



# **BANTING**

## **RESEARCH FOUNDATION**

Annual Report 2015

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### About our logo

Our logo shows the characteristic three-pair structure of the insulin molecule, with white lines radiating brightly from the centre. By evoking the explosive power of scientific discovery to change our lives profoundly, the stylized molecule and rays serve as a graphic metaphor for the history and contemporary mandate of the Banting Research Foundation.

The Banting Research Foundation supports outstanding new investigators conducting a broad range of biomedical research at universities and research institutes in Canada.

La Fondation de recherche Banting soutient de nouveaux chercheurs exceptionnels œuvrant dans divers secteurs de la recherche biomédicale au sein d'universités et d'instituts de recherche au Canada.



A Frederick Banting oil sketch, composed during a painting expedition with AY Jackson of the Group of Seven, 1930

## Message from the Chair



This, my last annual report as Chair, provides several welcome opportunities: to reflect upon the Foundation's accomplishments over the last fiscal year; to commend each of our present and prior Trustees, our Executive Director, our Grant Review Panel Chairs and Members for supporting selflessly the Foundation's purpose; and to express to our generous donors the Trustees' appreciation of their confidence in our capacity to identify the most promising of the many innovative research proposals submitted by early-career Canadian medical investigators.

Our refreshed website attracted considerable traffic from our two target audiences—the public at large and the scientific community. Our reward was to receive 78 applications for funding, double that of recent years. Our volunteer Grant Review Panel was undaunted by this challenge. Each application was evaluated judiciously; each applicant was provided a constructive critique. We were pleased to have the resources this year to distribute \$175,000 to the seven highest-scored applicants. Their profiles and project details have been published on the Foundation's web site.

A new initiative, with the aim of elevating the Foundation's profile amongst aspiring medical investigators, is the Banting Research Foundation Prize, awarded to physicians judged to have the highest-ranked research presentations to the annual joint meeting of the Canadian Society for Clinical Investigation and the Clinician Investigator Trainee Association of Canada. The 2014 awardees and their project titles also are available on our site for review.

The Foundation's dual goals of augmenting the scientific impact of its awards and elevating its public profile require a stable endowment, the development of partnerships with like-minded agencies, and the encouragement of philanthropy.

The Investment Committee interviewed seven of the fund managers who responded to our request for proposals. We elected to transfer our account to RBC Phillips Hager & North, whose portfolio construction aligned best with the Foundation's tolerance for risk and with its commitment to a robust annual Discovery Award program.

We have revived our historical relationship with the Royal Canadian Institute for Science to engage with the Friends of the Canadian Institutes of Health Research in mounting in December a national workshop on the theme of discovery science in Canada in conjunction with the Friesen Prize Program celebrating Nobel Laureate Sir Paul Nurse.

Over the latter half of the year the Trustees focused their attention on developing a Case for Support. As groundwork, the Executive Director compiled a list, accessible through our web site, of all research recipients of Foundation funds since its inception, then identified those awards that yielded results with great impact on the health of Canadians. Those who have supported the Foundation's work over the last 90 years can be justifiably proud of this affirmation of the seminal role it has played in fostering medical investigators and discovery science in Canada.

Concurrently, we unraveled the mystery surrounding the received Banting oil sketches dedicated to his housekeeper, Nancy Archer. This confluence of research into his artistic life and into our grant archives evoked, for each Trustee, an extraordinarily vivid and palpable connection with the discoverer of insulin. Ivan Semeniuk tells the story of these paintings and our Foundation in his July 27 front page Globe and Mail article.

In the summer of 1921 a Department Chair willing to take a risk and provide the necessary resources gave Frederick Banting the opportunity to pursue a novel research idea that would lead to the transformational discovery of insulin. The Foundation preserves this legacy by taking calculated risks annually to assist a new generation of biomedical researchers with imaginative ideas. Each year we ask ourselves, might this investigator be our next Banting? In this and in future years we invite you to join us in this quest by donating to the Banting Research Foundation.

John Floras MD DPhil  
Chair, Board of Trustees  
The Banting Research Foundation

### Recent Chairs of the Board of Trustees

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## Grant Review Panel 2015

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Department of Medicine  
University of Toronto

**Dr Michael Ratcliffe**

Professor  
Department of Immunology  
University of Toronto

**Dr Robert Tsushima**

Associate Professor  
Department of Biology  
York University

## Grants Awarded 2014-15

### **Benoît Arsenault, PhD, Université Laval**

#### *Impact of a lifestyle modification program on high-density lipoprotein function*

Plasma levels of high-density lipoprotein (HDL) cholesterol, often referred to as “the good cholesterol”, are inversely associated with cardiovascular disease and type 2 diabetes risk. Several lines of evidence suggest that these associations could be explained by the fact that HDL particles promote macrophage-to-feces reverse cholesterol transport and stimulate insulin secretion from pancreatic beta cells. Our laboratory has developed cell-based assays that enable us to measure the capacity of HDL particles to promote cholesterol efflux from macrophages and insulin secretion from beta cells. Our main objective is to show that physical activity will significantly improve these anti-atherogenic functions of HDL particles in patients with coronary heart disease. We hope that this project will help us determine whether HDL represents a therapeutic target for the prevention and management of CVD and type 2 diabetes.

### **Yannick Doyon, PhD, Université Laval**

#### *In vivo genome editing as a novel class of human therapeutics to treat pediatric metabolic disorders*

Genetic disorders in children are individually rare but collectively frequent, affecting the lives of approximately 500,000 children in Canada. They often are serious, life threatening or fatal, but because each rare disease affects a relatively small population few treatments have been developed. Efforts by national and international groups such as the Canadian Pediatric Genetic Disorders Sequencing Consortium (FORGE) and the International Rare Disease Research Consortium (IRDiRC) are uncovering disease-causing genes that could be corrected through genetic therapies. Our goal is to translate an innovative genome editing technology into a novel class of human therapeutics that enables precise molecular modification of a genetic defect. Our long-term objective is to develop gene therapies to treat rare inherited metabolic diseases affecting children. Ultimately, this research proposal may lead to significant improvements in quality of life for children and their families affected by rare diseases.

### **Jennifer Heisz, PhD, McMaster University**

#### *Examining the dose-response relationship between physical exercise and cognitive function in older adults*

Alzheimer's disease is the most common form of dementia, causing severe cognitive impairment and interfering with daily life. As the population ages, the number of Canadians living with dementia is projected to double within a generation to affect 1.1 million people and cost Canada's healthcare system in excess of \$150 billion.

There is urgent need for intervention to reduce the burden of dementia on Canadian families and the economy. The proposed research will develop evidence-based economical and practical exercise interventions to improve brain function in seniors. Exercise programs engaged at critical stages will extend autonomy and improve quality of life, and ultimately keep more aging Canadians healthier for longer.

## **Jeffrey Leyton, PhD, Université de Sherbrooke**

### ***An advanced development in targeted radiation against muscle invasive migrating bladder cancer cells***

Bladder cancer affects thousands of Canadians on an annual basis. Unfortunately, bladder cancer remains one of the most difficult cancers to manage. The treatment options currently available to patients with muscle invasive bladder cancer have remained essentially unchanged. For patients with advanced or metastatic disease, bladder cancer is lethal within 2 years.

Identifying and treating muscle invasive bladder cancer is the primary challenge. Specialized cells that become highly mobile cause tumour spread. The cell surface protein IL-5R $\alpha$  is a marker of highly mobile invasive bladder cancer cells. Our research is to develop IL-5R $\alpha$ -specific probes that can deliver enhanced quantities of radionuclides inside migrating bladder cancer cells to provide for better visualization and treatment of muscle invasive bladder cancer. The endocytic pathway is the major uptake mechanism of cells for our class of radioactive probes. These probes are quickly degraded and flushed once inside cells. We have devised new designs to address this issue and give these probes the ability to escape degradation. Thus, our main objective is to generate anti-IL-5R $\alpha$  probes that will accumulate sufficient amounts of suitable radionuclides that can be used to provide highly specific imaging of migrating bladder cancer cells or deliver lethal blows of radiation without causing harm to non-target tissue. This will greatly aid physicians to detect and treat cases of muscle invasive bladder cancer.

## **Ewa Niechwiej-Szwedo, PhD, University of Waterloo**

### ***The role of binocular vision in the development of fine motor skills***

Seeing in depth is essential for guiding purposeful movements, such as reaching and grasping for toys or food, catching a ball or using tools to accomplish complex tasks. Binocular vision provides important cues for 3D depth perception. However, 3-5% of children with amblyopia or strabismus have abnormal binocular vision. There is limited research on the effects of abnormal binocular vision on motor skill performance in school-aged children. Thus, the goal of this research is to investigate the role of binocular vision in the development of fine motor skills. It is essential to develop greater insight into the fundamental mechanisms that are disrupted by the visual impairment in order to develop evidence-based interventions for children with abnormal binocular vision.

## **Emanuel Rosonina, PhD, York University**

### ***Regulation of transcription and splicing factors by sumoylation***

SUMO is a protein modification that plays important roles in regulating many cellular processes. Several proteins that are involved in neurodegenerative disease are modified by SUMO, and abnormal protein modifications by SUMO have been implicated in many types of cancer, indicating that tight regulation of this modification is critical to preventing disease.

Dr Rosonina is interested in studying how cells use SUMO modifications to control the expression of genes under normal conditions, and how abnormal SUMO modifications, like those associated with cancer, result in inappropriate expression of some genes. He expects the results of his work to add significantly to our understanding of gene expression in normal and disease situations.

## Grants Approved for Funding 2015-16

**Jeffrey Chen, PhD, University of Saskatchewan**

*Towards a next generation of superior BCG tuberculosis vaccines*

**Jeremy Hirota, PhD, University of British Columbia**

*A 3D-printed human airway model for studying respiratory mucosal immune responses*

**Petra Kienesberger, PhD, Dalhousie University**

*Role of the adipokine autotaxin in obesity-associated insulin resistance*

**Morgan Langille, PhD, Dalhousie University**

*Design and implementation of a human microbiome interaction database*

**Joon Lee, PhD, University of Waterloo**

*Personalized predictive analytics based on electronic medical data and patient similarity metrics*

**Catherine Martel, PhD, Université de Montréal**

*Lymphatic vessel function in atherosclerosis*

**Michael Suits, PhD, Wilfred Laurier University**

*Protein structure-function relationships in periodontal disease*

[For these project descriptions, please see our website.](#)

## Some results from our **2014** grant recipients

**Jeffrey Leyton** reported that his preliminary results produced very important technological advancements in the field of antibody-conjugates. These results provide the necessary support for his applications for larger grants.

**Ewa Niechwiej-Szwedo** showed that abnormal visual experience due to amblyopia or strabismus during development changes how the brain integrates sensory inputs. Her findings help to explain why visuomotor coordination in adults and children with amblyopia is disrupted, and may lead to improved rehabilitation methods.

**Emanuel Rosonina** reported that the preliminary data obtained from his research project was key to securing a 5-year CIHR operating grant, which will allow him to continue projects initiated with his Discovery Award.

## Impact of Our Funding

### 1980 Adolfo de Bold, PhD

**Adolfo de Bold** was funded in 1980 for his studies on storage granules in atrial heart cells. The resulting discovery and isolation of atrial natriuretic peptide (ANP) changed our understanding of how the heart functions, and opened up a new field of research, resulting in diagnostic and therapeutic applications in the treatment of heart failure and hypertension. The discovery of the endocrine function of the heart was named one of the top six achievements in Canadian health research by the CIHR and Canadian Medical Association Journal.

Dr de Bold received the 1986 Gairdner Foundation International Award for the discovery and characterization of ANP. He was made an Officer of the Order of Canada in 1992, and was inducted into the Canadian Medical Hall of Fame in 2014.

### 1983 Janet Rossant, PhD

**Janet Rossant** was funded in 1983 for her early research in developmental biology. She has become a world leader in understanding the role of genes in embryo development.

Dr Rossant received the 2015 Canada Gairdner Wightman Award for her outstanding scientific contributions to developmental biology and for her exceptional international leadership in stem cell biology and policy-making, and in advancing research programs for children's illnesses.

“The early support of the [Banting Research] Foundation was very helpful in setting my course towards the Gairdner Wightman award.”

In 2015, she was made a Companion of the Order of Canada for advancing the global understanding of embryo development and stem cell biology, and for her national and international leadership in health science.

For these and other stories, please see our website.

## BALANCE SHEET

As at June 30

	2015	2014
	\$	\$
<b>ASSETS</b>		
Cash and cash equivalents	89,489	76,758
HST recoverable	3,504	7,784
Investments, at fair value	4,265,198	4,168,804
	<b>4,358,191</b>	<b>4,253,346</b>
<b>LIABILITIES AND FUND BALANCES</b>		
<b>Liabilities</b>		
Accounts payable and accrued liabilities	17,397	22,360
<b>Fund balances</b>		
General Fund	725,289	708,558
Endowment Fund	3,615,505	3,522,428
<b>Total fund balances</b>	<b>4,340,794</b>	<b>4,230,986</b>
	<b>4,358,191</b>	<b>4,253,346</b>

## CONDENSED STATEMENT OF REVENUE AND EXPENSES AND CHANGES IN FUND BALANCES

Year ended June 30

	2015	2014
	\$	\$
<b>REVENUE</b>		
Investment income, net	315,231	546,538
Donations	23,141	46,166
	<b>338,372</b>	<b>592,704</b>
<b>EXPENSES</b>		
Grants awarded to new investigators	150,000	104,946
Other grants	9,500	7,500
Professional fees	44,575	37,403
Office, general and administrative	13,725	16,364
Accounting and audit fees	10,764	10,764
	<b>228,564</b>	<b>176,977</b>
<b>Excess of revenue over expenses for the year</b>	<b>109,808</b>	<b>415,727</b>
Fund balances, beginning of year	4,230,986	3,815,259
<b>Fund balances, end of year</b>	<b>4,340,794</b>	<b>4,230,986</b>

This summarized financial information is derived from financial statements that were audited by Ernst & Young LLP, Chartered Professional Accountants.

Complete financial statements are available upon request.

## Donors, Partners and Sponsors

The Banting Research Foundation was established in 1925 to fund biomedical research. For many years it was essentially the only organization funding health and biomedical research across Canada.

From its endowment fund and donations, the Foundation is currently able to fund only 10-15% of applications received from new investigators during its annual grant competition. As a consequence, many outstanding proposals may go unsupported because of insufficient funds. We want to ensure that no opportunity for health and biomedical discovery is lost due to lack of resources, and that new investigators have the funds they need to explore their ideas.

Your contribution can go a long way in helping us to fund additional awards so we can support these researchers early in their careers. Although grants are awarded in all fields of medical research, if a sponsor wishes to target a specific disease or area of research, the Foundation will work with the sponsor toward this goal. Receipts for income tax purposes will be issued.

The Banting Research Foundation gratefully acknowledges donations from the following individuals and corporations during the 2015 fiscal year:

Mr John Burnes

The William and Nona Heaslip Foundation

Donors through CanadaHelps

Anonymous

Thank you!

Your donations have supported innovative medical research projects by outstanding early-career investigators.

Charitable Business No. 10807 2927 RR0001

Banting Research Foundation



**Frederick Grant Banting**  
1923 Nobel Prize in Physiology or Medicine,  
for the discovery of insulin

“The Banting Research Foundation commemorates the discovery of insulin, and the hope is that through its opportunities other discoveries will be made, which, like insulin, will bring alleviation to human suffering.”

Sir Robert Falconer, KCMG, LLD  
First Chairman of The Banting Research Foundation  
President of the University of Toronto  
June 23, 1925

**Banting Research Foundation**

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