



BANTING

RESEARCH FOUNDATION

Annual Report 2014

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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 awards seed grants in all areas of medical research to outstanding new investigators within the first three years of their independent appointment at a university or research institute in Canada.

La Fondation de recherche Banting octroie des fonds d'amorçage dans tous les domaines de la recherche médicale aux nouveaux chercheurs exceptionnels dans les trois premières années de leur nomination indépendante dans une université ou un institut de recherche au Canada.



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

Message from the Chairman



At its 2013 strategic retreat, the Foundation set two objectives: to elevate our profile within the Canadian medical research and philanthropic communities and to augment the scientific impact of our Awards. Consistent with the Foundation's aspiration, since its founding in 1925, to provide enabling seed funds for early-stage medical researchers seeking to test innovative hypotheses, we established new annual Banting

Research Foundation Discovery Awards, each in the amount of \$25,000. At the same time we streamlined the processes of application and adjudication by our Grant Review Panel. In the spring 2014 competition, we received 30 highly meritorious submissions. Our finances sound, we had the capacity to grant Discovery Awards to the 6 top-ranked applicants.

Our iconic new logo, inspired by the structure of the insulin molecule, has been received enthusiastically. An entirely new website (BantingResearchFoundation.ca) features with text and photography many of our recent and past Awardees. We encourage you to visit. You will be enthused by their stories and by their discoveries.

At the Annual Meeting of the Canadian Society for Clinical Investigation, on November 26, we will recognize with Banting Research Foundation Prizes 6 post-graduate trainees ranked highest amongst a competitive pool of 110 abstract presenters. These Prizes provide tangible evidence of the Foundation's commitment to the aspirations of Canadian clinician scientists transitioning to independent careers.

I thank all Trustees for their time, wisdom, and dedication to the development of future leaders of Canadian medical research. Our website highlights the remarkably gratifying stories of many internationally recognized investigators who still remember and appreciate greatly that it was our Foundation that had the confidence to provide them with their first research grant.

We are determined to augment through philanthropic donations and partnerships both the pool of funds available for annual disbursement and, to sustain our Awards program through future periods of financial turbulence, our endowment. To ensure the continued success of the Banting Research Foundation, we require your support. Please donate.

Sincerely,

John Floras MD DPhil FRCPC FCAHS
Chairman, Board of Trustees
The Banting Research Foundation

Recent Chairs of the Board of Trustees

John M Burnes (2000-2009)
John G Ambrose (1994-2000)
Dorothy M Hellebust (1990-1994)
John H Watson (1987-1990)
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Board of Trustees 2013-2014

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Grant Review Panel 2014

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Department of Biochemistry
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Dr Michael Ohh

Professor
Department of Laboratory Medicine
and Pathobiology
University of Toronto

Dr Lucy Osborne

Professor
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 2013-14

Banting and Best Department of Medical Research, University of Toronto

The Joint Postdoctoral Fellowship of the Dr Charles H Best and The Banting Research Foundations

Jelena Tomic, PhD

Combining the fields of immunology and biochemistry in order to understand how resistance to immunotherapies arises in highly glycolytic tumour cells.

Dr Tomic is exploring the function and full potential of synthetic monoclonal antibodies that can detect different cellular metabolic states. The goal is to broaden our understanding of antibody-based cancer immunotherapy.

Craig Bailey, PhD, University of Guelph

Nicotinic receptor signaling in Fetal Alcohol Spectrum Disorder

Chronic prenatal exposure to alcohol can produce a spectrum of adverse effects known collectively as Fetal Alcohol Spectrum Disorder (FASD). Although deficits in attention rank among the most common and persistent components of FASD, mechanisms underlying this behavioural outcome are not known. This project aims to determine mechanisms by which exposure to alcohol during development alters the brain's attention systems. We will focus on the nicotinic acetylcholine neurotransmitter system within the prefrontal cortex, because it is important for normal attention behaviour and can be modulated by short- and long-term exposure to alcohol. The long-term goal of this research is to identify appropriate therapeutic interventions to mitigate attention deficits in FASD.

David Chatenet, PhD, Centre INRS – Institut Armand-Frappier

Design and synthesis of peptide inhibitors of PqsE as novel antibacterial therapeutics

Pseudomonas aeruginosa (Pa), a prevalent opportunistic human pathogen responsible for pneumonia in individuals suffering from cystic fibrosis, is notorious for its high resistance to antibiotic treatments. Recently demonstrated cell-to-cell signaling regulated by the PqsE enzyme plays a central role in the control of the pathogenicity of Pa by modulating the expression of virulence-related functions. As such, PqsE represents a potential target for therapeutic intervention. The present proposal aimed to design specific inhibitors of this enzyme through a combinatorial chemistry approach and to evaluate their potential as new antibacterial agents.

Margaret K Hahn, MD PhD, Centre for Addiction and Mental Health

Central insulin to prevent olanzapine-induced adiposity

Atypical antipsychotic (AAP) medications, the mainstay treatment for psychosis and schizophrenia, are defined by weight gain and metabolic problems that likely contribute to a 2-fold increase in cardiovascular (CV) deaths in this population. Lifestyle interventions often have limited success, so other medical interventions must be considered. Intranasal

insulin, comparable to administration into the brain, could represent a new approach for several reasons: a) schizophrenia has been associated with brain abnormalities in insulin signaling, and b) in healthy humans, intranasal insulin is considered safe and is associated with beneficial effects on cognition and weight. We will look at insulin given directly into the brain to see if it can prevent AAP-associated increases in fat, a key risk factor for CV disease. We also propose to clarify mechanisms of AAP-induced disturbances of energy metabolism, examining if central insulin can attenuate disruptions in shared pathways.

Pierre-Yves Lozach, PhD, Centre INRS – Institut Armand-Frappier

Bunyavirus entry into mammalian cells

Bunyaviridae is a large family of viruses mainly transmitted by arthropods such as mosquitos and ticks. Many bunyaviruses are important pathogens in humans and livestock. Due to their mode of transmission, they are considered emerging agents of diseases. Unfortunately, bunyaviruses are understudied, which has contributed to an absence of treatments or vaccines approved for human use. Through this research program, using the bunyavirus *Uukuniemi* as a model, we expect to gain information about the molecular and cellular mechanisms subverted by these viruses to infect a host. The results gleaned here will lay the basis for developing new antiviral strategies.

Dave Richard, PhD, Université Laval

Protein trafficking to the apical complex of the malaria parasite

Malaria is one of the world's most common infectious diseases, with approximately 274 million cases each year and 1 million deaths, and thus represents one of the most devastating global public health problems. The lack of an effective vaccine and the emergence of resistance to first-line drugs, combined with the small number of suitable new drugs against the malaria parasite, demonstrate the urgent need for the development and implementation of new interventions in the form of drugs, vector control measures and an effective vaccine. Invasion of a red blood cell by *Plasmodium falciparum* parasites is an essential step in the malaria lifecycle. Our laboratory is focused on dissecting this multi-step process since the molecular players involved likely represent key targets for both therapeutic and vaccine-based strategies to block parasite development.

Marie-Ève Tremblay, PhD, Université Laval

Microglial relationships with synaptic elements in Alzheimer's disease

A series of recent discoveries have challenged our view of microglia, the brain immune cells, showing unexpected roles in the active maintenance of neuronal circuits throughout the lifespan. This project aims at exploring the relevance of these new roles in Alzheimer's disease, the most common cause of dementia affecting over 35 million people worldwide. State-of-the-art imaging of microglial interactions with neuronal circuits will be performed throughout disease progression and pharmacological treatment. This work will provide better understanding of the learning and memory deficits in Alzheimer's disease, fundamental insights into the possible implication of microglia, and new data to help evaluate the brain's response to a variety of therapeutic approaches.

Grants Approved for Funding 2014-15

Benoît Arsenault, PhD, Université Laval

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

Yannick Doyon, PhD, Université Laval

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

Jennifer Heisz, PhD, McMaster University

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

Jeffrey Leyton, PhD, Université de Sherbrooke

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

Ewa Niechwiej-Szwedo, PhD, University of Waterloo

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

Emanuel Rosonina, PhD, York University

Regulation of transcription and splicing factors by sumoylation

1945 From the archives—JKW Ferguson

The Banting Research Foundation funded the research of James Kenneth Wallace (Ken) Ferguson, MD, from 1945 to 1955, during the time he chaired the Department of Pharmacology at the University of Toronto, for various studies on oxytocin, thyroxine, and antithyrotropic compounds.

In 1941, Dr Ferguson discovered the oxytocin hormonal reflex in childbirth (the Ferguson reflex). During World War II, he developed, with Dr Edward C Black, the first oxygen mask for pilots that did not freeze up at high altitudes. For this he and Black were awarded the Member of the British Empire (MBE) in 1945. He also developed, with Dr Gordon Bell, citrated calcium carbimide (Temposil) as a treatment for alcohol addiction.

Director of Connaught Laboratories from 1955 to 1972, he oversaw the development and production of polio vaccine, as well as the production of vaccines against measles, rubella, whooping cough and smallpox.

Impact of Our Funding

2013 grantee Dave Richard identifies a key target for malaria prevention and treatment

Dave Richard, PhD, reported that with the funds provided by his Banting Research Foundation grant his team was able to identify and characterize a protein involved in the generation of specific parts of the malarial parasite cell. This is a critical step in developing vaccines and new medications for malaria. The article published on this work will be his laboratory's first on their malaria cell biology work. In addition, this data was critical in his obtaining a 5-year operating grant from the Canadian Institutes for Health Research.

"Extensive preliminary data is now required to have any chance of being successful at the open operating grant competitions of major Canadian funding bodies. As a new investigator, I had access to very limited funds to generate these precious data, so the support I got from the Banting Research Foundation was extremely important for my laboratory."

1983 grantee Brenda Gallie appointed to the Order of Canada

In December 2014 it was announced that Brenda Gallie, MD, world-renowned ophthalmologist at The Hospital for Sick Children, would receive the distinction of Member of the Order of Canada. Dr Gallie was recognized for her contributions to the prevention, diagnosis and treatment of retinoblastoma, a childhood eye cancer.

Dr Gallie received a Banting Research Foundation grant in 1983, shortly after she was appointed assistant professor of ophthalmology at the University of Toronto. "The Banting Research Foundation grant, '*The mutations of retinoblastoma*,' set the stage for my team to first characterize the major mechanism by which tumor suppressor genes lose their ability to suppress cancer. It empowered a wonderful time for students, colleagues, and me, and for the families around the world affected by retinoblastoma. Thank you." Her highly sensitive test for retinoblastoma mutations is now used across Canada and around the world.

Dr Gallie's grandfather, William E Gallie, MD, was one of the founding trustees of the Banting Research Foundation in 1925.

[For more on this and other stories, please see our website.](#)

BALANCE SHEET

As at June 30

	2014	2013
	\$	\$
ASSETS		
Cash	76,758	68,840
HST recoverable	7,784	4,761
Investments, at fair value	4,168,804	3,777,743
	4,253,346	3,851,344
LIABILITIES AND FUND BALANCES		
Liabilities		
Accounts payable and accrued liabilities	22,360	36,085
Fund balances		
General	708,558	331,069
Restricted	—	108,229
Endowment	3,522,428	3,375,961
Total fund balances	4,230,986	3,815,259
	4,253,346	3,851,344

CONDENSED STATEMENT OF REVENUE AND EXPENSES AND CHANGES IN FUND BALANCES

Year ended June 30

	2014	2013
	\$	\$
REVENUE		
Investment income (loss), net	546,538	430,081
Donations	46,166	107,000
Grants returned	—	20,000
	592,704	557,081
EXPENSES		
Grants awarded to new investigators	104,946	99,860
Grants awarded to University of Toronto for Banting and Best Department of Medical Research	—	40,000
Other grants	7,500	5,000
Professional fees	37,403	37,158
Office, general and administrative	16,364	13,165
Accounting and audit fees	10,764	10,364
	176,977	205,547
Excess (deficiency) of revenue over expenses for the year	415,727	351,534
Fund balances, beginning of year	3,815,259	3,463,725
Fund balances, end of year	4,230,986	3,815,259

This summarized financial information is derived from financial statements that were audited by Ernst & Young LLP, Chartered Accountants. Complete financial statements are available upon request.

Donors, Partners and Sponsors

The Banting Research Foundation was established in 1925 to fund medical research. For many years it was the only organization in Canada that supported medical research throughout the country.

From its endowments and donations, the Foundation is currently able to fund only about 20% of applications received from new investigators during its annual grant competition. As a consequence, many meritorious proposals simply cannot be funded.

In order to support a higher proportion of applicants, The Foundation welcomes new joint initiatives and donations from individual and corporate sponsors. Receipts for income tax purposes will be issued. 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.

The Banting Research Foundation gratefully acknowledges donations from the following individuals and corporations during the 2014 fiscal year:

Mr Cecil Hawkins

ONTARIO FEIsters

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.



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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