



**2022 End Diabetes  
Award Winners**

# DIABETES CANADA



## OUR RESEARCHERS | DR. AHMAD HAIDAR

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Ahmad Haidar, associate professor of biomedical engineering at McGill University, is bringing us one step closer to developing an artificial pancreas for people with type 1 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. Insulin is produced by cells in the pancreas called beta cells. For people with type 1 diabetes, their beta cells have been destroyed. They can no longer produce insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death. Unfortunately, it is very difficult to manage blood sugar levels – less than 20% of people with type 1 diabetes achieve healthy blood sugar targets.

Dr. Haidar and his lab are developing an artificial pancreas – a set of technologies that together help type 1 diabetes patients control their blood sugars. An artificial pancreas is an automated insulin delivery system made up of an insulin pump which delivers insulin; a sensor which measures real-time blood sugar levels; and an algorithm which calculates the right insulin amount required to maintain healthy blood sugars. Together, they help type 1 diabetes patients better manage their blood sugars. Dr. Haidar is constantly improving this system, to help end the burden of blood sugar level control for type 1 diabetes patients.

In 2022-23, Diabetes Canada is supporting Dr. Haidar's new research study, which is testing the impact of adding a drug called empagliflozin to an automated insulin delivery system. Empagliflozin removes sugar via urine, without increasing the risk of low blood sugar levels, which can be dangerous. The study's goal is to improve the blood sugar levels of people with type 1 diabetes who cannot otherwise achieve healthy blood sugar levels, by adding another therapy to improve the effectiveness of the artificial pancreas system.

**Thank you for giving hope for a healthier future to people with type 1 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. ALANNA WEISMAN

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Alanna Weisman, a clinician, scientist and endocrinologist at the Leadership Sinai Centre for Diabetes, is bringing us one step closer to more equitable health outcomes for people living with type 1 diabetes.**

In Canada, who you are impacts how healthy you'll be. This is health inequity – when your ethnic background or level of income or where you live affects your health outcomes. This is unfair and unjust.

Dr. Alanna Weisman is working to achieve fair access to diabetes technologies for all people with type 1 diabetes. Diabetes technologies such as insulin pumps and glucose monitors help people with type 1 diabetes achieve better blood sugar control and quality of life. However, despite public health funding, these devices are used less by people from historically marginalized groups, including people belonging to ethnic communities.

Diabetes Canada's funding will enable Dr. Weisman and her research team to achieve the following:

- 1) The team will use large, anonymized health care databases to determine differences in the rates of use of diabetes technologies between adults with type 1 diabetes from historically marginalized communities, compared to those who are not.
- 2) Through interviews with patients, diabetes educators, and endocrinologists, the team will determine factors that lead adults with type 1 diabetes from historically marginalized communities to use or not use diabetes technologies.
- 3) Through a co-design process, the team will develop strategies to improve the use of diabetes technologies among those from historically marginalized communities.

Dr. Weisman's goal is to identify barriers to diabetes technologies use and develop strategies to improve the equitable use of diabetes technologies for marginalized people with type 1 diabetes.

**Thank you for giving hope for a healthier future to all people with type 1 diabetes.**



## OUR RESEARCHERS | DR. AMY KIRKHAM

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Amy Kirkham, assistant professor of health at the University of Toronto, is bringing us one step closer to better management of type 2 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. For people with type 2 diabetes, they can no longer produce or use enough insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death. Type 2 diabetes is caused by several different risk factors, including obesity, and accounts for 90% of diabetes cases in Canada.

Dr. Amy Kirkham is working to prove the effectiveness of intermittent fasting on blood sugar control in people with obesity, who have or are at risk of getting type 2 diabetes.

Intermittent fasting is an intervention where individuals eat within an 8- to 10-hour period, and fast for the remaining time each day. Intermittent fasting is safe, easy to follow, and its positive effects on body weight and chronic blood sugar control means it could be effective for the prevention and management of type 2 diabetes.

Diabetes Canada is funding Dr. Kirkham's new study to determine which intermittent fasting period best impacts blood sugar control. Her study will compare the impact of three eating window times on daily blood sugar control, and whether the regime is easy to follow:

- Early: 7:00-16:00
- Mid: 9:30-18:30
- Delayed: 12:00-21:00h

These study results are required to determine if intermittent fasting can be used in clinical care to prevent or manage type 2 diabetes.

**Thank you for giving hope for a healthier future to people with type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. ANTHONY HANLEY

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Anthony Hanley – professor with the Department of Nutritional Sciences, Department of Medicine, and Dalla Lana School of Public Health at the University of Toronto – is increasing our understanding of the impacts of the COVID-19 pandemic on people at risk of getting with type 2 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. For people with type 2 diabetes, they can no longer produce or use enough insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death.

We know that that low levels of physical activity, poor diet, and stress can, over time, increase people's risk of getting type 2 diabetes. Dr. Hanley is studying whether the impacts of the COVID-19 pandemic might increase people's risk of being diagnosed with this disease.

Findings from this work will improve our understanding of the COVID-19 pandemic's impacts on diabetes risk, and may help identify new targets for early risk prevention of type 2 diabetes.

**Thank you for giving hope for a healthier future to people at risk of type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. BRUCE VERCHERE

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Bruce Verchere, director of the Centre for Molecular Medicine and Therapeutics Childhood Diabetes Laboratories at BC Children's Hospital and Irving K Barber Chair in Diabetes Research, is bringing us one step closer to reversing type 1 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. Insulin is produced by cells in the pancreas called beta cells. For people with type 1 diabetes, their beta cells can no longer produce insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death.

Dr. Bruce Verchere and his lab are studying how beta cells work, in order to protect them and their ability to produce insulin.

Beta cells first produce large proteins that are then “cut” down into insulin. For people with type 1 diabetes, this process doesn't work well, and as a result their blood is full of these larger proteins. In Dr. Verchere's current research study, he aims to understand why this occurs, and to determine whether correcting this problem can prevent type 1 diabetes.

Dr. Verchere believes a key enzyme in beta cells in the pancreas of people with type 1 diabetes is deficient. He will test this by decreasing or increasing the amount of this enzyme in beta cells in a mouse model of type 1 diabetes.

He hopes increasing the amount of this enzyme in beta cells might restore insulin production in people type 1 diabetes.

**Thank you for giving hope for a healthier future to people with type 1 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. CALVIN KE

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Calvin Ke, assistant professor in the Department of Medicine, University of Toronto, clinician scientist at the Toronto General Hospital Research Institute, and staff endocrinologist at the Toronto General Hospital, is bringing us one step closer to improved treatments for people living with type 2 diabetes.**

In the past, most people were diagnosed with type 2 diabetes after the age of 40. Nowadays, it is 30% more common for people to be diagnosed before the age of 40.

When compared, people diagnosed before the age of 40 with type 2 diabetes are more likely to experience more heart attacks, strokes, and other serious consequences of the disease.

Because people diagnosed earlier live with their condition for many decades, Dr. Ke believes that the impacts of high blood sugars and high cholesterol could be far greater than previously realized on these individuals' health.

Diabetes Canada is supporting Dr. Ke's research into how blood sugar and cholesterol levels in early adulthood affects the future risk of heart attack and stroke among people diagnosed with type 2 diabetes before the age of 40. His findings will provide valuable information for developing better strategies to help these people live healthier lives. For example, doctors usually prescribe drugs to lower cholesterol levels among people with diabetes after the age of 40 years, but people diagnosed earlier with diabetes could benefit from these drugs at a much earlier age.

**Thank you for giving hope for a healthier future to people with type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. CAROL HUANG

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Carol Huang, associate professor with the Departments of Endocrinology, Medical Science, Pediatrics at University of Calgary, is bringing us one step closer to preventing gestational diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. Insulin is produced by cells in the pancreas called beta cells. For people with type 2 diabetes, they can no longer produce or use insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death.

When diabetes is detected for the first time during pregnancy, it's called gestational diabetes. Gestational diabetes is a very common condition, affecting up to 20% of pregnant women. 50% of these women progress to type 2 diabetes within 10 years after their gestational diabetes diagnosis.

Dr. Carol Huang is developing a better understanding of what causes gestational diabetes, and what factors hasten progression from gestational to type 2 diabetes. Her research study's aim is to help us design strategies to delay and prevent this progression.

Prolactin receptor (PRLR) plays a vital part in beta cell production. Dr. Huang is examining:

- if a lack of PRLR can lead to diabetes both during and after pregnancy
- testing whether prebiotics can treat this
- determining whether an abnormal PRLR gene is more common in women with gestational diabetes

This research will help identify and treat women at risk of developing gestational diabetes.

**Thank you for giving hope for a healthier future to pregnant women at risk of developing diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. CLAUDIA GAGNON

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Claudia Gagnon, a clinician researcher at the CHU de Québec-Laval University Research Centre and a Professor at Laval University's School of Medicine, is bringing us one step closer to better health outcomes for people living with type 1 diabetes.**

People living with type 1 diabetes have a 2- to 7-fold higher risk of fracture because both bone mass and bone quality are affected by this disease. Based on what we know, bone fragility in people with type 1 diabetes is different than bone fragility caused by aging. What we don't know is if common anti-osteoporosis drugs are the best strategy to improve bone health in people with type 1 diabetes.

Diabetes Canada's support will enable Dr. Gagnon to determine:

- 1) Whether people with type 1 diabetes lose bone or bone quality more so than people without diabetes
- 2) If blood sugar control affects bone health in people with type 1 diabetes

Dr. Claudia Gagnon is working on improving our understanding of the mechanisms behind type 1 diabetes bone fragility, to inform better prevention strategies and treatments.

**Thank you for giving hope for a healthier future to people with type 1 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. COLIN ANDERSON

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Colin Anderson, immunologist and professor at the University of Alberta is bringing us one step closer to ending type 1 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. Insulin is produced by cells in the pancreas called beta cells. For people with type 1 diabetes, their beta cells have been destroyed by their own immune system. They can no longer produce insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death.

Dr. Colin Anderson is working on a method to prevent a person's immune system from destroying beta cells. His research aims to wipe out problematic immune system cells and restart the immune system in a way that blocks their ability to attack insulin-producing cells.

Diabetes Canada is excited to fund the next phase of Dr. Anderson's research. He and his team have already achieved a partial immune system reset which can delay type 1 diabetes. They aim to do a more complete reset such that diabetes is permanently stopped.

Previous studies achieved only a partial reset because immune system cells that hide in tissues like the pancreas are not destroyed by current methods. Dr. Anderson will test a new method that could allow the drug that destroys these immune cells to penetrate tissues like the pancreas.

By combining this immune system reset approach with transplants to restore the insulin producing cells, type 1 diabetes may be cured.

**Thank you for giving hope for a healthier future to without type 1 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. DAN LUCIANI

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Dan Luciani, investigator with BC Children's Hospital and associate professor at the Department of Surgery, Faculty of Medicine, University of British Columbia, is bringing us one step closer to ending type 1 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. Insulin is produced by cells in the pancreas called beta cells. For people at risk of developing diabetes, their beta cells cannot produce enough insulin, which puts the beta cells under stress. The beta cells try to adapt, but if this fails, a vicious cycle begins – even less insulin production, more stress, higher blood sugars, and eventually a diabetes diagnosis.

Dr. Dan Luciani is discovering new ways to preserve beta cell insulin production and combat diabetes.

Through Diabetes Canada's funding, Dr. Luciani is building our understanding of the mechanisms of beta cell adaptation and why they fail.

Stressed cells often activate a self-destructive process called autophagy, which breaks down and recycles the cell. Dr. Luciani is testing whether two proteins which help control this process can be used to prevent beta cell self-destruction.

This study will show if these proteins can be used to protect beta cells and potentially prevent and treat diabetes.

**Thank you for giving hope for a healthier future to all people with diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. DAVID CAMPBELL

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. David Campbell, assistant professor of medicine with the University of Calgary, is bringing us one step closer to better health for people experiencing homelessness and living with type 2 diabetes.**

In Canada, where you are impacts how healthy you'll be. This is health inequity – when your level of income or where you live affects your health outcomes. This is unfair and unjust. Managing diabetes is difficult, requiring medications, a strict diet, regular exercise, monitoring blood sugar levels, and access to a healthcare team. It is especially challenging for people experiencing homelessness, who face many inequitable barriers. As a result, they often experience more diabetes-related complications, poorer health, and worsened quality of life.

Dr. Campbell is working to reduce inequitable health barriers for people experiencing homelessness. Using a community-based participatory research approach, where members of the community act as co-researchers. This approach empowers study participants to help find solutions to the challenges they face. In this study, people experiencing homelessness will work with Dr. Campbell and his team to co-design the study, take part in collecting and analyzing the data, and help share the results.

Through Diabetes Canada's support, Dr. Campbell will:

- engage people living in homeless shelters with type 2 diabetes to understand their stories of stigma related to diabetes and homelessness
- explore the knowledge, attitudes, and behaviours of frontline staff to people with type 2 diabetes in the shelter system
- work to improve the policies and practices related to diabetes in homeless shelters

To translate this knowledge into practice change, Dr. Campbell and his team will develop a short narrative film to share stories of stigma experienced by the co-researchers, to increase awareness about diabetes among frontline staff. The film will be screened for the frontline staff and public.

**Thank you for giving hope for a healthier future to people with type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. DEAN EURICH

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Dean Eurich, professor with the school of public health and program director for the clinical epidemiology program at the University of Alberta, is bringing us one step closer to more equitable health outcomes for First Nations people living with diabetes.**

In Canada, who you are impacts how healthy you'll be. This is health inequity – when your ethnic background, level of income or where you live affects your health outcomes. This is unfair and unjust.

The diabetes epidemic in First Nations communities is a tragic legacy in Canada. Health, social, and systemic inequities, discrimination and racism, and geographic isolation all have had long-term, negative impacts on the health of First Nations peoples – First Nations living on reserve have a rate of diabetes three to five times higher than that of other Canadians. On top of this, the COVID-19 pandemic has affected the care of patients with diabetes and has impacted First Nations communities more than the general population.

To help address these health inequities, Dr. Dean Eurich is working in partnership with First Nations communities to better understand the impact of COVID-19 on diabetes care for First Nations in Alberta.

With First Nations health leaders, traditional knowledge holders, and Chiefs and Council, Dr. Campbell will examine how the COVID-19 pandemic is influencing trends in diabetes and diabetes care among First Nations people in Alberta. Their findings will help inform more equitable future diabetes programming in the province post-pandemic.

**Thank you for giving hope for a healthier future to First Nations people with diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. ELIZABETH RIDEOUT

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Elizabeth Rideout, associate professor with the Faculty of Medicine at the University of British Columbia, is bringing us one step closer to better management of type 2 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. Insulin is produced in the pancreas by cells called beta cells. For people with type 2 diabetes, they can no longer produce or use enough insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death. Type 2 diabetes is caused by several different risk factors, and accounts for 90% of diabetes cases in Canada.

We know that whether an individual is male or female affects diabetes risk: adult men are 40% more likely to develop type 2 diabetes than women. We don't know why.

Dr. Elizabeth Rideout, through the support of Diabetes Canada, is increasing our understanding of why women are protected from diabetes more so than men. Her initial studies in humans and mice show that male and female beta cells are different – beta cells in women survive stress better than beta cells in men, and are better at making insulin in stressful conditions than men's beta cells. Beta cell stress is linked with multiple forms of diabetes. Dr. Campbell will determine whether better stress management may be the reason women are better protected from type 2 diabetes. She will identify which pathways and cellular strategies women's beta cells use during times of stress to maintain the body's insulin levels.

With more clues into how female beta cells respond to stress, scientists can develop better treatments to relieve beta cell stress, improve insulin production, and better manage diabetes in both women and men.

**Thank you for giving hope for a healthier future to people with type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. GREGORY STEINBERG

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Gregory Steinberg – professor of medicine at McMaster University who holds the Canada Research Chair, J. Bruce Duncan Endowed Chair in Metabolic Diseases, and is co-director of the Centre for Metabolism, Obesity and Diabetes Research – is exploring new ways to prevent and treat type 2 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. For people with type 2 diabetes, they can no longer produce or use enough insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death. Type 2 diabetes is caused by several different risk factors including weight gain and obesity, and accounts for 90% of diabetes cases in Canada.

In people with type 2 diabetes or who are at risk of developing type 2 diabetes, weight loss can be effective in lowering blood sugar levels. While many of these people can lose weight through dieting, this weight loss is usually difficult to maintain because the body's metabolism slows down, causing the weight to return.

With support from Diabetes Canada, Dr. Gregory Steinberg is studying how a protein called GDF15 promotes calorie burning and lowers blood sugars. This information may lead to new ways to lower blood sugar in people with prediabetes or type 2 diabetes.

Dr. Steinberg hopes that these findings may be effective for both preventing and treating type 2 diabetes.

**Thank you for giving hope for a healthier future to people with type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. HERBERT GAISANO

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Herbert Gaisano, professor, Departments of Medicine and Physiology at the University of Toronto, is bringing us one step closer to treating a condition related to type 2 diabetes – fatty liver disease.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. For people with type 2 diabetes, they can no longer produce or use enough insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death. Type 2 diabetes is caused by several different risk factors including weight gain and obesity, and accounts for 90% of diabetes cases in Canada.

Diabetes can lead to fatty liver disease, which affects 30% of Canadians. If untreated, this disease can lead to severe liver damage, liver cancer, and liver failure.

Dr. Herbert Gaisano has developed a unique technology platform that he will use to test new drug treatments for fatty liver disease. By using liver samples taken from people with fatty liver disease, he can create a preclinical model to conduct these tests and determine if drugs currently used to treat type 2 diabetes can also be used to treat fatty liver disease.

**Thank you for giving hope for a healthier future for people with type 2 diabetes and fatty liver disease.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. JANE YARDLEY

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Jane Yardley, associate professor with the University of Alberta, is bringing us one step closer to improved treatments for women living with type 2 diabetes.**

People with type 1 diabetes are living longer due to better care. Once women with type 1 diabetes reach menopause, however, heart disease risk increases very quickly; they also lose bone and muscle faster making them more likely to become frail. Regular exercise prevents these problems, but in people with type 1 diabetes it also makes their blood sugar levels unstable. Fear of low blood sugars – which can cause faintness, unconsciousness, or seizures – is one of the main reasons why people with type 1 diabetes avoid exercise. Current advice for treatment, drug dosage, diet and exercise might not work well for older women with type 1 diabetes as most treatment studies test younger people.

Dr. Jane Yardley is working to improve advice and treatment for menopausal women with type 1 diabetes. She will study how aerobic exercise and weight lifting affect blood sugar levels during and after exercise in 20 women with type 1 diabetes who have been through menopause.

Her study will be the first to look at how different types of exercise affect blood sugar levels in this group, and will help to figure out if and how current advice should be changed to improve exercise safety and health benefits for older women with type 1 diabetes.

**Thank you for giving hope for a healthier future to women with type 1 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. JASON DYCK

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Jason Dyck, Professor, Department of Pediatrics and Director of the Cardiovascular Research Centre, University of Alberta and Canada Research Chair in Molecular Medicine, is bringing us one step closer to helping people with diabetes and heart disease.**

The number of individuals in the world with type 2 diabetes is rapidly growing. Many people with type 2 diabetes are also at risk of developing a wide variety of heart complications that are very often life threatening. One of the complications arising from diabetes is poor heart function that can gradually worsen over time. Very little is known about why the heart starts to function poorly. As a result, effective treatments for this condition cannot be developed.

Dr. Jason Dyck's aim for his Diabetes Canada supported project is to better understand what causes poor heart function during the development of type 2 diabetes with the ultimate goal of discovering ways to slow or prevent this complication.

He and his team have already identified a specific diabetic pathway in the heart that increases heart cell damage. Their research will improve understanding of how it damages heart cells, and determine if they can prevent poor heart function during the development of diabetes.

Dr. Dyck's ultimate goal is to develop treatment strategies for patients at risk for, or who have already developed, diabetic heart disease.

**Thank you for giving hope for a healthier future people with diabetes and heart disease.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. JENNIFER BRUIN

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Jennifer Bruin, associate professor at Carleton University, is bringing us one step closer to better health outcomes for cancer survivors with diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. Insulin is produced in the pancreas by cells called beta cells. For people with type 2 diabetes, they can no longer produce or use enough insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death. Nearly 1 in 3 Canadians are living with either prediabetes or type 2 diabetes. Cancer survivors have an even higher risk of developing type 2 diabetes. This is concerning because cancer patients who develop diabetes have higher rates of mortality.

Dr. Jennifer Bruin is investigating whether cisplatin, a medication commonly used to treat different cancers, has unintended side effects on pancreatic beta cells, leading to increased diabetes risk in cancer survivors.

Dr. Bruin has three goals:

1. Investigate how cisplatin disrupts insulin secretion in beta cells.
2. Treat lean and obese mice with either a placebo solution or cisplatin for 2 weeks and assess their long-term metabolic and beta cell health outcomes.
3. Test whether a dietary intervention or treatment with a metformin, a type 2 diabetes medication, at the same time as chemotherapy, protects mice from cisplatin-induced diabetes.

Dr. Bruin's work will provide insight into how anti-cancer drugs negatively impact beta cell health. By better understanding how these drugs disrupt beta cells, she hopes to design targeted treatments to protect beta cell health and function and reduce the risk of diabetes in cancer survivors.

**Thank you for giving hope for a healthier future to cancer survivors with type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. JENNIFER ESTALL

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Jennifer Estall, professor of medicine at the University of Montreal, is bringing us one step closer to improving diabetes treatment.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. For people with diabetes, they can no longer produce or use enough insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death. Type 2 diabetes is caused by several different risk factors including genetics, age, lifestyle, and diet, and accounts for 90% of diabetes cases in Canada.

The PGC-1A protein is linked to higher rates of obesity and diabetes. PGC-1A is a protein that controls how our body uses sugar and fat to make energy. Research shows almost 35% of world's population have a mutated, or different form of PGC-1A. This version of PGC-1A may also impact how well people respond to diabetes treatments.

Not much is known about how this mutation affects the function of PGC-1A, or why it is linked to diabetes. Dr. Jennifer Estall will determine how this mutation changes how the protein works, by investigating how different forms of PGC-1A affects how the body burns and stores food energy and the body's response to exercise, diet, and common treatments for diabetes.

This research will help us understand how a gene influence diabetes risk, how the body tightly controls energy use and storage, and may also help better predict one's response to diabetes treatment.

**Thank you for giving hope for a healthier future for people with diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. JOHN EDWARD USSHER

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. John Ussher, professor with the Faculty of Pharmacy and Pharmaceutical Sciences at University of Alberta, is bringing us one step closer improved treatments for people with diabetic heart disease.**

People with diabetes have a much higher risk of developing heart disease.

Through Diabetes Canada's funding, Dr. Ussher is learning how diabetes impacts the heart's ability to function, with the aim of developing new drugs to treat diabetic heart disease.

The ability of the heart to produce energy from the fuel we eat is extremely important for its proper function. If the heart is not able to produce enough energy, it cannot pump blood to the rest of the body, or relax properly between pumping, which can increase the risk for heart failure. For people with diabetes, the heart cannot produce energy as well as in healthy individuals. Dr. Ussher has identified proteins in the heart that regulates these processes, and will test how manipulating these proteins will impact how the heart relaxes during diabetic heart disease.

This research will provide key information on whether our proteins are good targets for pharmaceutical companies to develop drugs for improving diabetic heart disease.

**Thank you for giving hope for a healthier future to all people with diabetes.**



## OUR RESEARCHERS | DR. JONATHAN LITTLE

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Jonathan Little, a professor at the Centre for Chronic Disease Prevention and Management at the University of British Columbia, is bringing us one step closer to better health outcomes for people with type 2 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. For people with type 2 diabetes, they can no longer produce or use insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death.

Unfortunately, most people living with type 2 diabetes do not get enough physical activity and miss benefiting from the powerful health benefits of exercise.

Exercise “snacks” are short bursts of exercise lasting 1 minute or less that can be performed sporadically over the course of the day. Exercise snacks are easy to do because they can be performed virtually anywhere, using stair climbing or simple body weight exercises. Sprinkling in exercise snacks throughout the day can also break up sedentary time and help people with type 2 diabetes better control their blood sugar levels.

Dr. Jonathan Little will determine if people with type 2 diabetes like doing exercise snacks, can fit exercise snacks into their daily routines, and see if exercise snacks work to improve fitness and blood sugar control. A smartphone app and web-based platform will guide participants through their exercise snack program, which they can complete in their home or workplace.

This research will test exercise snacks as an innovative approach to increase physical activity and improve the health of people living with type 2 diabetes.

**Thank you for giving hope for a healthier future to people with type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. JONATHAN SCHERTZER

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Jonathan Schertzer, an associate professor in Biochemistry and Biomedical Sciences at McMaster University, who holds a Canada Research Chair in Metabolic Inflammation, is bringing us one step closer to better health outcomes for people living with diabetes.**

Many people are at risk for both diabetes and heart attacks. Millions of people take statin drugs to lower bad cholesterol and reduce the risk of heart attacks. The government recently changed the warning label for all statins, however, to include an increased risk of diabetes, as statins can increase blood sugar levels.

Many doctors believe that the benefits of statins outweigh the risks. Dr. Jonathan Schertzer agrees. His research aims to improve the safety and effectiveness of statins, and stop the diabetes-related side-effects of these drugs.

Dr. Schertzer discovered that statins activate inflammation, which can be targeted without interfering with the cholesterol-lowering benefits of statins. Targeting inflammation can prevent diabetes-related side effects and enhance the lowering of cholesterol. He and his team will test if blocking certain specific causes of inflammation are the best targets to improve cholesterol-lowering and prevent diabetes-related side effects.

Preventing even a small increase in blood sugar levels would have a significant benefit given the large number of patients taking a statin who are also at risk for diabetes.

**Thank you for giving hope for a healthier future to people with diabetes.**



## OUR RESEARCHERS | DR. KYOUNG HAN KIM

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Kyoung Han Kim, a scientist and director of the Functional Genetics and Metabolism Laboratory at the University of Ottawa Heart Institute, is bringing us one step closer to better health outcomes for people with type 2 diabetes and fatty liver disease.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. For people with type 2 diabetes, they can no longer produce or use enough insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death. Type 2 diabetes is caused by several different risk factors, including obesity, and accounts for 90% of diabetes cases in Canada.

Fatty liver disease is the most common complication of type 2 diabetes, affecting 1 in 5 Canadians. If not managed or treated, people with fatty liver disease may develop irreversible liver failure.

A new group of drugs called SGLT2 inhibitors has been approved by Health Canada and is being widely used to lower the blood glucose levels of people with type 2 diabetes. Notably, several clinical trials have shown that these drugs effectively improve fatty liver disease in type 2 diabetes patients as well.

Dr. Kyoung Han Kim's goal is to understand how SGLT2 inhibitors work to improve fatty liver disease. He and his team will:

1. Determine how SGLT2 inhibitors work against fatty liver disease.
2. Investigate how SGLT2 inhibitors improve metabolism in fatty livers.
3. Examine the molecular mechanism of SGLT2 inhibitors' beneficial effects.

This work will improve the care of patients living with type 2 diabetes and fatty liver disease.

**Thank you for giving hope for a healthier future to people with type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. MATHIEU LAPLANTE

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Mathieu Laplante, professor with the Faculty of Medicine at Université Laval, is bringing us one step closer to better treatments for people with type 2 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. For people with type 2 diabetes, they can no longer produce or use enough insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death.

Dr. Mathieu Laplante and his research team are studying a protein called VSTM2A. In mice, this protein significantly improves blood sugar control.

Through Diabetes Canada's support, Dr. Laplante will:

1. Determine the potential of VSTM2A to improve blood sugar control and metabolism in mice.
2. Confirm the impacts of VSTM2A on major tissues.
3. Study the side effects triggered by VSTM2A.

His work will reveal new biological processes that could be used to improve metabolism and blood sugar control in people with type 2 diabetes.

**Thank you for giving hope for a healthier future to people with type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. MICHAËL SHUM

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Michaël Shum, associate professor with the Department of Molecular Medicine at Université Laval, is bringing us one step closer to preventing type 2 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. For people with type 2 diabetes, their bodies can no longer produce or use insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death.

Lipids are molecules that serve as the building blocks of all living cells. Lipids that are not safely stored within cells, however, can accumulate and become dangerous, resulting in lipid toxicity. Lipid toxicity in the liver can lead to the development of type 2 diabetes. Usually, mitochondria – the powerhouse of the cell which process lipids into energy – protect cells from lipid toxicity. But in people with diabetes, their mitochondria do not function properly.

Dr. Michaël Shum is working on restoring proper function to liver cell mitochondria, by examining the interaction between mitochondria and lipids. He and his team hope to identify new therapies to treat lipid toxicity and prevent type 2 diabetes.

**Thank you for giving hope for a healthier future to people with type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. MINNA WOO

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Minna Woo, professor, Departments of Medicine, Institute of Medical Science, Immunology, and Pharmacology and Toxicology and Director, Banting & Best Diabetes Centre at the University of Toronto, is bringing us one step closer to improved treatments for people living with diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. For people with diabetes, their bodies can no longer produce or use insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death.

The autonomic nervous system controls body functions such as food digestion and breathing. The vagus is an important branch of this nervous system that can regulate blood sugar levels by controlling insulin activity. When the vagus nerve malfunctions, this can precede the development of diabetes.

Dr. Minna Woo is examining whether manipulating the vagus nerve can prevent or treat diabetes. Currently, some conditions such as depression and epilepsy can be treated through vagus nerve stimulation. Her research will determine whether this innovative treatment can also be used to treat diabetes.

**Thank you for giving hope for a healthier future to people with diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. MORGAN FULLERTON

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Morgan Fullerton, associate professor and director, Flow Cytometry and Virometry Core at the University of Ottawa, is bringing us one step closer to better treatments for people with type 2 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. Insulin is produced by cells in the pancreas called beta cells. For people with type 2 diabetes, they can no longer produce or use insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death.

Dr. Morgan Fullerton's research has uncovered that when his team block certain beta cell processes, the cells release more insulin, which lowers blood sugar levels.

Diabetes Canada's funding will enable Dr. Fullerton to:

1. Understand how more insulin is released when they block these processes in the beta cell.
2. Identify drugs that may be able to target this.
3. Test whether beta cells that have been treated with these drugs can lead to better control over blood sugar levels.

By understanding how these cell processes affect insulin release, Dr. Fullerton hopes to leverage existing therapies to help combat and treat type 2 diabetes.

**Thank you for giving hope for a healthier future to people with type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. PETER THOMPSON

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Peter Thompson, assistant professor at the Max Rady College of Medicine at the University of Manitoba, is bringing us one step closer to preventing type 1 diabetes.**

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. Insulin is produced by cells in the pancreas called beta cells. For people with type 1 diabetes, their own immune system destroys their beta cells. They can no longer produce insulin to control their blood sugars, which can lead to health complications such as nerve damage, blindness, heart disease, kidney failure, anxiety, amputations, and even death.

We need new treatments that stop the immune attack and preserve beta cells.

Dr. Peter Thompson and his team are studying beta cells that escape the immune system attack, but become sick and then further accelerate the development of type 1 diabetes. They have discovered that in mice, removal of the sick beta cells spares the healthy beta cells and prevents type 1 diabetes. In order to move this exciting new approach towards clinical trial they will evaluate ways to target sick human beta cells. They will also establish markers to track these sick beta cells to determine who could most benefit from this therapy.

These studies will lay the groundwork for a new preventive therapy and improved screening of beta cell health in people with type 1 diabetes.

**Thank you for giving hope for a healthier future to people with type 1 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. RYAN RHODES

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Ryan Rhodes, professor in the School of Exercise Science, Physical and Health Education, and Director of the Behavioral Medicine Laboratory at the University of Victoria, is bringing us one step closer to a future without type 2 diabetes.**

Promoting regular physical activity is one of the most effective methods of reducing people's chances of developing diabetes. Developing regular physical activity habits begins in childhood; unfortunately, over 80% of Canadian children are not active enough to establish the physical activity habits needed for diabetes prevention. To improve children's physical activity levels, we need to improve physical activity levels for the whole family.

Currently, we lack effective physical activity interventions targeted at families. We know that identity is one of the most powerful determinants of behaviour, but a focus on how to promote a physical activity identity amongst families has never been explored.

Dr. Ryan Rhodes is testing an innovative approach that focuses on identity formation and behavioral change, rather than traditional education and goal-setting approaches, to improve families' physical activity levels. His interventions concentrate on encouraging family members and families to take on self- and social identities as exercisers and physically active families. This approach holds promise to create lasting child behaviour change, improved physical activity levels, and help prevent type 2 diabetes.

**Thank you for giving hope for a healthier future without type 2 diabetes.**

# DIABETES CANADA



## OUR RESEARCHERS | DR. SONIA BUTALIA

**Thank you for your generosity. Diabetes Canada is grateful to our donors for supporting critical research that will end diabetes.**

**Through your support, Dr. Sonia Butalia, associate professor in the Departments of Medicine and Community Health Sciences at the University of Calgary, is bringing us one step closer to better, more equitable treatment for people living with diabetes.**

In Canada, who you are impacts how healthy you'll be. This is health inequity – when your ethnic background or level of income or where you live affects your health outcomes. This is unfair and unjust.

The most common complication of diabetes is cardiovascular disease, which includes heart attacks, strokes, and heart failure.

Since 2015, studies have shown a newer medication is highly effective at reducing heart failure in people with diabetes. Unfortunately, when Dr. Sonia Butalia and her team looked at a small group of family medicine practices, less than 20% of people living with diabetes who would benefit from this medication were actually prescribed the treatment.

Through Diabetes Canada's support, Dr. Butalia will gain a better understanding of why this lack of treatment is taking place. She and her team will speak with people living with diabetes as well as doctors, and look at anonymous prescribing information to determine if there are certain groups of people living with diabetes and heart failure who are not receiving this treatment.

Together, this information will help reduce barriers to care for different groups and improve equitable approaches to medication use.

**Thank you for giving hope for a healthier future to all people with diabetes.**