

FY 2020

Annual Report

July 2019 - June 2020

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Banting
Research
Foundation**

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2021: The 100th Anniversary
of the Discovery of Insulin

Chair's Message

Never before in our lifetimes have scientific research and innovation been more important across the globe.



This means that our Foundation is a beacon of hope in its support of the brightest young scientific minds in Canada as they launch their careers. To support our mission, we are reaching out to donors.

The first part of our 2019-20 year saw generous support from the Jarislowsky Foundation for three new Discovery Awards for two years. In addition, the McLean Foundation, the J.P. Bickell Foundation, and the Ontario Regional Center of the Canadian Statistical Sciences Institute (CANSSI) are supporting new Awards.

We received over 62 applications from 9 provinces for the 2019-20 competition from amazing young scientists across the country, many more than we could fund. This underscores the urgency to increase the number of awards and ideally, their monetary value. When COVID hit, the Foundation fully entered the virtual world.

Many thanks to Cindi Morshead and the Grant Review Panel who quickly adapted and held a successful virtual annual adjudication of the Discovery Award applications. We know that some of our Awardees have experienced delays in completing their projects because of the temporary lab closures. The Foundation anticipated the

-delay and will publish the end of project progress reports for 2019-20 as soon as they are available.

We were sorry to say goodbye to Tavia Caplan at the end of March, our Executive Director for the last two years, who was recruited to an important hospital management position to fight the pandemic.

The Foundation welcomed our new Executive Director, Maurine Kwok, who has joined us with many years of experience in senior academic, public and private sector management. With Maurine's expert leadership we are entering a new era of advancement to grow and sustain the Foundation for the next 100 years.

Thanks to all of our volunteers and donors for building on the Banting legacy, and for supporting young health and biomedical researchers in their quest to catalyze discovery and improve the health of all Canadians.

Sincerely,

Catharine Whiteside
Chair, Banting Research Foundation Board

Donors, Partners and Sponsors

The Banting Research Foundation was established in 1925 to fund biomedical research innovation. Income from its endowment, interest and new donations has now funded 1,341 awards.

To ensure that every opportunity to support innovative scientific discovery is achieved, we are working hard to increase our funding capacity to support more young scientists. Since 2017, we have more than doubled our annual revenue from donations thanks to generous contributions from individuals, foundations and partnerships with other small health organizations. Still, in 2020 alone, 10 deserving high-potential applications were left unfunded.

Your contribution will go a long way to help launch the careers of our young scientists whose research promises to have major impacts on improving health.

In addition, we are also interested in providing opportunities for sponsors who wish to partner with the Foundation targeting research in a specific health or biomedical field.

These generous donations support innovative health and biomedical research projects by outstanding early-career investigators.

Many thanks to the University of Toronto Faculty of Medicine for the in-kind contribution of our office space.

We invite you to donate online at
bantingresearchfoundation.ca/donate

The Banting Research Foundation gratefully acknowledges donations from the following individuals and foundations during the 2020 fiscal year:

\$10,000 and above

Donald A. Guloien and Irene A. Boychuk

Ontario Regional Center of the Canadian Statistical Sciences Institute (CANSSI)

The J.P. Bickell Foundation

The Jarislowsky Foundation

The Henry White Kinnear Foundation

The William and Nona MacDonald Heaslip Foundation

The McLean Foundation

\$1,000 and above

John Burnes

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William E. Hewitt

Catharine Whiteside

Up to \$100

Anonymous

Roy Kendall

Paypal Foundation

Louise Levitt

David Weiss

Bryon Bellows

J. Keith Stokes

Charitable registration number:
108072927 RR 0001

The Discovery Award Big Picture

**Funding for our Discovery Award Program
has not faltered during the pandemic.**

**We are pleased that the Banting Foundation
has maintained Discovery funding at
previous levels.**

**In fact, we anticipate an increase in fiscal
year 2021 as we press on with our strategic
partnerships.**

Discovery Award Recipients:

Research in-progress

2018

The Banting Foundation had an unusual year in 2018 and was able to fund a total of nine projects. We reported the exciting ground breaking results of the eight projects in our 2019 Annual Report.

The work on an automated brain mapping system by Professor Dylan Cooke is delayed.



Dylan Cooke, PhD

Department of Biomedical Physiology
and Kinesiology, Simon Fraser University

We have shifted to a new direction to include clinical stroke data. In addition, we are collaborating with the UC Berkeley and UC Davis teams, doing real-time analysis on a bat brain mapping experiment – this data collection is focused on a tiny but crucial part of the bat's brain that controls vocalizations.

Our long term goal remains to understand how individual variation in brains affects behaviour and how it can be used to improve treatment for and even prevent disability resulting from neurological injuries like stroke.

This work will ultimately be used to answer questions such as: Are “natural athletes” aided-by specific natural variations in the ways that brains control muscles?

Project extended to June 2021.

***The pandemic has not
stopped our research.***

2019

Unsurprisingly, the pandemic has upset the plans most of our young investigators in completing their bold new research by June 2020.

With limited time in the lab, their teams could not run all of the necessary experiments and collect data within the original timelines. The following provides an update on their projects indicating the expected time to completion, after which the Foundation will receive a final report.

Negative Affect and Reward Processing in Individuals with Binge Eating

Lindsay Bodell, PhD

Department of Psychology
Western University

My research project investigates the influence of negative mood states on motivation to eat in individuals who binge eat.

In August 2019, we finalized the coding/development of our behavioural task being used in the study and submitted our ethics application to Western University's Research Ethics Board.

We began recruiting study participants and running the study toward the beginning of 2020. We were making our recruitment goals at the start of the study, until the beginning of my maternity leave and the COVID-19 pandemic.

Unfortunately, all in-person research activities at Western were halted because of the pandemic in March, and I have not resumed recruitment since this time.



I returned to work from my leave in October 2020, and am in the process of developing a COVID-safety protocol for my study in the hopes of being able to re-start study recruitment in January 2021.

Thus far, funds have been used for subject fees (compensation) for participants who have completed the study as well as to provide a partial stipend for one of my graduate students.

Project extended to December 2021.

2019

Intersections of Weight Stigma in New Brunswick

Andrea Bombak, PhD

Department of Sociology
University of New Brunswick

My team pivoted to online/phone interviews this summer and a modified form of participant observation.

We were largely successful in this transition and were able to recruit a sufficient number of participants. We are finishing our last interview this month and have been conducting on-going analysis.

We know people facing multiple forms of stigma report worse health than those facing fewer stigmas.

We know that weight stigma is:

- Damaging to health.
- Affects people of different gender, race, and class groups differently, and
- Motivates different coping behaviours among different groups.

Bombak Lab Team (2019)



Other forms of stigma might interact with weight stigma and further affect health.

The intent of our study was to understand how New Brunswickers experience weight stigma and other stigmas to deliver culturally safe care, social programming, and improve spaces.

We have completed approximately 100 interviews (two interviews per participant) and concomitant participant observation among higher-weight adults among the following subsamples: older adults New Brunswickers, low-income New Brunswickers, Francophone New Brunswickers, sexual and/or gender minority New Brunswickers, and newcomer to Canada New Brunswickers.

Preliminary analyses of these interviews are revealing how diverse New Brunswickers cope with stigma and recommendations for ensuring an inclusive New Brunswick.

The project has provided employment and research experience for 7 UNB students and recent alumni.





Dietary Patterns and Food Policies: Measuring the Impact on Health

Mahsa Jessri, PhD

Department of Food, Nutrition, and Health
University of British Columbia

I am an epidemiologist so my students work primarily in the Research Data Centre of Statistics Canada.

The Centre was closed from March to September and even now it is working with minimal hours, allowing only 6 hours maximum per week of access. This has caused massive delays in progress of my students. I still have part of the plans proposed in Banting on pause (hoping to start in January 2021).

Despite the growing number of studies in the field of human nutrition, the prevalence of diet-related non-communicable chronic diseases (NCDs) increases every year worldwide.

Recently, it has been suggested that the failure to halt this burden is due to research focus on the effect of single foods/nutrients, while overall dietary patterns are more relevant to the real world.

Dietary pattern modelling and linkage with health outcomes is an essential first step towards development of dietary strategies and guidelines with the potential to reduce NCDs.

This project will address the following objectives:

- Estimate current and future (to 2025) population burden of mortality, cardiovascular disease and diabetes attributable to unhealthy dietary patterns.
- To predict the health impact of different dietary patterns and nutrition policies (i.e., changes in food supply and nutrition labelling) that could be adopted to effectively improve health.
- Reverse engineer culturally-relevant dietary patterns that provide the greatest health benefits among subgroups.

This research fills a critical gap regarding the impact of dietary patterns on health outcomes in Canada.

Estimates of future health burden from different dietary patterns will be an invaluable national resource, enabling timely and targeted planning, population-based interventions and focused education campaigns.

Project extended to June 2021.

2019

Deciphering the Epigenetic Regulation of Alternative Splicing in Neurons

Benoit Laurent, PhD

Department of Biochemistry
Université de Sherbrooke

Dr. Benoit Laurent is currently assistant professor in the Biochemistry Department of the Université de Sherbrooke (Québec).

He received the Banting Research Foundation Discovery Award in 2019 for his project on the molecular mechanisms involved in the birth of new neurons, a process called neurogenesis.

More specifically, this award gave him the opportunity to shed light on how the GATA3/LSD1 complex regulates RNA alternative splicing in neurons.

Laurent Lab Team (2019)



The funding of this project helped him to:

- Further develop new research directions on the biology of brain aging, but also to
- Build his newly established lab, which now consists of seven young scientists.

Since receiving this award, Professor Laurent received a CIHR operating grant (2019-2024) to support his overall research program which strives to translate basic science discoveries to novel therapeutic treatments for neurodegenerative diseases.

Project completed in August 2020.

2019

Characterization of the Workplace Food Environment in Montreal Canada: New Directions for Gene-Environment Interaction and Health Research

Daiva Nielsen, PhD

Department of Human Nutrition
McGill University

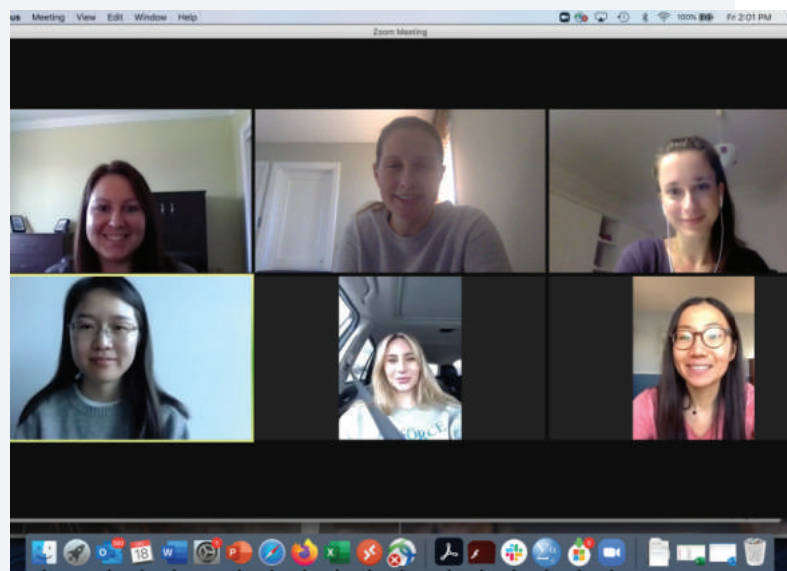
The retail food environment is implicated in chronic disease risk, but results of previous studies have been conflicting.

Individual characteristics, including genetic susceptibility to chronic diseases and sensitivity to marketing strategies, may be important to consider when studying relationships between the retail food environment, diet, and health.

Professor Nielsen's lab has geographically and temporally linked a Quebec biobank (CARTaGENE) with data on the provincial retail food environment.

The biobank contains data on participant genetics, lifestyle, dietary intake, and anthropometric measurements (including body mass index (BMI), waist circumference, and body composition), while the retail food environment data contains information on food prices, products, and promotion for grocery stores, mass merchandisers, and convenience stores.

Nielsen Lab Team (2020)



*Using this linked data, the Nielsen lab recently demonstrated significant relationships between genetic susceptibility to obesity, exposures in the retail food environment, and obesity-related outcomes including BMI, waist circumference, and percentage of body fat (Han et al. *Nutrients* 2020;12(11):3349).*

The relationship between genetic susceptibility to obesity and waist circumference was significantly strengthened when retail food environment exposures were more unhealthful and, conversely, the relationships with obesity-related outcomes were attenuated when retail food environment exposures were more healthful. Prices of high vs. low energy dense foods represented a notable finding of interest.

The results suggest that less healthful retail food environments may accentuate genetic susceptibility to obesity.

2019

Investigating the Role of Heterochromatin Readers in Genome Stability

Arneet Saltzman, PhD

Department of Cell and System Biology
University of Toronto

This grant was supported by the University of Toronto McLaughlin Centre.

I want to express my gratitude to the Banting Foundation for the Discovery Award - these funds have really helped me to get things started in my lab!

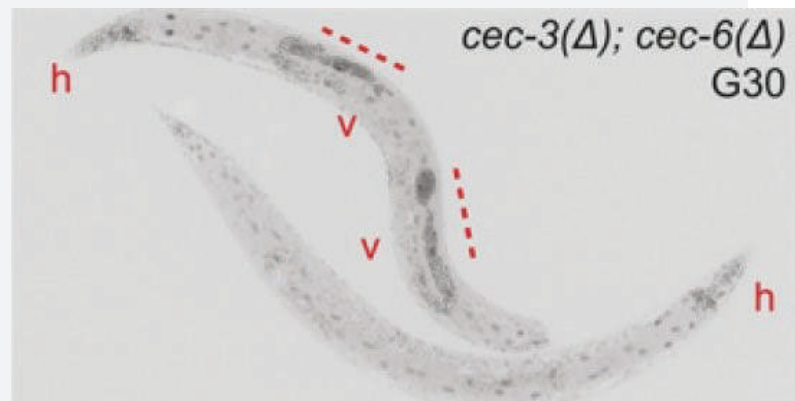
The pandemic certainly interrupted our experiments and progress, but we are starting to recover now.

Mechanisms that preserve germ cell fate and genome stability safeguard the germ cell lineage over generations, thus ensuring the 'immortality' of the germline.

The main goal of our project is to understand the roles of heterochromatin binding proteins in maintaining germline immortality.

To this end, we use the model nematode *C. elegans* and focus on two genes encoding proteins that recognize histone modifications associated with heterochromatin.

Through our Discovery Award-funded research, we found that these heterochromatin binding proteins:



- Contribute to the regulation of repetitive transgenes, which are models for understanding the silencing of endogenous repeat sequences of the genome.
- Show elevated repeat instability based on a frame-shift reporter, and
- Disrupt germ granules, which organizing centers for RNA regulation and maintenance of germ cell fate.

Together, these phenotypes suggest that these heterochromatin binding proteins act at the intersection of chromatin and small RNA-mediated silencing in the germline, and set the stage for more detailed mechanistic studies.

The Discovery Award also helped us to recently publish a review on the functions of chromatin binding proteins (Das Gupta et al. 2020 Frontiers in Cell and Developmental Biology).

Project extended to April 2021.

2019



Sensory Feedback in Dystonia

Nicholas Strzalkowski, PhD

Department of Biology
Mount Royal University

This Discovery Award was supported in part by Dystonia Medical Research Foundation Canada.

It isn't clear when data collection will be able to resume. I am very committed to carrying on with this area of research and this funding has been very motivating.

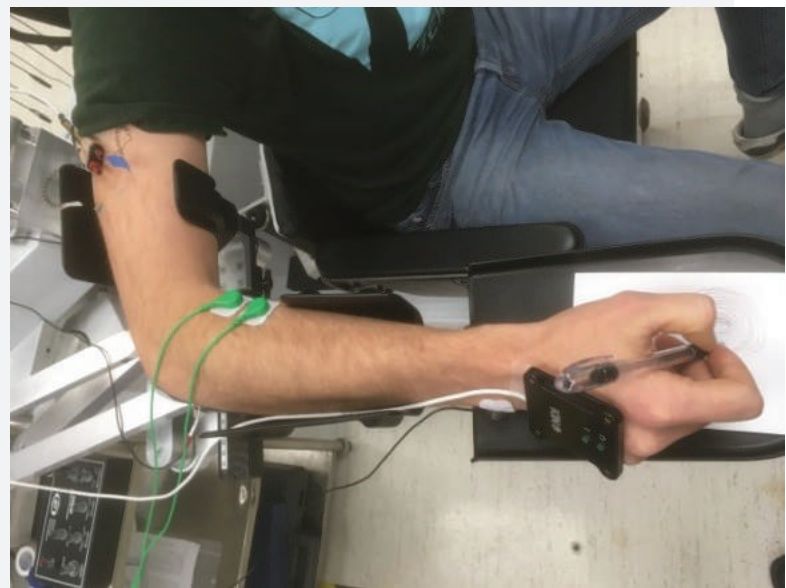
This work is in collaboration with Dr. Ryan Peters, an Assistant Professor at the University of Calgary. All the data collection is taking place in his laboratory (thanks to equipment purchased with the Discovery Grant funding).

We were able to conduct a number of pilot experiments before COVID struck, but I do

-not have a lot to report at this point. Over the past year, the Banting Discovery Grant has helped to initiate valuable research collaborations between Mount Royal University and the University of Calgary.

In addition to facilitating the funded project, these collaborations will lead to future research and training opportunities for students.

Our interdisciplinary team is combining basic science and clinical approaches to explore sensory feedback in idiopathic dystonia (a movement disorder) and healthy controls.



Micro Vibration and Spiral experimental setup

Our goal is to better understand the role of muscle sensory feedback in producing involuntary dystonic muscle contractions, and how botulinum toxin (Botox), a common treatment for dystonia, may influence this feedback.

Covid-19 has delayed data collection, but we have been able to test and refine the methods. We hope this pause and refinement will allow us to hit the ground running once data collection resumes.

Project extended to September 2021.

2020

These exciting new projects have been funded to commence in July 2020. Delays are expected as our investigators will continue to make adjustments to their research operations as they monitor the evolution and impact of the coronavirus.

Understanding the Effects of Treatment to Prevent Brain Injury in Premature Babies

Lindsay Cahill, PhD

Department of Chemistry
Memorial University of Newfoundland

One of the most common pregnancy complications is giving birth too early.

In Canada, 8% of babies are born premature and while survival rates have improved dramatically, the risk of severe disability from brain injury remains high. When a mother is at risk of premature birth, she is usually given a magnesium sulphate treatment to protect the baby's brain.

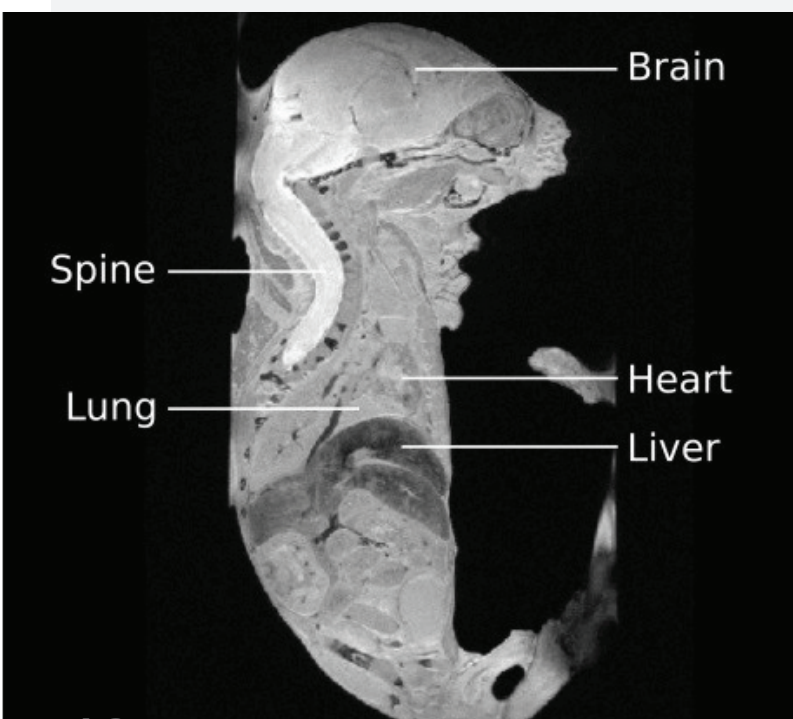


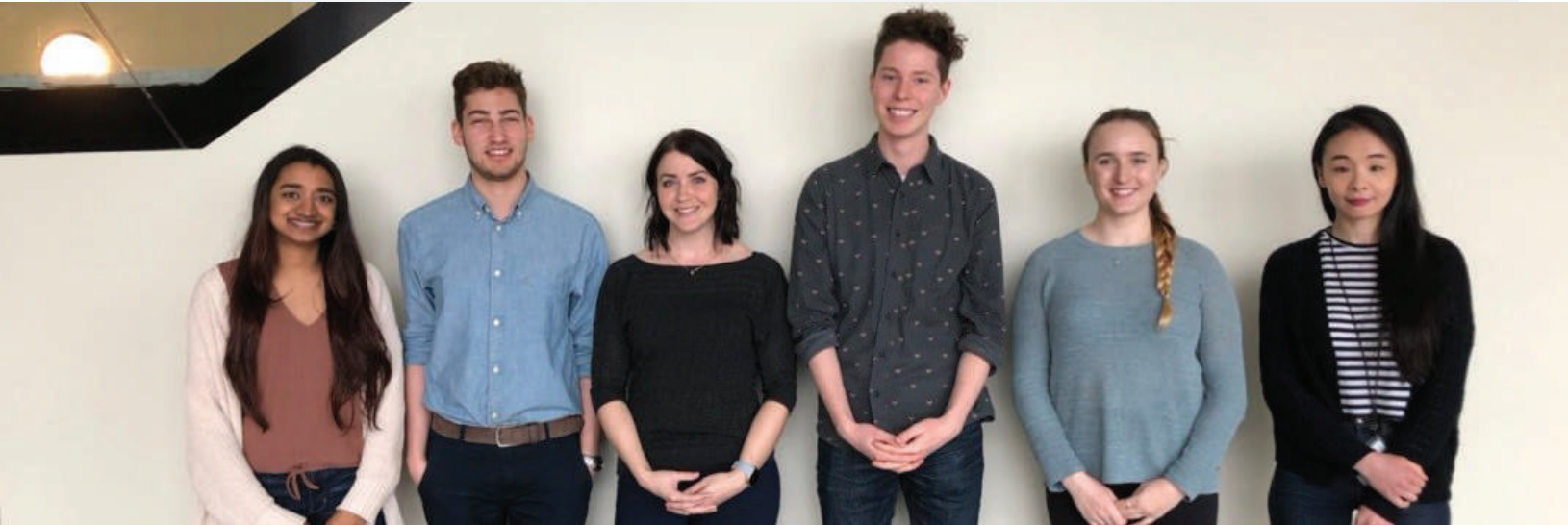
There is conflicting evidence about the efficacy of this treatment and how it works.

One possible explanation is that only a subset of premature babies benefit from treatment.

We will:

- Look at how magnesium sulphate works by using experimental mice that mimic different causes of premature birth.
- Make use of magnetic resonance to study how chemicals in the brain change with treatment, and
- Look at whether the gender of the baby and/or the cause of the early birth should be considered, when making decisions about treatment.





Harnessing Cell-Surface Glyco-Engineering to Enhance Stem-Cell Therapies

Chantelle Capicciotti, PhD

Departments of Chemistry & Biomedical & Molecular Sciences, School of Medicine - Queen's University
Recipient of the McLean Foundation – Banting Discovery Award 2020

Stem cell therapies are promising treatments for various infections and diseases.

To be effective, stem cells must be delivered to specific tissue such as bone marrow. Unfortunately, many stem cells lack the required carbohydrates (known as glycans) on their surface to be efficiently directed to bone marrow.

Scientists also do not understand how glycans bind to a protein called E-selectin, which helps direct cells to a particular target (like bone marrow).

In this project, we will:

- Use new chemical biology approaches to display the glycan structures on cells, to discover which ones bind to E-selectin
- Determine which glycan structures are involved in the first step in cell-delivery to bone

This will help us engineer stem cells with new functions to improve their delivery to bone marrow, and make stem cell therapies more effective.

Heat Waves and Child Health in a Warming World

Kate Weinberger, PhD

School of Population and Public Health
University of British Columbia

*Recipient of the J.P. Bickell Foundation
– Banting Discovery Award 2020*

Major heat waves have resulted in large, immediate increases in illnesses and deaths.

For example, in Vancouver, a 2009 heat wave led to more than 100 deaths over a period of several days.

Children are particularly vulnerable to heat waves, but few studies have focused specifically on younger populations.

We will:

- Examine the relationship between heat waves and child health in a large number of communities across Canada, and
- Identify what characteristics of children and/or the neighbourhoods they live in make them vulnerable to hot weather

This research is critical as heat waves are expected to become more frequent and intense in the future, as temperatures rise due to climate change.



Not just coronavirus — heat also poses a threat to public health this summer

2020

Membrane Re-modelling as an Antiviral Target for Coronaviruses

Che Colpitts, PhD

Department of Biomedical and Molecular Sciences, School of Medicine
Queen's University

*Recipient of the Jarislowsky Foundation
– Banting Discovery Award 2020*

Coronavirus has underscored the severe health and societal impact of emerging viruses.

To mitigate this global health threat:

- We will identify new treatment strategies for these viruses by targeting conserved aspects of their replication cycles

Coronaviruses, like other similar viruses, remodel cellular lipid membranes to form membranous 'forts' that are necessary to support and protect viral replication in cells.

- We will characterize how coronaviruses manipulate the cellular environment to build these membranous forts, and
- Use this knowledge to identify novel antiviral strategies targeting conserved aspects of viral-induced membrane remodeling

Such antivirals are expected to have pan-coronavirus activities and thus would be useful for rapid treatment of emerging coronaviruses, including those yet to emerge.

Colpitts Research Team



2020

Combatting Fungal Infections through the Discovery and Mechanistic Elucidation of Novel Anti-virulence Strategies

Jennifer Geddes-McAlister, PhD

Department of Molecular and Cellular Biology
University of Guelph

*Recipient of the Jarislowsky Foundation
– Banting Discovery Award 2020*

Fungal pathogens are emerging as critical threats to global health, with over 300 million people affected by serious fungal diseases worldwide.

In Canada, pathogenic fungi are a growing public health concern with the evolution of drug-resistant strains and the emergence of new pathogens.

The treatment of fungal infections is challenging given similarities of drug targets in the human host, the requirement for prolonged treatment regimens, and a limited selection of clinically-effective, non-toxic, anti-fungal agents.

We will:

- Define how fungal pathogens interact with the host, and
- Understand why the host is unable to clear infection.
- We also aim to identify new strategies to perturb the interaction between pathogen and host to reduce our reliance on current antifungals for treatment options.

This information will provide new insight into how fungi cause disease, and the mechanisms used to evade the immune response.

McAlister-Geddes Lab (pandemic style)



2020

Premature Aging of Blood Vessels in Eye Diseases

Malika Oubaha, PhD

Department of Biological Sciences
University of Quebec at Montreal

*Recipient of the Jarislowsky Foundation
– Banting Discovery Award 2020*

Quality of life is adversely affected by visual impairment or loss of sight – commonly caused by retinal vascular diseases. We have recently discovered premature aging in blood vessels during retinopathy.

- We aim to identify the molecular and cellular mechanisms by which premature aging modulates blood vessel identity in the eye.
- Documenting this process is expected to improve the diagnosis, prognosis, and treatment of visual disorders associated with vascular abnormalities.
- To identify the molecular signatures that direct vascular cell identity specification during blood vessel growth, will enable the design of new strategies to prevent and treat eye diseases.

Our research project meets an important need – to prevent vision loss and restore sight to people living with blinding diseases.



2020



Stepping Out of the Lab: New Methods to Translate Movement Analyses into the Real-World with Wearable Sensors

Dylan Kobsar, PhD

Department of Kinesiology
McMaster University

Recipient of the CANSSI Ontario – Banting Discovery Award 2020 in Data Science

Osteoarthritis is a degenerative joint disease characterized by the loss of cartilage and change in bone – resulting in pain, disability, and a reduced quality of life for millions of Canadians.

Wearable sensors offer the opportunity to measure detailed information on human movement and can be useful in treating osteoarthritis and improving quality of life.

Unfortunately, wearable sensors have failed to realize their full potential in real-world settings due to the difficulty in processing and interpreting the large amounts of movement data recorded in daily life.

- We will develop new and innovative computational methodologies to streamline the analysis and interpretation of human movement.

The findings from this research will support the future integration of wearable sensors into research and clinical settings, to improve how we manage osteoarthritis.

Virtual Gala

Virtual Gala - November 12th 2020

Our first Catalyzing Discovery Virtual Gala in almost 100 years was a great success! Select Discovery Award recipients presented updates on their research work. Gala guests had a chance to meet, ask questions, and find out more about the impact the work is having on improving health.



STATEMENT OF FINANCIAL POSITION

As at June 30

	2020	2019
	\$	\$
Assets		
Cash and cash equivalents	24,384	37,235
HST recoverable	5,453	5,394
Investments, at fair value	4,744,283	4,729,501
Artwork	60,000	60,000
	<u>4,834,120</u>	<u>4,832,130</u>
Liabilities and Fund Balances		
Liabilities		
Accounts payable and accrued liabilities	22,619	7,882
Total Liabilities	<u>22,619</u>	<u>7,882</u>
Fund balances		
General Fund	687,342	792,947
Restricted Fund	112,500	37,500
Endowment Fund	4,011,659	3,993,801
Total Fund Balances	<u>4,811,501</u>	<u>4,824,248</u>
	<u>4,834,120</u>	<u>4,832,130</u>

The Statement of Financial Position is an excerpt of the audited financial statements by Ernst & Young, LLP, Chartered Professional Accountants. A complete version of the 2020 financial statements is available upon request.

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

Year ended June 30

	2020	2019
	\$	\$
REVENUE		
Investment income, net	122,720	281,446
Donations	116,727	106,273
	<u>239,447</u>	<u>387,719</u>
EXPENSES		
Grants awarded to new investigators	164,152	225,000
Academic grants	7,500	7,500
Professional fees	57,790	57,087
Office, general and administrative	10,973	12,879
Accounting and audit fees	11,779	11,303
	<u>252,194</u>	<u>313,769</u>
Excess (deficiency) of revenue over expenses for the year	(12,747)	73,950
Fund Balances, beginning of year	4,824,248	4,750,298
Fund Balances, end of year	<u>4,811,501</u>	<u>4,824,248</u>

The Condensed Statement is an excerpt of the audited financial statements by Ernst & Young, LLP, Chartered Professional Accountants. A complete version of the 2020 financial statements is available upon request.

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Professor, Department of Biochemistry, University of Toronto
Chair, Royal Canadian Institute of Science

Ex Officio

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Chair, Banting Research Foundation Scientific Review Panel
Professor and Chair, Division of Anatomy, Department of Surgery, and Scientist in The Donnelly
Centre for Cellular and Biomolecular Research and Toronto Rehabilitation Institute (KITE)

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John G. Ambrose (1994-2000)

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John H. Watson (1987-1990)

Elizabeth H. Pearce (1981-1987)

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Assistant Professor

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and Evaluation
University of Toronto

2021: The 100th Anniversary of the Discovery of Insulin

Events line-up

Celebrating a Century of Health Innovation at the University of Toronto
insulin100.utoronto.ca

Walk in the Footsteps of Banting Event - 3D, 360 degree Virtual Tour
bantinglegacy.ca/virtual-tour

Insulin to Innovation
insulintoinnovation.ca



The Banting Research Foundation