section of medical disciplines. And knowing that the future of medicine depends on today's research, they continue to make it a priority to provide leadership support to the Research Institute through the visionary generosity of our faithful contributors.

## The Montreal Children's Hospital Foundation

Thanks to the generosity of its donors, The Montreal Children's Hospital (MCH) Foundation disbursed \$2.3 million in support of pediatric research in 2009–2010, contributing to the progress of a number of significant projects.

Among the Foundation's major partners in this contribution are Shire Canada (research to improve diagnosis and treatment of attention-deficit hyperactivity disorder), the Cole Foundation (leukemia research), and the National Bank Financial Group (research into the preconception and prenatal causes of birth defects in children to better understand normal embryonic development and how it can be affected by environment and genetics). Leucan, the Children's Leukemia Research Association and the Fast Foundation were also important contributors to the MCH Foundation's substantial disbursement for this year.

The MCH Foundation continues working toward its objective of raising \$100 million in *The Best Care for Children* campaign to construct the new Montreal Children's Hospital and its new Research Institute home on the Glen Campus. To date, this campaign has raised \$74 million.

## Montreal Chest Hospital Foundation

The Montreal Chest Institute (MCI) Foundation supports the healthcare professionals at the MCI—leaders in respiratory ailments such as asthma, chronic obstructive pulmonary disease (COPD), cystic fibrosis, pulmonary hypertension, obstructive sleep apnea, and Duchenne muscular dystrophy. The Foundation also funds pioneering research to treat and cure these devastating illnesses.

The MCI Foundation is very pleased to have funded the renovations of the MCI's Intensive Care Unit. The most important new project was the purchase of advanced diagnostic equipment to support the early detection and treatment of lung cancer. Several other meaningful projects relating to the quality of life of the MCI's patients were also funded.

# Core Facilities

## Cancer Research

The Rosalind and Morris Goodman Cancer Centre and the McGill Life Science Complex have at their disposal and offer the services of several in-house core facilities. These facilities provide the GCC members and the McGill research community access to advanced technical expertise with state-of-the-art equipment. Facility services are also available to the outside scientific community in order to enhance the level of collaborative research. Available Facilities are: Transgenic Mouse Core Facility, Histology Core Facility, Hybridoma Core Facility, Imaging Core Facility, Mouse Phenotyping, Dissection Microscopy, Fluorescence Imaging, Flow Cytometry, High. Other Services are also available through the Animal Resources Centre: Veterinary Pathology. For more information: [cancercentre.mcgill.ca/research](http://cancercentre.mcgill.ca/research)

## Clinical Research Cord Blood Bank

The MUHC Clinical Research Cord Blood Bank opened its doors in October 2007. The facility specializes in storing cord blood units too small for public banks but adequate for other clinical applications that require a low volume of stem cells. It provides isolation of hematopoietic stem cells or other components from the umbilical cord blood at a low price. In a structured program of quality and standardized manufacturing processes, it meets the standards of good laboratory practice and the requirements of Health Canada. This unique bank in Canada contains cord blood units that can be used safely in clinical research projects. A detailed research project and a consent form must accompany all applications. A research ethics committee recognized by the Unit for Ethics of the Government of Québec or by the Panel on Research Ethics of the Canadian Government must approve projects.

## Endocrinology

Investigators in the Endocrinology/Diabetes/Nutrition/Renal Diseases Axis direct the following core services:

The Sheldon Biotechnology Centre provides high quality synthesis of peptides and modified/conjugated peptides. It also houses a Biacore instrument for high precision surface plasmon resonance kinetic and affinity analysis of protein-protein interactions. Experienced technical support is available.

Director: Dr. Hugh Bennett

Molecular Imaging Pre-Core Facility at the RVH - Provides access to Confocal Microscopes with high resolution immunofluorescent analyses on fixed samples and tissue and for live cell imaging

Director: Dr. Stéphane Laporte

Proteomic Services – Mass spectrometric analysis and identification of proteins and their post translational modification - service provided jointly by the MUHC and McGill University/Genome Quebec Innovation Centre –

Director: Dr. Tommy Nilsson

Clinical Investigation Unit – Provides nursing and administrative support for clinical trials and clinical research projects – Director: Dr. Errol Marliss

## Genomics and Proteomics

Genomics and Proteomics at the McGill University and Genome Quebec Innovation Centre, originally established at the MUHC, provides DNA sequencing, genotyping, microarray, proteomics and informatics technologies for over 700 scientists each year. The Centre provides access to the latest genomics and proteomics technologies so that researchers may discover causes and therapies for common diseases and access core facilities that are essential for large research projects in human health.



## Infection & Immunity

The Infection and Immunity core facility offers a variety of services including automated sequencing, confocal imaging, SELDI-ToF mass spectroscopy, access to Levels 2 and 3 biosafety labs and animal facilities, and microarray technologies. Moreover, the Infection and Immunity Axis now benefits from a state-of-the-art, immune phenotyping platform which provides researchers and clinicians with access to training and use of multi-parametric flow cytometry and cell sorting.

## Musculoskeletal

Services for X-ray and micro CT imaging, histologic and histomorphometric analyses of mineralized tissues and for the analysis of a variety of cytokines and growth factors relevant to skeletal health and disease are available through the Centre for Bone and Periodontal Research. Consultation in small animal models, biomaterials, stem cells and devices for bone tissue engineering is available to members of the research community and private sector partners through members of the Musculoskeletal Axis.

## Neuroscience

The new Brain Imaging Centre (BIC) at the MNI will facilitate the development of new techniques for imaging humans and animals and for creating new ways to unite molecular biology and brain-imaging confocal microscopes. BIC's world-class facilities include some of the most advanced MR, PET, and MEG imaging devices available. In addition to scanners used for human and primate studies, the BIC has high-tech scanners designed specifically for use with small animals. Image processing and other processor intensive tasks are completed using the BIC's first-class computing system. For more information: [www.mni.mcgill.ca](http://www.mni.mcgill.ca)

## Procure Quebec Prostate Cancer Biobank

This Biobank is a long-term collaborative study between Procure Alliance, a not-for-profit prostate-cancer organization, and Quebec's four universities with teaching hospitals, namely Université de Montréal, McGill University, Université de Laval and Université de Sherbrooke. The goal is to collect and store research-grade human tissues and associated data from men with prostate cancer, and those at risk, for research purposes. Materials and data are stored in the research institutes of participating university hospitals, and made available to researchers. To date, the Biobank has collected samples and data from over 1,000 men with prostate cancer.

## Respiratory Health

Core services in the following areas are available: molecular pathology, tissue culture, animal physiology, molecular cloning and imaging facility. A tissue bank, situated at the RI/MCI site, contains tissues and samples from asthmatics, subjects with COPD or cystic fibrosis, as well as from healthy subjects.

## Sheldon Biotechnology Centre

Located in the Duff Medical Building, the Sheldon Biotechnology Centre provides life-science researchers with core technologies to analyze biomolecules. Services and training include: multiplex, surface plasmon resonance; peptide synthesis; protein sequencing; and mass spectrometry. ([www.mcgill.ca/sheldon](http://www.mcgill.ca/sheldon))

## Vivarium

The Research Institute supports animal facilities at the MUHC and Montreal Neurological Institute. The Animal Care Committee reviews and approves protocols prior to the start of any project that will use animals.

# Funding by Source

Granting Agency	All Funding 2009-10
Canadian Institutes of Health Research (CIHR)	\$47,756,933
Pharmaceutical Agreement	\$13,702,101
Internal Funds (McGill/MUHC/RI-MUHC)	\$15,017,442
Various Granting Agencies	\$8,548,313
Canada Foundation For Innovation (CFI)	\$7,121,435
Fonds de la recherche en santé du Québec (FRSQ)	\$5,830,674
Federal Agencies	\$4,305,072
Canada Research Chairs	\$3,788,336
National Institute of Health (NIH)	\$3,179,926
Ministère de la Santé et des Services sociaux du Québec	\$2,936,957
Provincial Agencies	\$2,272,403
Multiple Sclerosis Society	\$2,132,073
National Sciences and Engineering Research Council of Canada	\$2,005,621
Genome Quebec	\$1,689,162
Cancer Research Society	\$1,576,219
National Cancer Institute of Canada (NCI)	\$1,305,123
Canadian International Development Agency	\$1,057,679
Health and Welfare Canada	\$848,394
Réseaux du fonds de la recherche en santé du Québec	\$847,825
Juvenile Diabetes Research Foundation International	\$771,328
Canadian Cystic Fibrosis Association	\$576,019
Other	\$3,826,132
<b>Total</b>	<b>\$131,095,167</b>



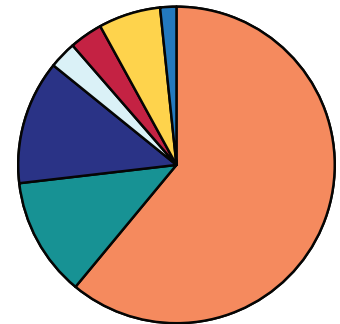
# Financials - Quick Stats

Statement of operations year ended March 31, 2010

Operations &  
Grants Combined  
Total 2010  
(Millions\$)

## Revenues

Peer Review Grants	80,013,056
Non Peer Review Grants w/o Overhead	15,927,191
Non Peer Review Grants with Overhead	16,621,159
Federal Grant's Indirect Costs (McGill)	3,654,075
FRSQ Support	4,446,549
Foundation, Donations	8,318,102
Income from cash, investments and other with McGill Overhead	2,167,221

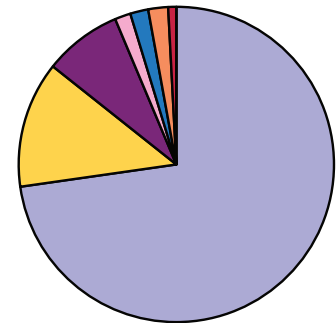


Total Revenue

131,147,353

## Expenditures

Salaries & Fringe Benefits	94,057,449
Laboratory & Office Supplies	16,735,638
Animal Board & Purch, Minor Equip, Travel and Other	10,321,170
Amortization Expense - Equipment	2,096,452
Building Occupancy, Renovations and Support	2,392,281
Transfer to partner institutions, net of recoveries	2,629,600
Telecommunications	1,071,202



Total Expenditures

129,303,793

(Deficiency) excess of revenue over expenditures

1,843,560

# Internal Committees

## Board of Directors

Mr. Brian Baxter, Chairman  
Dr. Armen Aprikian  
Dr. Miguel Burnier  
Mr. Barry Cappel  
Dr. Richard Cruess  
Dr. Jean-Pierre Farmer  
Mr. Gordon Fehr  
Dr. Harvey Guyda  
Mr. Richard Ingram  
Mr. John Johnson  
Ms. Celia Kaplow  
Mr. Paul Marchand  
Mrs. Maria Mastracchio-Lafontaine  
Dr. Bruce Mazer  
Mrs. Gail Merilees-Jarislowsky  
Dr. Vassilios Papadopoulos  
Dr. Arthur T. Porter  
Dr. Rémi Quirion  
Mr. Normand Rinfret  
Dr. Rima Rozen  
Mr. François Schubert  
Mr. Ian B. Scott  
Dr. Jacquetta Trasler  
Dr. Brian Ward

## Audit/Investment Committee

Mr. Brian Baxter  
Dr. Richard Cruess  
Mr. Gordon Fehr  
Mr. Richard Ingram  
Ms. Danielle Langlois  
Mr. Ian B. Scott  
Mr. François Schubert

## Management Committee (2009)

Dr. Vassilios Papadopoulos, Chair  
Dr. Miguel Burnier  
Dr. Robert J. Dunn  
Dr. David Eidelman  
Dr. Paul Goodyer  
Dr. Theresa Gyorkos

Dr. Qutayba Hamid  
Dr. Janet E. Henderson  
Dr. Sheldon Magder  
Dr. Bruce Mazer  
Dr. Gilles Paradis  
Dr. Arthur T. Porter  
Mr. François Schubert  
Dr. Jacquetta Trasler  
Dr. Brian Ward

## Research Council (2010)

Dr. Bruce Mazer, Chair  
Dr. Paul Goodyer, Co-Chair  
Dr. Michal Abrahamowicz  
Dr. Marcel Behr  
Dr. Chawki Benkelfat  
Dr. Pnina Brodt  
Dr. Jean Bourbeau  
Dr. Miguel Burnier  
Dr. Sal Carbonetto  
Dr. Hugh Clarke  
Dr. Robert J. Dunn  
Dr. David Eidelman  
Dr. Mostafa Elhilali  
Dr. Eric Fombonne  
Dr. Jacques Genest  
Dr. Harvey Guyda  
Dr. Miriam Israel  
Dr. Nada Jabado  
Ms. Jenny Koulis, Secretary  
Dr. Richard Kremer  
Dr. Stéphane A. Laporte  
Dr. Sheldon Magder  
Dr. Nancy Mayo  
Dr. James G. Martin  
Dr. Henri-André Ménard  
Dr. Ciriaco A. Piccirillo  
Dr. Vassilios Papadopoulos  
Dr. Judith Ritchie  
Mr. François Schubert  
Dr. Eric Shoubridge  
Dr. Seang L. Tan  
Dr. Patricia Tonin  
Dr. Brian Ward  
Dr. Simon Wing  
Dr. Christina Wolfson

## Site Directors

Dr. Andrew Bateman, RVH Site  
Dr. Robert Dunn, MNI Site  
Dr. Qutayba Hamid, MCI Site  
Dr. Janet Henderson, MGH Site  
Dr. Jacquetta Trasler, MCH Site

## Space Committee

Dr. Sheldon Magder, Chair  
Dr. Andrew Bateman  
Mr. Jean-Marie Chavannes  
Dr. Qutayba Hamid  
Dr. Janet Henderson  
Dr. Vassilios Papadopoulos  
Mr. François Schubert  
Dr. Jacquetta Trasler

## Research Administration Operations

Dr. Vassilios Papadopoulos, Chair  
Mr. Walid Al-Challe  
Dr. Miguel Burnier  
Mr. Jean-Marie Chavannes  
Ms. Caroline Donelle  
Ms. Marilyn Drouin  
Ms. Stéphanie Guilbault  
Ms. Susan James  
Mr. Costas Karatzas  
Ms. Jenny Koulis  
Ms. Danielle Langlois  
Dr. Marlies Otter  
Mr. Jaime Pimstone  
Ms. Cinzia Raponi  
Ms. Sonia Rea  
Ms. Danuta Rylski  
Mr. Marwan Samia  
Mr. François Schubert  
Mr. Patrice Vaillancourt



# Acknowledgements

This year's Annual Report was produced by Caroline Donelle, Manager, Research Communications and Public Relations, The Research Institute, McGill University Health Centre.

Many people have contributed their time and talents to the preparation of this year's annual report. To mention some of them is not to diminish our appreciation for the efforts of others. Among those who deserve special mention are:

Judith Horrell  
Cindy Young

Special thanks to Sylviane Duval for editing, Owen Egan for content photography, Andree Michon of Micatraduction for translation services and Susan Rakita of T2 Marketing for putting vision to print.

Sincerest gratitude goes to Ashley Donelle (cover photo) for incredible courage and strength in abject adversity, her daughter Leila for providing more will to live, and to Denise Grant (Denise Grant Photography, Toronto, for the captivating photography.

The Research Institute of the McGill University Health Centre is funded in part by the Fonds de la recherche en santé du Québec (FRSQ).

© Copyright 2010, The Research Institute of  
the McGill University Health Centre  
All rights reserved  
2155 Guy, 5th Floor  
Montreal, QC H3H 2R9  
514-934-8354

[www.muhc.ca/research](http://www.muhc.ca/research)