



Banting & Best Diabetes Centre
UNIVERSITY OF TORONTO

Banting & Best Diabetes Centre

Annual Report | July 2022 - June 2023



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Who We Are

The BBDC was established in 1978 as an extra-departmental unit of the Faculty of Medicine, University of Toronto with the primary objective of advancing diabetes research, education, and patient care.

We offer several grants, studentships, fellowships, and other support for qualified individuals involved in diabetes research or quality improvement at the University of Toronto and its affiliated hospitals and research institutes across the city including SickKids, Mount Sinai Hospital, University Health Network, Sunnybrook Health Sciences Centre, St. Michael's Hospital, Women's College Hospital, Centre for Addiction and Mental Health and many other community affiliated sites.

We host scientific conferences to facilitate the exchange of scientific information and ideas, and to assist in the development of collaborative diabetes research activities both locally and internationally. We foster and develop continuing health education and quality improvement initiatives for all members of the diabetes health care team with the aim of providing a tangible impact for people living with diabetes.

Our members are a network of over 200 faculty and health care providers involved in diabetes research, education or care from various departments at the University of Toronto and its affiliated hospitals and research institutes.

Our Vision

As a centre of excellence for innovation in diabetes research, education, and clinical care, we will tangibly impact diabetes prevention and outcomes in Canada and globally.

Our Mission

We bring together researchers and health professionals across multiple University of Toronto affiliated disciplines and institutes to:

Lead discoveries in patient-oriented and fundamental research in diabetes

Develop novel treatment paths to cure diabetes or prevent its complications

Identify innovative ways to manage diabetes and improve the lives of those living with the condition

Director's Report

What an incredible experience my first year as Director of the BBDC has been!

So much of what BBDC members value about our network is the personal connection and the opportunities to discuss ideas over coffee or meals—and we were able to resume doing that this past year! As pandemic restrictions started to ease, we very cautiously made the bold decision to return to in-person Trainee Lab Seminars with all the mandated safety precautions. Finally, our trainees had the opportunity to do away with yet another ‘Can you see my slides?’, and hearing ‘You’re muted’, then giving their nerve-wracking presentation into the abyss. It was nice to see seasoned postdoctoral fellows graciously hosting the sessions, and PIs and trainees alike asking astute questions and having great discussions over lunch.

Similarly, the BBDC Seminar Series transitioned to hybrid delivery. While many attendees continued to follow the lecture over Zoom, the in-person discussions with the invited speakers were much appreciated and valued, particularly for the faculty and trainees who had the chance to talk science face-to-face. Some things just cannot be captured over Zoom!

With the lifting of pandemic restrictions I had the honour, on behalf of the BBDC, to unveil the plaque to commemorate the 2021 Canada Hall of Fame award given to the co-discoverers of insulin, Banting, Best, Collip, and MacLeod. There, I had the chance to meet and chat with Melinda Best, the granddaughter of Charles Best. It was surreal to listen to her talk about her grandfather and the pride that she continues to carry. She also recalled the tragic early death of Sir Fredrick Banting and told the story of Lady Henrietta Elizabeth Banting, a practicing physician and



Minna Woo, MD, FRCPC, PhD

Director, Banting & Best Diabetes Centre
Professor, Departments of Medicine and
Immunology, University of Toronto

Director of the Cancer Detection Clinic at Women's College Hospital. Lady Banting was a force behind Early Mammography Research. It was a surprise to realize I had never heard about the important contribution to medicine Lady Banting had made. The irony of how this was overshadowed by her Nobel laureate husband was not lost on me, nor was the understanding that he may also have helped propel her passion and career at a time when women leaders in science were, at best, scarce.

The real highlight of this past year was the BBDC's annual Scientific Day, which resumed at our traditional Old Mill location. The excitement of reconnecting after so many years of pause was truly palpable. The turnout was spectacular, and the entire day was a complete success that encapsulated what the BBDC represents. The opening sessions given by our trainees and young faculty highlighted the bright future of our diabetes research community in Toronto. It also showcased the wide-ranging fields with which

diabetes intersects, from mental health to frailty and aging to bioengineering and tissue stiffness. These outstanding presentations left me with sense of pride and excitement about what the Toronto scientific community has to offer to the world.

Indeed, the University of Toronto has just been ranked the third highest in health sciences research output by [Nature](#).

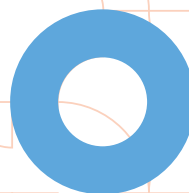
At the same time, the grim ways diabetes overlaps with the many other areas of medicine our Scientific Day speakers are working in left me with a heavy heart and highlighted the need to work and innovate harder to find improvements and, one day, a cure for this devastating condition. We ended the day with a wonderful Charles Hollenberg Memorial Lecture by Laurie Goodyear, and the award ceremony for our trainee posters which were judged by Rosalind Mott, Senior Scientific Editor of Cell Metabolism. It was truly a perfect day!

Our [5th Annual PMCC/BBDC Cardiovascular-Diabetes Symposium](#) was another success. This virtual event was also well-attended by our clinical colleagues, along with notable regional and national faculty. Speakers highlighted the challenges around providing diabetes care to vulnerable populations who are often affected by socioeconomic factors. The event made clear that our community has to be aware of cultural and ethnic considerations in treating people with diabetes. This is especially true in cities like Toronto, one of the most ethnically diverse on the planet. Again, the mix of incredible advancements in treatments around diabetes in the face of unprecedented challenges in diabetes care was a recurring theme and impetus to further innovate.

The [Diabetes Team of the Year Award for 2022](#) was presented to The Hospital for Sick Children. The paediatric population was hit hard this past year with the pandemic, with youth living with diabetes being particularly vulnerable. We thank the diabetes team at SickKids for their continued support for this special group.

To broaden the BBDC scope, we also developed an exciting new initiative through partnership with the Korea Association of Medical Colleges (KAMC) to launch the BBDC-KAMC Scientist Training program. A memorandum of understanding has been signed by KAMC and the Dean of the University of Toronto's Temerty Faculty of Medicine to fully support and acknowledge this partnership, which will promote international collaboration between BBDC Scientists and KAMC's academic research institutes throughout South Korea. As part of this partnership, KAMC will provide up to \$120,000 USD for an initial 12 to 18 months to support trainees from Korea to obtain research training in a host BBDC laboratory. Scientist trainees at all levels (graduate, postgraduate or early faculty) in a clinical or fundamental research track are eligible.

Lastly, I would like to thank all of the Centre's administrative support team members, our committees, the Executive, the Associate Director of Research, Tony Lam, and QUEST program leader, Phillip Segal, who together help fulfill the important mission of the BBDC.



Committees



Photos: Diana Tyszko, Polina Teif

Committees (July 2022 – June 2023)

EXECUTIVE COMMITTEE

The governance structure of the BBDC consists of a Director and Executive Committee who ensure that the goals of the Centre are appropriately implemented. The Executive Committee provides leadership and representation for the University of Toronto diabetes research, education and care communities.

Director and Chair: Minna Woo

Department of Medicine, Division of Endocrinology & Metabolism, and Departments of Pharmacology, Immunology and Institute of Medical Sciences*

Andrew Advani

Department of Medicine,
Division of Endocrinology & Metabolism*

Carolyn Cummins

Faculty of Pharmacy*

Tony Lam

Departments of Medicine and Physiology*

Lorraine Lipscombe

Department of Medicine, Division of Endocrinology & Metabolism*, and Institute of Health Policy, Management and Evaluation*

Justin Nodwell

Vice Dean, Research and Health Sciences Education, Temerty Faculty of Medicine*

Bruce Perkins

Department of Medicine,
Division of Endocrinology & Metabolism*

Phillip Segal

Department of Medicine,
Division of Endocrinology & Metabolism*

Baiju Shah

Department of Medicine, Division of Endocrinology & Metabolism*, Institute of Health Policy, Management and Evaluation*

Dianne Wherrett

Department of Paediatrics*

QUALITY EDUCATION AND SAFETY (QUEST) COMMITTEE

This committee fosters and develops continuing health education and quality improvement initiatives for all members of the diabetes care team with the aim of improving the lives of people living with diabetes.

Chair: Phillip Segal

Department of Medicine,
Division of Endocrinology & Metabolism*

Leigh Caplan

Certified Diabetes Nurse Educator,
Sunnybrook Health Sciences Centre

Sandra Fitzpatrick

Regional Facilitator, Toronto Diabetes Care Connect,
South Riverdale Community Health Centre

Julie Anne Gilmour

Department of Medicine,
Division of Endocrinology & Metabolism*

Geetha Mukerji

Department of Medicine,
Division of Endocrinology & Metabolism*

Violetta Nikolova

Clinical Nurse Specialist, Mount Sinai Hospital

Monica Parry

Lawrence S. Bloomberg Faculty of Nursing*

Judy Qiang

Department of Medicine,
Division of Endocrinology & Metabolism*

Rene Wong

Department of Medicine,
Division of Endocrinology & Metabolism*

*University of Toronto

Committees (July 2022 – June 2023)

RESEARCH EXCELLENCE COMMITTEE

This committee implements the scientific review of most BBDC funding programs, develops the Annual Scientific Day program, and selects speakers for the BBDC Seminar Series.

Chair: Tony Lam

Associate Director of Research, BBDC; Departments of Medicine and Physiology*

Mahavir Agarwal

Department of Psychiatry*

Jacqueline Beaudry

Department of Nutritional Sciences*

Julie Lovshin

Department of Medicine,
Division of Endocrinology & Metabolism*

Sara Nunes Vasconcelos

Institute of Biomaterials and Biomedical Engineering*; Department of Laboratory of Medicine and Pathobiology*

Ian Rogers

Department of Obstetrics and Gynecology*

Hoon-Ki Sung

Department of Laboratory Medicine and Pathobiology*

Xiao Yu (Shirley) Wu

Leslie Dan Faculty of Pharmacy*

Darren Yuen

Department of Laboratory Medicine and Pathobiology*

TRAINEE ADVANCEMENT AND DEVELOPMENT COMMITTEE

As a subcommittee of the Training and Research Excellence Committee, this committee implements the scientific review of the Summer Studentships, Annual Trainee Awards and Trainee Travel Awards funding programs. Members are postdoctoral fellows with diverse expertise and disciplines who are either BBDC or externally funded.

Chair: Tony Lam

Associate Director of Research, BBDC; Departments of Medicine and Physiology*

HoYin Lip

(Supervisor: Shirley X.Y. Wu)

Adriana Migliorini

(Supervisor: Cristina Nostro)

Luisa Ulloa Severino

(Supervisor: Darren Yuen)

Raghunath Singh

(Supervisor: Margaret Hahn)

Majid Mufaqam Syed Abdul

(Supervisor: Gary Lewis)

Shirine Usmani

(Supervisor: Minna Woo)

Chi Kin Wong

(Supervisor: Daniel Drucker)

Song-Yang Zhang

(Supervisor: Tony Lam)

*University of Toronto

BBDC By the Numbers

We support the current and the next generation of diabetes researchers who are working toward a cure for diabetes and its complications.

Funding for Trainees Granted in 2022/2023

9	17	14	30	6
Postdoctoral Fellowships	Graduate Studentships	Summer Studentships	Trainee Travel Awards (Virtual and In-Person)	Annual Trainee Awards
<small>totalling</small>	<small>totalling</small>	<small>totalling</small>	<small>totalling</small>	<small>totalling</small>
\$317,500	\$294,215	\$45,570	\$27,287	\$1,800

Funding for Faculty and Health Professionals Granted in 2022/2023

1	1	4
Archie Sopman Diabetes Research and Education Awards	BBDC-Novo Nordisk Chair in Incretin Biology	Drucker Family Innovation Fund Grants
<small>totalling</small>	<small>totalling</small>	<small>totalling</small>
\$435	\$180,602	\$200,000

1	1
Novo Nordisk-BBDC New Investigator Award	Innovative Diabetes Quality Improvement Grant
<small>totalling</small>	<small>totalling</small>
\$90,000	\$10,000

3
Novo Nordisk-BBDC Pilot and Feasibility Grants
<small>totalling</small>
\$120,000

Total Number
of Individuals Funded

87

Total Amount Awarded

\$1,287,409

Funding Programs & Funding Decisions



Photos: Lisa Lightbourn, Daria Perevezentsev

Funding Programs and Funding Decisions

This section of our annual report provides a brief overview of the funding that we provide for diabetes research, education and care communities at the University of Toronto and its affiliated institutions. Complete details and specific eligibility requirements for each program are outlined on our website bbdc.org.

Funding Programs for Trainees

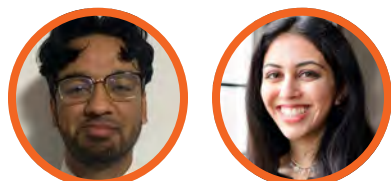
Annual Trainee Awards

The Annual Trainee Awards program is intended to showcase the best innovative and novel diabetes research being conducted by trainees at the University of Toronto, and for BBDC trainees to share their work with their colleagues in the BBDC community. The top ten abstracts are selected for poster presentations at the BBDC's Annual Scientific Day. This year's posters were co-judged by Rosalind Mott, Senior Scientific Editor of Cell Metabolism, and Julie Lovshin, Department of Medicine, University of Toronto. The prize winners receive eGift cards. The 2022/2023 prize winners are:

Prize	Recipient	Supervisor(s)	Title of Research
1st Prize	Rola Hammoud	Daniel Drucker	Gain and Loss of GIP-GIPR Signaling Modifies Gut Inflammation in Mice
2nd Prize	Safwat Tahmin Khan	Sara Nunes Vasconcelos	Elucidating the role of pancreatic islet endothelial cells in glucose homeostasis and diabetes by uncovering its transcriptomic signature
3rd Prize	Daniel Barros	Tony Lam	Small intestinal protein sensing mechanism in feeding and glucose regulation
Honourable Mention	Ji-Eun Chon	Anthony Hanley	Circulating omega-3 polyunsaturated fatty acids and adipose tissue inflammation: longitudinal analysis in the PROspective Metabolism and ISlet cell Evaluation (PROMISE) cohort
Honourable Mention	Sulayman Lyons	Jacqueline Beaudry	Stressed Out: Elucidating the cellular effects of glucocorticoids on white adipose tissue lipolysis
Honourable Mention	Lauren Pickel	Hoon-Ki Sung	The role of the Müller cell circadian clock in retinal homeostasis

Charles Hollenberg Summer Studentship Program

This program is designed to introduce undergraduate and medical students to the field of diabetes research by providing an opportunity to conduct a full-time summer research project with a BBDC scientist. Students and their supervisors participate in a weekly seminar series which include presentations by the summer students describing how their projects fit into the overall goals of their labs. All students present the results of their work at the end of the summer at a half-day mini-conference. The awards are valued at \$6,510 each (half is provided by the BBDC). The 2023 award recipients are:



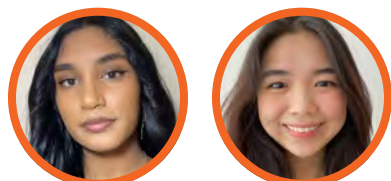
Abdul Ahad

Amna Ahmed



Krista Ariello

Serena Bansal



**Abigail Reya
Bisnauth**

Susanna Fang



Frances Ford

**Mu Hang (Henry)
Guan**



Sanchit Kaushal

Daeun Kim

Recipient	Supervisor(s)	Research Title
Abdul Ahad	Mahavir Agarwal	Is brain insulin resistance a feature of the biology of depression? A pilot multi-modality neuroimaging study in adolescents
Amna Ahmed	John Sievenpiper and Vasanti Malik	Quality Assurance Evaluation of the PortfolioDiet.app for Knowledge Translation and Mobilization in a High-Risk Community for Prevention and Management of Diabetes
Krista Ariello	Darren Yuen and Eno Hysi	Quantitative ultrasound of POCUS (point of care ultrasound) of kidneys
Serena Bansal	Mamatha Bhat	The Predictive Value of Myosteatosis on the Development of Post-Transplant Diabetes Mellitus
Abigail Reya Bisnauth	Jacqueline Beaudry	Determining the role of glucose-dependent insulinotropic polypeptide (GIP) receptor in activated brown adipose tissue on lipid uptake
Susanna Fang	Daniel Drucker	Immunometabolic role(s) of the astrocyte GLP-1 receptor
Frances Ford	Ian Rogers	Development of a mouse pancreas ex vivo perfusion system to generate a type 1 diabetes model for cell therapy studies
Mu Hang (Henry) Guan	Khosrow Adeli	Mechanistic studies of GLP-1-mediated regulation of lipid metabolism in a novel GLP-1R knockout hamster model
Sanchit Kaushal	Alanna Weisman	Endocrinologists' Perceptions of Hemoglobin A1c Targets for Adults with Type 1 Diabetes
Daeun Kim	Minna Woo	Investigating the role of platelet JAK2 V617F activating mutation-mediated inflammatory response in diabetes and atherosclerosis

Charles Hollenberg Summer Studentship Program (continued)



Justin Lin



Caroline Grace Middleton



Aws Feras Mustafa



Natasha Johanna Verhoeff

Recipient	Supervisor(s)	Title of Research
Justin Lin	Maria Cristina Nostro	Investigating the role of FEV knockout on pancreatic endocrine lineage commitment to reduce the off-target enterochromaffin cells in stem cell differentiation to islet-like cells
Caroline Grace Middleton	Mary L'Abbe	Influence of front-of-pack labelling adapted to Canada's Food Guide on perceptions of consumers with type 2 diabetes and other non-communicable diseases on product healthfulness and purchase intentions: a randomized controlled trial
Aws Feras Mustafa	Denise Belsham	Delineation of miRNA-circadian mechanisms leading to the disruption of energy homeostasis in models of hypothalamic neurons
Natasha Johanna Verhoeff	Bruce Perkins and Noah Ivers	Working to Mitigate Diabetic Ketoacidosis in Type 1 Diabetes: An Education Tool Combining Novel Trial Data Analysis and Lived Experience

Graduate Studentships

BBDC-Novo Nordisk Studentships

A collaboration with Novo Nordisk Canada Inc. was established to provide long-term endowment in support of graduate students who are pursuing a career in diabetes research. As part of the Ontario Student Opportunity Trust Fund program, the support obtained from Novo Nordisk was matched by equal contributions from the University of Toronto and the Government of Ontario. Studentships are valued at up to \$22,000 each. The 2022/2023 award recipients are:

Recipient	Supervisor(s)	Title of Research
Natasha Anita	Walter Swardfager	The effect of exercise on omega fatty acid-derived diols and mood in type 2 diabetes mellitus patients
Emily Au	Margaret Hahn	Disruptions of brain fatty acid sensing by antipsychotics as a mechanism of metabolic adverse effects
Riddhita De	Margaret Hahn and Mahavir Agarwal	Semaglutide in comorbid obesity and schizophrenia-spectrum disorders for metformin non-responders: a randomized control trial
Tina Felfeli	Richard Glazier and Michael Brent	Prevalence and predictors for being unscreened for diabetic retinopathy: A population-based study over a decade
Jia Nuo Feng	Tianru Jin	Extra-pancreatic function of GLP-1-based diabetes drugs- involvement of FGF21
S M Niazur Rahman	Adria Giacca	Role of NOD1-mediated Inflammation in Fat-induced Beta-cell Dysfunction and Insulin Resistance
Nicolette Stogios	Mahavir Agarwal and Margaret Hahn	Do antipsychotics disrupt brain insulin action? A pilot multi-modality magnetic resonance imaging (MRI) study in healthy controls

Recipient	Supervisor(s)	Title of Research
Nicole Tsakiridis	Adria Giacca	Investigating the role of NOD1 signaling in high fat/sucrose-diet induced insulin resistance and β -cell dysfunction
Nathaniel Vo	Hoon-Ki Sung	The role of adipose tissue angioarchitecture and macrophage heterogeneity on metabolic homeostasis in mice and humans
Nagam Yehia	Anthony Hanley and Richard Bazinet	The Role of Branched Chain Fatty Acids in Cardiometabolic Disorders Underlying Type 2 Diabetes Mellitus: a Longitudinal Study in the PROMISE Cohort

BBDC-University Health Network Graduate Awards

These awards were made possible by the partnership between the BBDC and the University Health Network. To be eligible for this award, the student's supervisor must hold a full-time UHN appointment as an active staff physician, or if he/she holds an associate staff position or staff scientist position, the supervisor's principal laboratory or clinical research space must be physically located at the UHN. Studentships are valued at up to \$22,000 each. The 2022/2023 award recipients are:

Recipient	Supervisor(s)	Title of Research
Kyla Bruce	Tony Lam	Leptin action in the dorsal vagal complex of the brain
Fung Man Jennifer Chiu	Tony Lam	Insulin Action in the Brain on Glucose Homeostasis
Sinhuja Jegatheeswaran	Sarah Crome	Exploring immunotherapy potential of ILCs for T1D & islet transplant
Yu Zhe Li	Minna Woo	Assessing the Role of Insulin Signaling in Parasympathetic Neurons in Diabetes and Obesity

Tamarack Graduate Awards in Diabetes Research

These graduate scholarships were made possible by a generous private endowment which was matched by equal funding from the University of Toronto and the Government of Ontario under the Ontario Student Opportunity Trust Fund program. The awards are valued at up to \$22,000. The 2022/2023 award recipients are:

Recipient	Supervisor(s)	Title of Research
Luxcia Kugathasan	David Cherney	Cardiorenal benefits of sodium-glucose cotransporter-2 inhibition in individuals with diabetes mellitus: an analysis on cardiovascular and kidney disease biomarkers
Kateryna Maksyutynska	Mahavir Agarwal and Margaret Hahn	Is brain insulin resistance a feature of the biology of depression? A pilot multi-modality neuroimaging study in adolescents

Yow Kam-Yuen Graduate Scholarship in Diabetes Research

This graduate scholarship was made possible by a generous private endowment which was matched by equal funding from the University of Toronto and the Government of Ontario under the Ontario Student Opportunity Trust Fund program. The value of the award varies and is normally between \$12,000 and \$14,000. The 2022/2023 award recipient is:

Recipient	Supervisor(s)	Title of Research
Yuqing Lisa Hong	Andrew Advani	Epigenetic regulation of immune cells in diabetic kidney disease

Postdoctoral Fellowships

The support of research fellows has been a major priority of the BBDC since the Centre's inception. Each year, the BBDC endeavours to provide as many fellowships as possible to enable individuals holding an MD or PhD to carry out full-time diabetes research at the University of Toronto or one of its affiliated institutions. The objective of these awards is to attract and foster young investigators to initiate and/or continue research training in the field of diabetes. Awards are \$40,000 or \$50,000 depending on the degree held. The 2022/2023 recipients are:

BBDC Postdoctoral Fellowships

Recipient	Supervisor(s)	Title of Research
Khairunnadiya Prayitno	Mamatha Bhat	How does diabetes epigenetically modulate progression of non-alcoholic steatohepatitis?
Majid Mufaqam Syed Abdul	Gary Lewis	Intravital imaging of intestinal lipid mobilization
Shirine Elizabeth Usmani	Minna Woo	Determining the role of Bcl6 in diabetes and skeletal muscle function
Julie Anh Dung Van	Michael Wheeler	Mining the circulatory proteome for early signals for the progression to type 2 diabetes in women with a history of gestational diabetes
Kevin Yau	David Cherney and Ron Wald	GLP-1 Receptor Agonists in Chronic Kidney Disease and Maintenance Dialysis Patients

BBDC Fellowship in Diabetes Care (Funded by Eli Lilly)

This fellowship has been made possible by a generous contribution from Eli Lilly.

Recipient	Supervisor(s)	Title of Research
María Jesús González Rellán (July 1 – Sept. 30, 2022)	David Cherney	Elucidation of the role(s) of the vascular smooth muscle GLP-1 receptor

D.H. Gales Family Charitable Foundation Fellowships

These fellowships have been made possible by a generous contribution from the D. H. Gales Family Charitable Foundation to the UHN Foundation.

Recipient	Supervisor(s)	Title of Research
Sulayman Aslan Lyons	Jacqueline Beaudry	Effects of acute and prolonged high levels of glucocorticoid exposure on white and brown fat lipid metabolism
Raghunath Singh	Margaret Hahn	Role of the gut microbiome in metabolic alterations associated with antipsychotics

Sellers Postdoctoral Fellowship

Recipient	Supervisor(s)	Title of Research
Rola Hammoud	Daniel Drucker	Elucidating the role of the central nervous system as a metabolic target for agonists and antagonists of the glucose-dependent insulinotropic polypeptide receptor (GIPR)

Trainee Travel Awards

Attendance at scientific meetings provide all researchers, trainees and established researchers alike with an opportunity to hear about and share cutting edge research in their field, often well before those results are published in scientific journals. Scientific meetings provide an opportunity for trainees to present their research findings to an international audience of their peers and promote networking and the establishment of research collaborations. Awards are available to trainees presenting a first-authored abstract directly related to diabetes research which has been accepted for poster or oral presentation at a scientific meeting. Award recipients received reimbursement of up to \$1,000 to present at an in-person or online meeting. The 2022/2023 award recipients are:

Recipient	Supervisor(s)	Title of Research
Danielle Alvares	Khosrow Adeli	Bile acids modulate hepatic lipoprotein production via a TGR5 and GLPIR dependent pathway
Emily Au	Margaret Hahn	Olanzapine Impairs Central Lipid-Mediated Regulation of Glucose Homeostasis
Daniel R. Barros	Tony Lam	Small intestinal protein sensing mechanism in feeding and glucose regulation
Dominika Bhatia	Lorraine Lipscombe	Predictors of readiness for postpartum health behaviour change in women with gestational diabetes
Kyla Bruce	Tony Lam	Feeding- and gluco-regulatory role of leptin action in the nucleus of the solitary tract
Tsung Chun (Jim) Chen	Iliana Lega	Patterns of diabetes testing for older adults without diabetes in Ontario's nursing homes: a population-based study
Ji-Eun Chon	Anthony Hanley	Circulating omega-3 (n-3) polyunsaturated fatty acids (PUFAs) and adipose tissue inflammation: longitudinal analysis in the PROspective Metabolism and Islet cell Evaluation (PROMISE) cohort
Armin Farahvash	Iliana Lega	Antihyperglycemic Medication Initiation after Cardiovascular Hospitalization in Older Adults with Diabetes Increases Hypoglycemia without Improving Survival
Jia Nuo Feng	Tianru Jin and Michael Wheeler	GLP-1R is required for resveratrol in exerting its metabolic beneficial effect in HFD challenged male mice
Alexa Lee Govette	Jenna Gillen	Influence of Remotely-Delivered Exercise on Glycemia in Women With or At-Risk for Type 2 Diabetes
Meaghan Elizabeth Kavanagh	John Sievenpiper	Feasibility of a Web-Based Health Application (PortfolioDiet.app) to Translate Nutrition Therapy for Cardiovascular Disease Risk Reduction in High-Risk Adults: A Pilot Study
Rachel Kuah	Tony Lam	Metformin Action and Upper Small Intestinal Lipid Sensing in Feeding Regulation
Jennifer Lee	Mary L'Abbe	Examining the diet quality of Canadians and the alignment of the proposed Canadian 'high-in' front-of-pack labelling regulations with other front-of-pack labelling systems and dietary guidelines
Ju Hee Lee	Hoon-Ki Sung	Remodeling of the White Adipose Tissue by Intermittent Fasting
Jia Xu Li	Carolyn Cummins	LXR β in Adipose Tissue is Required for the Metabolic Side Effects of Glucocorticoid Treatment
Jackie Fule Liu	Xiao Yu (Shirley) Wu	A Novel Self-crosslinked Matrix Microneedle Patch for "Smart" Delivery of Insulin at Hyperglycemia

Recipient	Supervisor(s)	Title of Research
Neruja Loganathan	Denise Belsham	Generation and characterization of immortalized pancreatic cells and hypothalamic neurons from human induced-pluripotent stem cells
Kateryna Maksyutynska	Mahavir Agarwal	The Impact of Metabolic Dysregulation on Cognition in Mood Disorders: A Systematic Review and Meta- Analysis
Saba Manzoor	Michael Fralick	EMERGE: Evaluating the unintended consequences of elevated glucose MEasuRinG in hospital
Anthony Nguyen	Satya Dash	Insulin response to oral glucose and cardiometabolic disease: A Mendelian randomization study to assess potential causality
Michelle Nguyen	Vasanti Malik	100% fruit juice consumption and body weight in children and adults: a systematic review and meta-analysis of prospective cohort studies and randomized controlled trials
Amanda Oakie	Maria Cristina Nostro	Effects of Notch signalling on the expansion of human stem cell-derived pancreatic cells
SM Niazur Rahman	Adria Giacca	Effect of aging on insulin clearance in mice
Fitore Raka	Khosrow Adeli	Serotonin regulates postprandial fat absorption and chylomicron secretion
Si Won Ryoo	Walter Swardfager	Sex-Specific Associations between Fatty Acid–Derived Oxylipins and Executive Function in T2DM
Fei Yi Teenie Siu	David Jenkins	The Association of GI/GL, Fiber and Whole Grains with Type 2 Diabetes in Mega Cohorts of over 100,000 participants: A Systematic Review and Meta-analysis
Emily Chen Smith	Margaret Hahn and Satya Dash	Dysglycemia and Clinical Improvement in Patients With Schizophrenia Treated With Antipsychotics: A Systematic Review
Nicolette Stogios	Mahavir Agarwal	Exploring the Neural Correlates of Brain Insulin Signaling in Humans: A Systematic Review and Activation Likelihood Estimation Meta-Analysis
Majid Mufaqam Syed Abdul	Gary Lewis	Mechanism of glucagon-like peptide-2 (GLP-2) intestinal lipid mobilization and enhancement of chylomicron secretion
Quin Xie	Jayne Danska	Immune responses to gut bacteria associated with time to diagnosis and clinical response to T-cell directed therapy for type 1 diabetes prevention

Funding Programs For Faculty and Health Professionals

Archie Sopman Diabetes Research and Education Awards 2022

This program is intended to promote continuing diabetes education for health professionals at the University Health Network who do not normally have access to funds to travel to diabetes conferences or attend continuing education courses in diabetes. Award recipients who attend educational events are encouraged to share their learnings from the event with their colleagues. Funding for this program is provided by the UHN Foundation Archie Sopman endowment fund. The endowment is held at the University Health Network and award payments are made directly to the recipients by the UHN. The 2022 funding recipient is:

Recipient	UHN Department	Amount
Lucia Chan	Diabetes Clinic, Toronto Western Hospital	Up to \$1,000 to attend conference

BBDC-Novo Nordisk Chair in Incretin Biology

The research Chair was made possible through a \$3 million gift from Novo Nordisk in appreciation of the innovative diabetes research undertaken by the BBDC. Both Novo Nordisk and the University of Toronto, Faculty of Medicine have a long-standing tradition of diabetes research originally dating back to the discovery of insulin, and most recently focused on the science of incretin biology which holds the potential to have the kind of transformative impact that insulin had in improving the lives of people with diabetes. This Chair will position the University of Toronto as a leader in this area of research. **Dr. Daniel J. Drucker** is the Chair holder and has been reappointed for a third 5-year term until 2025. Dr. Drucker is a clinician-scientist world-renowned for his ability to translate scientific breakthroughs into therapies for people living with diabetes.

Diabetes Team of the Year Award

Each year the BBDC presents one award to a team that has demonstrated outstanding efforts and achievements in their roles as diabetes educators. The award is meant to recognize a team that demonstrates leadership and accomplishments in innovations in patient education or diabetes care delivery, and/or education and professional development of healthcare trainees and clinicians, and/or advocacy for patients and best clinical practices.

The 2022 award was presented to the Hospital for Sick Children Diabetes Team. The team members are:

Denise Penny, Clinical Nurse Specialist, CDE – co-lead diabetes allied health team	Vanita Pais, RD, CDE – diabetes dietitian
Shaun Barrett, Clinical Nurse Specialist, CDE – co-lead diabetes allied health team	Esther Assor, RD, CDE – diabetes dietitian
Alicia Stevenson, RN, CDE – diabetes nurse educator	Yunnie Luk RD – diabetes dietitian
Catherine Pastor, RN, CDE – diabetes nurse educator	Kelly Polci, MSW – diabetes social worker
Amy Friedlein, RN, CDE – diabetes nurse educator	Lauren Daurio, MSW – diabetes social worker
	Madison Brown, diabetes clinic coordinator



Drucker Family Innovation Fund Grants

This is a joint funding program between the BBDC and the University Health Network/Mount Sinai Hospital Department of Medicine. The grants enable eligible investigators to explore innovative research that may change the paradigm and reorient the field in a new direction. The grants are intended to support high-risk innovative proposals focused on diabetes and metabolism research; however, in the absence of meritorious applications in the area of diabetes and metabolism, submissions related to other areas of biomedical research are considered. The 2022/2023 grant recipients are:

Recipient	Title of Research	Amount
Liliana Attisano Jeff Wrana Laurence Pelletier	An in vitro tissue vascularization platform to improve stem cell-derived-beta cell function	\$50,000
David Cherney and Sunita Singh Joanne Bargman Jeffrey Perl Brendan McCormick Pierre Brown Bruce Perkin	meChANisms and sAFety of SGLT2 inhibition in peRitoneal dialYsis - the CANARY study	\$50,000
Adria Giacca Xiao Yu (Shirley) Wu Michael Laflamme	Insulin and GLP-1 eluting stents for the prevention of restenosis	\$50,000
Dan Winer Mark Reed	Repurposing Promising Novel Therapies in Neurodegenerative Disease to Treat Diabetes	\$50,000

Innovative Diabetes Quality Improvement Grants

In 2022, the BBDC introduced a new funding program for healthcare professionals to support scholarly and innovative research initiatives in quality improvement and/or patient safety in diabetes care. The program is designed to encourage new academic research activities by frontline healthcare professionals such as clinicians, nurses, dietitians, social workers, pharmacists, etc. It is intended that this program will generate information directly applicable to the management of individuals or populations with diabetes. The 2022/2023 recipient is:

Recipient	Title of Research	Amount
Michael Fralick and Muhammad Mamdani Co-investigators: Bruce Perkins Patrick O'Brien Mike Colacci Chloe Pou-Prom Esmeralda Carson	RUSHH study (Risk of Unintentional Severe Hypoglycemia in Hospital)	\$10,000

Novo Nordisk-BBDC New Investigator Award

This award was established to support an independent scientist or clinician-scientist in the early stage of their career, which is a particularly challenging and vulnerable time as the researcher transitions from trainee to independent investigator. Faculty are eligible for this funding within five years of their first academic or research appointment. The 2022-2024 award recipient is:

Recipient	Title of Research	Amount
Mahavir Agarwal	Is brain insulin resistance a feature of the biology of depression? A pilot multi-modality neuroimaging study in adolescents	\$90,000

Novo Nordisk-BBDC Pilot And Feasibility Grants

New ideas and directions for research involve risk-taking by scientists and funding agencies. Most established funding agencies require considerable evidence of feasibility before they consider funding an application for a new project. Furthermore, researchers who are new to the diabetes field who may wish to adapt their non-diabetes research techniques to a diabetes-related topic of interest are disadvantaged in most funding competitions. The BBDC, therefore, prioritizes pilot and feasibility funding to attract researchers without a pre-existing track record of diabetes research or established diabetes researchers who wish to pilot an innovative research idea or project. The 2022/2023 grant recipients are:

Recipient	Title of Research	Amount
Andrew Advani	Discovering inflammation-driven post-translational modification in heart cells in diabetes	\$40,000
Jacqueline Beaudry	Inhibiting the Glucose-dependent Insulinotropic Receptor (GIPR) on Lipid Metabolism in Activated Brown Adipose Tissue	\$40,000
Michael Wheeler	Connecting Specific Central GLP-1 Receptors Functionally with Glucose Homeostasis and Energy Balance	\$40,000

Diabetes continues to affect more people than ever before and highlights the need for further investment into diabetes research.

Educational Activities



Photos: Diana Tyszko, Moussa Faddoul

5th PMCC-BBDC Joint Cardiovascular-Diabetes Symposium

On March 3-4, 2023, the Banting & Best Diabetes Centre and Peter Munk Cardiac Centre co-hosted this online educational event for healthcare providers. Cardiovascular disease is the leading cause of morbidity and mortality in those living with diabetes. Consequently, it is imperative for healthcare providers to engage, learn and challenge one another on how to best care for patients at risk, or affected by both conditions.

Day 1 – Friday, March 3, 2023

9:25 Welcome & Opening Remarks – Phillip Segal

Session 1:

9:30 GIP and Diabetes – Dan Drucker

9:55 Using SGLT2 Inhibitors in Advanced Renal Disease – Vikas Sridhar

10:20 5 Best Endocrine Papers for the Cardiologist (2022) – Jeremy Gilbert

10:45 Q&A Panel Discussion – Dan Drucker, Vikas Sridhar, Jeremy Gilbert

11:00 Break & Exhibits

Session 2:

11:10 Subcutaneous Insulin to Treat DKA. A New Model of Care – Denise Jacobson, Divyesh Patel, Vincent Liu, Bindiya Desai, Priya Rao

11:35 Lipid Update 2023 – Gary Lewis

12:00 Long COVID-19 and Diabetes – Peter Lin

12:25 Q&A Panel Discussion – Denise Jacobson, Divyesh Patel, Vincent Liu, Bindiya Desai, Priya Rao, Gary Lewis, Peter Lin

12:45 BBDC Diabetes Team of the Year Award Presentation

12:55 Lunch & Exhibits

Session 3

1:45 Walkability and Diabetes – Gillian Booth

2:10 Using Artificial Intelligence to Reduce Hypoglycemia in the Hospital – Michael Fralick

2:35 Update on Treating Diabetes in Older People – Afshan Zahedi

3:00 Intergenerational Diabetes in First Nations Populations – Brandy Wicklow

3:25 Q&A Panel Discussion – Gillian Booth, Michael Fralick, Afshan Zahedi, Brandy Wicklow

3:45 Day 1 Sessions Summary – Peter Lin

4:15 Adjourn for the Day

Day 2 – Saturday, March 4, 2023

9:25 Welcome & Opening Remarks – Sean Balmain

Session 4

9:30 Management of Aortic Valve Disease – Surgical and Percutaneous – Jennifer Chung

9:55 Ascending Aortopathy – Diagnosis, Screening, Surgery – Jennifer Chung

10:20 State of the Art – PFO Closure for Stroke – Eric Horlick

10:45 Q&A Panel Discussion – Jennifer Chung, Eric Horlick

11:00 Break & Exhibits

Session 5

11:10 Cardiovascular Autonomic Dysfunction – Recognition, Diagnosis, Management – Paula Harvey

11:35 Long COVID-19 and the Heart – Peter Lin

12:00 Cardiac Rehabilitation Strategies for “Long” COVID-19 and Autonomic Dysfunction – Alexandra Rendely

12:25 Q&A Panel Discussion – Paula Harvey, Peter Lin, Alexandra Rendely

12:45 Lunch & Exhibits

Session 6

1:35 Arrhythmia Update – From Atrial Fibrillation to Ventricular Arrhythmia – Andrew Ha

2:00 Primary and Secondary Prevention Update – From Risk Factor Management to Post-MI Care – Mike Farkouh

2:25 Heart Failure Update – From Medical Therapies to Advanced Management – Juan Duero-Posada

2:50 Q&A Panel Discussion – Andrew Ha, Mike Farkouh, Juan Duero-Posada

3:05 Day 2 Sessions Summary – Peter Lin

3:35 Symposium Adjourns

Annual Scientific Day

This annual event provides an opportunity for BBDC members to exchange scientific information and ideas and assists in the development of collaborative diabetes-related research activities. It also provides a valuable opportunity for BBDC trainees to network and present their research. BBDC postdoctoral fellowship recipients, graduate studentship recipients and select Annual Trainee Awards abstract submitters present posters of their work. This year's Charles Hollenberg Memorial Lecture was delivered by Laurie Goodyear, Professor of Medicine, Harvard Medical School and Senior Investigator, Joslin Diabetes Center. Rosalind Mott, Senior Scientific Editor of Cell Metabolism, and Julie Lovshin, Department of Medicine, University of Toronto co-judged ten of the trainee posters for the Annual Trainee Awards competition. The event focuses on the latest diabetes research topics with both clinical and laboratory applications. Attendance is free for all BBDC members, their trainees and U of T endocrine residents.

32nd Annual Scientific Day Friday, May 12, 2023 - Old Mill, Toronto

8:00 Breakfast and poster set-up

Session 1: (Moderator: Kevin Yau)

- 8:40 Welcome and Introduction - Tony Lam
- 8:45 Anti-inflammatory Actions of the Gut T Cell GLP-1 Receptor - Chi Kin Wong (supervisor: Daniel Drucker)
- 9:00 Determining the Role of BCL6 in Diabetes and Skeletal Muscle Function - Shirine Usmani (supervisor: Minna Woo)
- 9:15 From Vessels to Fibrosis: Photoacoustic Imaging of Chronic Kidney Injury - Eno Hysi
- 9:30 Brain Insulin Action in Mental Illness: Bedside to Bench and Back - Mahavir Agarwal
- 10:00 Refreshments, poster presentations, and BBDC Annual Trainee Awards Competition poster judging by Rosalind Mott and Julie Lovshin. Moderator: Tony Lam

Session 2: (Moderator: Adriana Migliorini)

- 11:15 Insights into MOA of SGLT2i - Preclinical and Clinical Observations - Kim Connelly
- 11:45 Novel Roles of Signaling Pathways in Fat Cells - Cynthia Luk
- 12:15 BBDC Director's Report - Minna Woo
- 12:30 Lunch

Session 3: (Moderator: Tony Lam)

- 1:30 Charles Hollenberg Memorial Lectureship: Ending the Transmission of Metabolic Disease to the Next Generation: How Maternal Exercise Improves the Metabolic Health of Offspring - Laurie J. Goodyear
- 2:30 BBDC Annual Trainee Awards presentations 2022/23 - Rosalind Mott and Julie Lovshin
- 2:40 Adjournment



BBDC Seminar Series

Each year the BBDC invites internationally renowned diabetes researchers to present their work at our Seminar Series. The seminars promote interaction and collaboration with BBDC researchers. Attendance is free and open to all BBDC members, their trainees, U of T faculty, and U of T endocrine residents. Our 2022/2023 guest speakers included:



Mechanisms Controlling Sex and Depot-Selective Fat Cell Differentiation in Obesity

Rana K. Gupta, PhD

Professor of Medicine
Duke University Medical Center
Duke Molecular Physiology Institute



Single-cell multi-omics analysis of human pancreatic islets reveals novel cellular states in type 1 diabetes

Golnaz Vahedi, PhD

Associate Professor of Genetics
University of Pennsylvania
School of Medicine



Understanding diabetic kidney disease from genetics to cells and mechanism

Katalin Susztak, MD, PhD

Professor of Medicine and Genetics
Director of Penn CHOP Kidney Innovation Center
Perelman School of Medicine, University of Pennsylvania



Adventures in Adipose Biology

Evan Rosen, MD, PhD

Chief, Division of Endocrinology, Diabetes, and Metabolism, BIDMC
Professor, Harvard Medical School
Institute Member, Broad Institute

Trainee Seminars

In an effort to provide an enhanced training environment for trainees, the BBDC regularly hosts two seminar series: the **Trainee Lab Seminar Series** and the **Network for Healthy Populations-BBDC Joint Clinical and Population Research-in-Progress Rounds**. These seminar series provide postdoctoral fellows, graduate students, residents and junior faculty with an opportunity to present their diabetes research proposals and unpublished research to their peers in a moderated academic setting.



The Trainee Lab Seminars are held in-person three to four times per year and focus on fundamental research. The Network for Healthy Populations-BBDC Joint Clinical and Population Research-in-Progress Rounds are co-hosted by the BBDC and the University of Toronto's Novo Nordisk Network for Healthy Populations and are held online three times per year. These seminars focus on clinical and population-based research. Each seminar includes presentations on a wide variety of topics to broaden trainees' exposure to different aspects of diabetes research. Attendance is free and open to all BBDC members, their trainees, U of T endocrine residents, and Network for Healthy Populations community partners.

QUEST Website



The BBDC's Quality Education & Safety (QUEST) program provides an educational website where diabetes health care providers can obtain the best diabetes clinical practice resources and learn about local diabetes initiatives. For clinicians and those living with diabetes including patients and their caregivers, QUEST offers valuable tools and information about diabetes as well as opportunities to get involved with diabetes care and research in the community. Providers will find valuable tools and information about the disease and options to get involved with diabetes care and research in their communities. Visit the site at diabetesquest.ca.

**Today, more than
5 million Canadians are living
with diagnosed type 1 or
type 2 diabetes**

Core Laboratory

The BBDC Core Laboratory operates as a specialty laboratory within Mount Sinai Services to provide high quality laboratory assays and services at discounted rates to BBDC members. The lab also provides services to the wider scientific community including external academic and/or industry-initiated research. A list of some of the current assays and services provided by the Core Lab is available on the BBDC's [website](#) or by contacting the Core Lab directly:

Client Service Team

Phone: (416) 586-4800 ext. 8797

Fax: (416) 586-8589

Email: client.service@mountsinaiservices.com

Banting & Best Diabetes Centre Core Laboratory

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Photo: Ken Jones

Acknowledgements

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- The dedicated members of our Executive Committee, Research Excellence Committee, Quality Education and Safety (QUEST) Committee, and Trainee Advancement and Development Committee who volunteer their time to review applications for the Centre's funding programs and implement educational initiatives on behalf of the BBDC.
- Members of the BBDC and Department of Medicine who provided scientific reviews for the 2022/2023 Drucker Family Innovation Fund Grants program: Michelle Bendeck, Mamatha Bhat, Patricia Brubaker, Kim Connelly, Ken Croitoru, Slava Epelman, Adria Giacca, and Michael Wheeler.
- Everyone who participated in and supported the 5th annual Joint Cardiovascular-Diabetes Symposium in March 2023 co-hosted by the BBDC and UHN's Peter Munk Cardiac Centre.
- Everyone who participated in and supported our 32nd annual Scientific Day on May 12.
- Writer and communications professional, Krista Lamb.
- Our 2023 Charles Hollenberg Summer Studentship program coordinator, Majid Mufaqam Syed Abdul.
- Faculty of Medicine Advancement and UHN Foundation who fundraise on behalf of the BBDC.

Our Supporters

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The Drucker Family Innovation Fund	Dr. & Mrs. Edward A. Sellers	Novo Nordisk
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The Estate of Marion Hamilton	The Estate of Archie Sopman	
The Estate of Miriam Neveren	(UHN Foundation)	

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Foundation (UHN Foundation)		to the Banting & Best Diabetes
		Centre this past year.

The BBDC gratefully acknowledges the support of our major contributor:



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