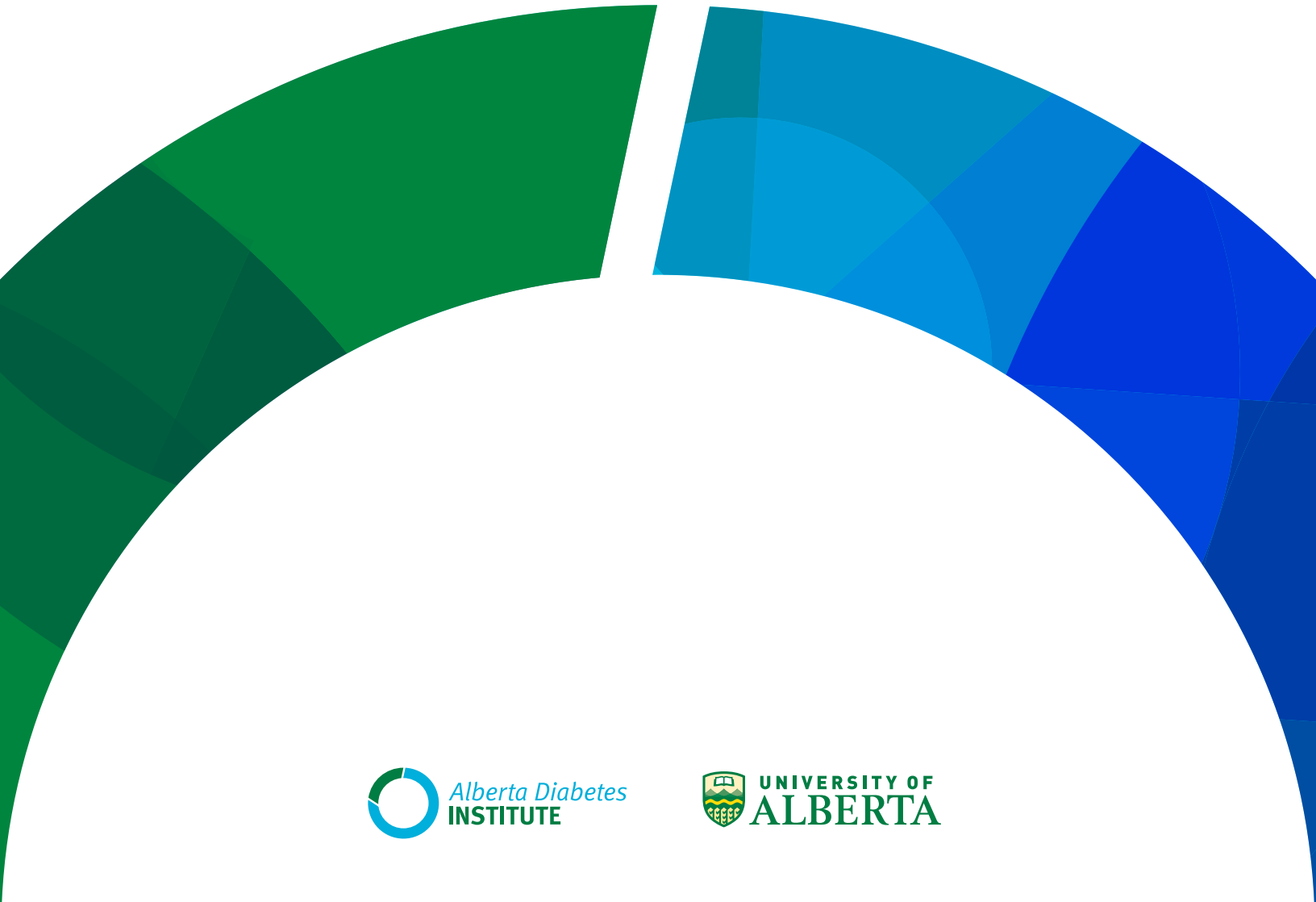
A 10-YEAR CELEBRATION

ALBERTA DIABETES INSTITUTE

2017-2018 BIENNIAL REPORT



Alberta Diabetes INSTITUTE

UNIVERSITY OF ALBERTA

THERE IS

RIGHT NOW

BUT

IS BEING MADE

IN ALBERTA.

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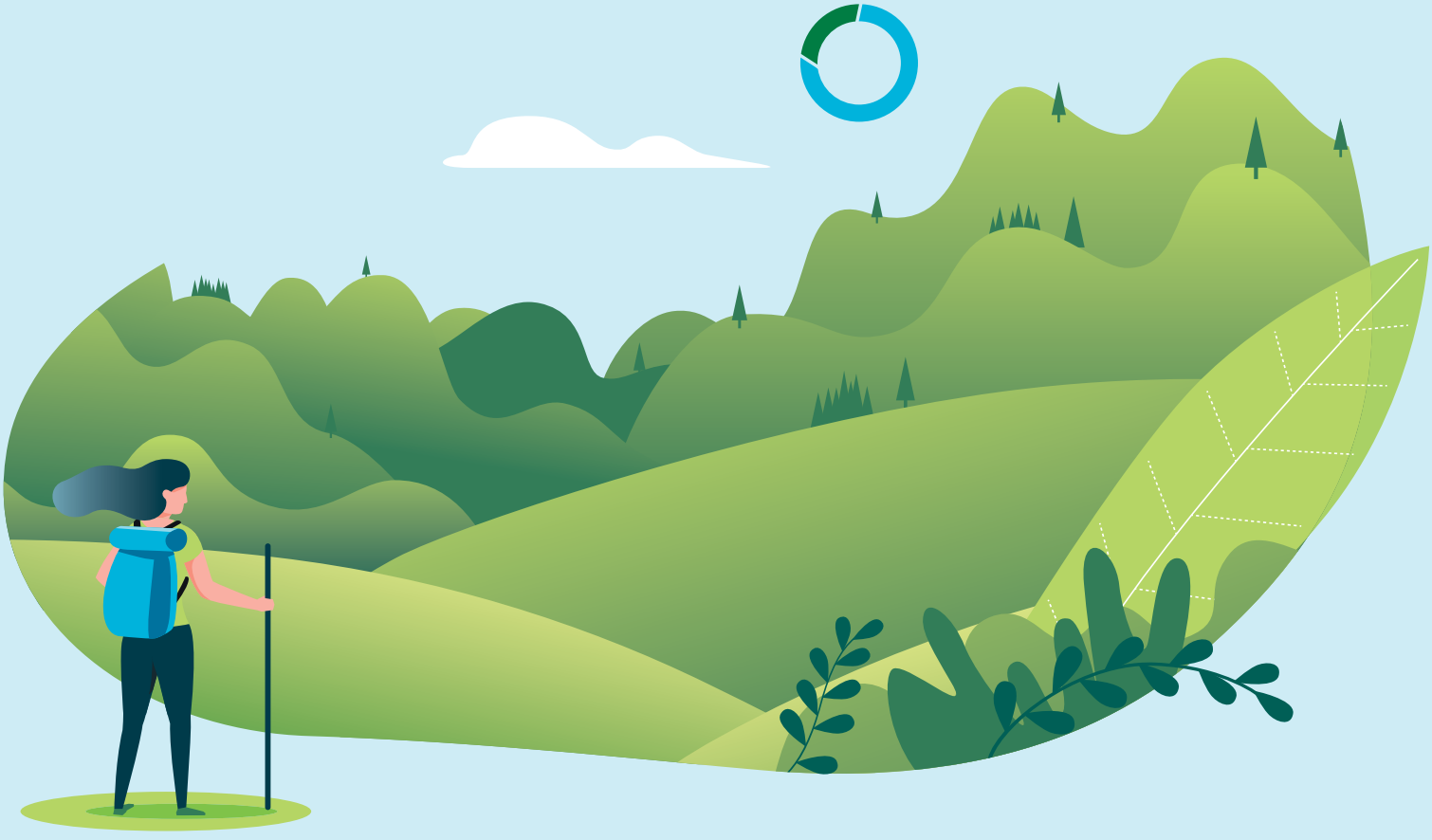


(BELOW) ADI Director Dr. Peter Light with *Junior Researchers for a Day* Sarah (LEFT) and Siyapreet (CENTER)

THE ALBERTA DIABETES INSTITUTE (ADI) IS 10 YEARS OLD...WELL, SORT OF. IN 2017 THE ADI CELEBRATED 10 YEARS SINCE OPENING ITS DOORS TO BECOME CANADA'S LARGEST FREE-STANDING STRUCTURE DEDICATED TO DIABETES RESEARCH, BOASTING 55 PRINCIPAL INVESTIGATORS AND NEARLY 200 TRAINEES FROM MULTIPLE SCIENTIFIC DISCIPLINES.

But the contributions made by the University of Alberta towards understanding and treating diabetes extend as far back as the first clinical application of insulin itself. University of Alberta Professor James Collip was instrumental in developing the protocol for the purification and first clinical application of insulin in 1921. In 1989, University of Alberta graduate Ray Rajotte led a team of clinical scientists to perform Canada's first islet transplant using technology he developed during his earlier PhD work in biomedical engineering. Just 10 years later, James Shapiro led the development of the landmark Edmonton Protocol: the first islet transplant procedure to consistently achieve 100 per cent insulin independence. He and others at the ADI are now pursuing the next generation of treatments for islet transplantation, immunomodulation and beta cell regeneration.

As remarkable as it has been for achievements made in Type 1 diabetes, our scientists are also at the forefront of numerous research areas related to Type 2 and gestational diabetes. In the past few years alone, they have identified a number of important intracellular signalling pathways that control insulin production and secretion. Our clinical, nutritional and metabolic scientists have made incredible progress in gestational diabetes research to help shape new policies for specific groups of women at high risk. Health outcomes research has brought to light the disadvantages of diabetes health care for First Nations and has developed the practical means for improving access to services.

The fight against diabetes is far from over, but with every new discovery, clinical trial and improvement to health care, we are one step closer to winning the battle. Thank you for reading this biennial report that highlights some of the contributions made these past two years by the dedicated women and men who make up the Alberta Diabetes Institute.

Dr. Peter Light
DIRECTOR, ALBERTA DIABETES INSTITUTE (ADI)
DR. CHARLES A. ALLARD CHAIR IN DIABETES RESEARCH

WHAT IS THE ALBERTA DIABETES INSTITUTE?

THE ALBERTA DIABETES INSTITUTE (ADI) IS A COMBINATION OF PEOPLE, INFRASTRUCTURE AND SERVICES DEDICATED TO THE PURSUIT OF EXCELLENCE IN ALL FORMS OF DIABETES RESEARCH.

The facility itself is in the Li Ka Shing Centre for Health Research Innovation on the University of Alberta campus and consists of:

- Wet and dry lab research areas
- Offices and workstations
- A clinical research unit
- Core services
- Research support structures

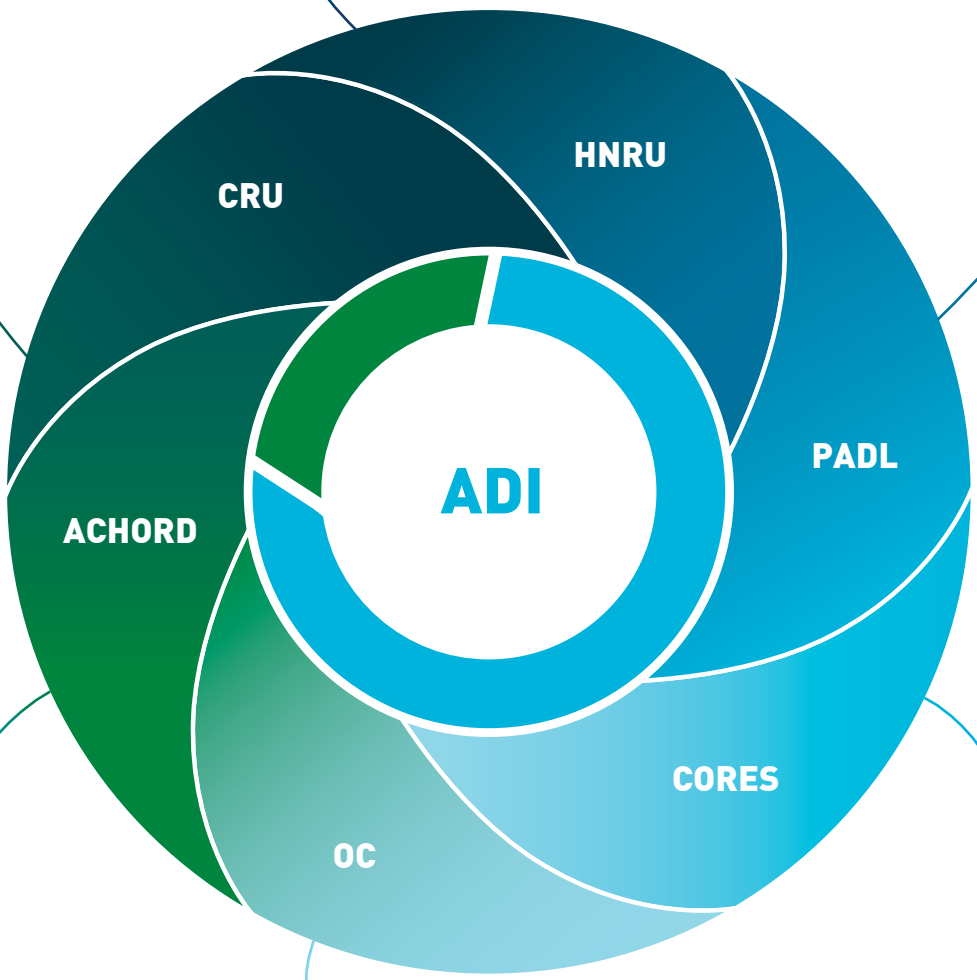
The space also encompasses a number of self-administered groups performing research in focal areas. With 25,000 square metres of space, the ADI is Canada's largest free-standing structure dedicated to diabetes research. The ADI is part of the Faculty of Medicine and Dentistry, but the 50-plus scientists making up membership are from multiple universities, faculties, schools and departments. These scientists work in a wide range of disciplines, reflecting the nature of diabetes itself, which is a disease of multiple factors.

Facilities & Collaborations

Clinical Research Unit
Biomedical clinical research
Alberta Diabetes Institute

Human Nutrition Research Unit
Food, metabolism and body composition clinical research
Faculty of Agriculture, Life and Enviromental Sciences

Physical Activity Diabetes Lab
Exercise physiology clinical research
Faculty of Kinesiology, Sport and Recreation



Alliance for Canadian Health Outcomes Research in Diabetes
Health outcomes research and policy development
School of Public Health

Obesity Canada
Weight-related health issues and policy development

Core Services
Technical expertise and access to specialized equipment
Alberta Diabetes Institute and Faculty of Medicine and Dentistry

Research Areas

Institute Membership*

Faculty of Agricultural, Life and Environmental Sciences
Rhonda Bell, Jean Buteau, Cathy Chan, Catherine Field, René Jacobs, Diana Mager, Vera Mazurak, Carla Prado, Spencer Proctor, Caroline Richard, Donna Vine, Jens Walter

Faculty of Medicine and Dentistry
Babita Agrawal, Colin Anderson, Geoff Ball, Denise Campbell-Scherer, Jason Dyck, John Elliott, Maria Febbraio, Edan Foley, Rose Girgis, Andrea Haqq, Padma Kaul, Greg Korbutt, Harley Kurata, Richard Lehner, Peter Light, Gary Lopaschuk, Patrick MacDonald, Finlay McAlister, Gavin Oudit, Andrew Pepper, Gina Rayat, Elizabeth Rosolowsky, Edmond Ryan, Yves Sauvé, Peter Senior, AM James Shapiro, Arya Sharma, Gita Sharma, Lori West, Rachel Wevrick, Roseanne Yeung, Jessica Yue, Douglas Zochodne

Faculty of Pharmacy and Pharmaceutical Sciences
Scot Simpson, John Ussher

Faculty of Kinesiology, Sport, and Recreation
Normand Boulé, Margie Davenport, Jane Yardley

School of Public Health
Dean Eurich, Jeff Johnson

Faculty of Law
Tim Caulfield

University of Calgary
Mark Ungrin

Athabasca University
Steven Johnson

(*on December 31, 2018)

Impact by our Members

TRAINEES LED

MSc

84 2017

94 2018

PhD

79 2017

77 2018

PDF

38 2017

40 2018

GRADUATES

MSc

25 2017

33 2018

PhD

14 2017

18 2018

ANNUAL RESEARCH FUNDS HELD (OPERATING)

Total	Member Median
$17.1M 2017	• $218K
$17M 2018	• $232K

SCIENTIFIC PUBLICATIONS

Total

341 2017

367 2018

Member Median

5 2017

5 2018

Clinical Trials Led

89 2017

74 2018

RESEARCH HIGHLIGHTS

ADI researchers are leaders in virtually every field of science relevant to diabetes, translating discoveries from bench to bedside to population health. This section provides a few recent highlights that demonstrate how our scientists continue to challenge out thinking about the causes of diabetes and to develop ways to better prevent and treat all forms of the disease.

Gestational Diabetes

ENRICH PROJECT PROMOTES HEALTHY WEIGHTS AND EATING HABITS BEFORE AND AFTER PREGNANCY

Nearly all women experience some degree of insulin resistance during their pregnancy, making them more prone to upswings in their blood sugar levels. While this tends to return to normal after childbirth, unchecked gestational diabetes (GD) can be a risk for developing Type 2 diabetes (T2D) later in life, both for the mother and her child.

There are a number of risk factors that can contribute to GD becoming a health concern, particularly poor nutrition or inappropriate weight gain. **Dr. Rhonda Bell** is the lead investigator for an ambitious project called ENRICH that received five-year funding from Alberta Innovates beginning in 2013 to study and promote healthy weights and eating habits among women during and after pregnancy. ENRICH encompasses a number of projects that fall under four general research themes **(https://enrich.ales.ualberta.ca/Research)** with researchers working closely with patients and community partners throughout the province to develop protocols that work.

One research theme focuses on recognizing and overcoming the barriers facing specific groups of women. For example, poverty, language, recent immigrant status and rural versus urban access to resources are just a few of the issues that can impede access to health care services.

Another research theme centres on First Nations women—one of Canada's most vulnerable groups for GD and related complications. **Dr. Richard Oster** and **Dr. Ellen Toth** worked with the Wetaskiwin Primary Care Network (PCN) and Maskwacis Health Services to develop an Elder Mentoring Support program called *Maskwacis Kokums and Mosoms* ("Grandmothers and Grandfathers"). This has been put into practice, offering weekly prenatal classes that include cultural and social support for new moms and dads*.

(*http://www.wetaskiwintimes.com/2017/02/15/ kokums-and-mosoms-helping-expectant-parents)

(ABOVE) Dr. Rhonda Bell, principal investigator for the ENRICH program

DID YOU KNOW?

Gestational diabetes mellitus is the **fastest rising** type of diabetes in the country

A third research theme involved surveying new moms about nutritional, physical activity and weight management advice they received from health care providers during pregnancy. In turn, the health care providers were asked about their experiences serving pregnant women. A report detailing the findings of this study was made available through Alberta Health Services and provides insight that is shaping future practice.

Clinical research comprises the fourth theme where new information is being generated that can help shape future nutritional guidelines. This includes the APrON (Alberta Pregnancy Outcomes and Nutrition) study that examines how dietary patterns during pregnancy affect long-term outcomes for both mom and baby (NCT02711644). The PCAL (Postpartum Calorimetry) study involving metabolism expert **Dr. Carla Prado** is bringing to light much-needed information about energy requirements of women in their first and last trimesters and is the largest study of its kind ever conducted. The PCAL study utilizes a whole body calorimetry unit, part of ADI's Clinical Research Unit and the only such operational facility of its kind in Canada.

Selected Publications

Nikolopoulos H, Mayan M, Macisaac J, Miller T, Bell RC (2017). Women's perceptions of discussions about gestational weight gain with health care providers during pregnancy and postpartum: a qualitative study. BMC Pregnancy Childbirth 2017 Mar 24;17(1):97. doi: 10.1186/s12884-017-1257-0

Subhan FB, Colman I, McCargar L, Bell RC, APrON Team (2017). Higher Pre-pregnancy BMI and Excessive Gestational Weight Gain are Risk Factors for Rapid Weight Gain in Infants. *Maternal and Child Health Journal* 2017 Jun;21(6):1396-1407. doi: 10.1007/s10995-016-2246-z

(ABOVE) Co-investigators Dr. Roseanne Yeung and Jamie Boisvenue at the launch of their gestational diabetes website

WEBSITE SUPPORT FOR MOMS

ADI member and endocrinologist **Dr. Roseanne Yeung** has treated many women with GD and is seeking more effective ways to prevent the disease. When expectant moms are diagnosed with GD, the responsibility of management can be overwhelming, especially when they thought they were already doing everything right. **Dr. Yeung** acknowledges that diabetes clinics do a tremendous job providing women with the information they need to manage GD, but realized that women may not be coming out of clinics with a correct understanding of what to do.

Yeung combined forces with endocrinologist **Dr. Eddie Ryan**, public health expert **Dr. Padma Kaul** and epidemiologist **Jamie Boisvenue** to undertake research aimed at getting to the bottom of the disconnect. The community-based research involved 17 participants who had visited a GD clinic during their pregnancy, and brought them together with front-line workers and the researchers themselves. The team found that clinics provided plenty of information when it came to testing blood sugars, adjusting diets and lifestyle, or even self-administering insulin injections if necessary, but there were problems.

One issue that came to light was inconsistency between information being given at clinics and online information. This led to confusion and a lack of confidence. Another issue was that clinics weren't dealing with the mental aspect of stigma associated with GD—a factor that kept women from making lifestyle changes out of blame. Further, language and cultural barriers sometimes made it difficult to adopt the necessary changes. Participants also revealed another important factor: they were accessing a specific website that was designed by Dr. Ryan. This site was popular for expectant moms with GD seeking supplemental information **(www.diabetes-pregnancy.ca)**; however, study participants felt the site would be a much more valuable tool if it was more fully developed. As a result, the research team then made it their priority to redesign the site with additional resources such as patient narratives, a blog and numerous support resources. These changes made the online tool more powerful for patients both before and after attending clinics.

In Alberta, the risk of developing diabetes among Indigenous Peoples is **60-70% higher than the general population.** Indigenous females also have a higher prevalence of diabetes than males

Indigenous Health Care

RADAR AIMS TO ADDRESS SHORTCOMINGS OF CURRENT HEALTH CARE SYSTEM

Why do Canada's Indigenous people figure so prominently in any discussions about diabetes? One reason is sheer numbers: First Nations, Inuit and Metis people account for more than 6 per cent of the country's population. This is more than 2 million individuals in total. There are also genetic, social, economic and cultural factors that put the Indigenous population at a much higher risk of developing Type 2 diabetes compared with non-Indigenous people. Even more alarming, diabetes health care delivery for Indigenous people does not approach the chronic care model favoured by the rest of Canada. The "chronic care" model includes the 5 Rs:

- Register (systematically tracking all patients)
- Relay (facilitate information sharing)
- Recall (timely review and reassessment)
- Recognize (screening/risk factors assessment)
- Resource (support self-management)

There are a number of reasons for this gap. Isolated communities that lack specialists, ineffective patient registries, and cultural sensitivities are just a few examples. In short, First Nations communities typically lack the infrastructure and resources needed to deliver the 5 Rs. Despite recognition of this, there have been few steps taken to close the gap in health care delivery for diabetes patients in First Nations communities. The result is suboptimal management of the disease.

(ABOVE) In 2017, ADI celebrated its 10-year anniversary with its "Portraits of Diabetes" photo series—offering a glimpse into what it's like to live with diabetes. Keisha Cardinal holds the blanket that's been a source of comfort for her since the age of 10, when she awoke in the hospital feeling scared and vulnerable.

ADI members **Drs. Dean Eurich, Jeff Johnson** and **Sumit Majumdar** were part of a team that led an innovative research trial called Reorganizing the Approach to Diabetes through the Application of Registries (RADAR). This trial focused on integrating two important elements for health care delivery for First Nations communities:

(i) An electronic health records (EHR)/registry system called the Community Assessment Response and Empowerment (CARE) platform

(ii) A centralized care coordinator

The CARE platform was developed by Canadian informatics company OKAKI Health Intelligence Inc. and was designed to meet the specific requirements of nursing-driven health programs currently in place on reserves, and to overcome shortfalls of existing EHRs. The latter stems from the fact that EHRs are typically designed for physician offices and are not harmonized with things like programs or the practice/reporting needs of service providers on reserves. The CARE platform brings together a patient registry and electronic clinical chart for patients across three programs that traditionally were not linked on reserves: Home and Community Care; Aboriginal Diabetes Initiative; and, Community Health. Doing so enables the capturing of pertinent medical data that can be shared amongst the service providers on web-based portals. This allows for remote monitoring and evaluation of care and reporting.

The other element to be integrated along with CARE under the RADAR project is the centralized care coordinator. Many First Nations patients don't have access to a dedicated physician who coordinates their care. This necessitates a different approach to health care delivery on reserves. The coordinator is ideally a First Nations registered nurse and certified diabetes instructor who has experience with diabetes health care on reserves and would work on site. They would connect with other health care workers on reserve as well as with other First Nations communities.

Together the two elements of RADAR–CARE and the centralized coordinator–make it possible for First Nations diabetes patients to receive health care that better approaches the 5 Rs model. It also allows for the tracking of population level data, which is important for assessing trends and making higher level policy decisions. RADAR is currently operating in seven First Nations communities and is seeking funding to initiate operations in five more across the province.

Selected Publications

Eurich DT, Majumdar SR, Wozniak LA, Soprovich A, Meneen K, Johnson JA, Samanani S (2017). Addressing the gaps in diabetes care in first nations communities with the reorganizing the approach to diabetes through the application of registries (RADAR): the project protocol. *BMC Health Services Research* 17: 17:117 DOI 10.1186/s12913-017-2049-y

(LEFT) Dr. Gita Sharma, Endowed Chair in Indigenous Health

WHY ACT NOW? HELPS INDIGENOUS AND NEW CANADIAN YOUTH DEVELOP HEALTHY HABITS

Dr. Sangita Sharma has worked with numerous Indigenous communities to help develop and implement improvements for healthy living in the context of social and cultural sensitivities. Her work has guided policy-making and the establishment of programs for First Nations, Inuit and Inuvialuit that are tackling high incidences of numerous chronic diseases, including diabetes. Since 2012 her WHY ACT NOW? program has helped develop and sustain heathy eating and lifestyle habits for Indigenous and new Canadian youth in Edmonton. In 2017, Sharma received the Alberta Medical Association's Medal of Honour for her contributions to ensuring health care for people in Alberta. In 2018, Sharma received a $1 million grant from CIHR to embark on an ambitious research project to improve the health of Indigenous women and their babies in Canada's North through culturally sensitive and community-driven interventions. Sharma and her team will collect evidence about women's experiences with breastfeeding, food security, and access to health care during pregnancy and postpartum. After they've collected the data the researchers will work with communities towards developing sustainable programs and practices aimed at improving maternal and infant care.

UNRAVELLING THE MECHANISM OF ACTION OF FLUTAMIDE

Polycystic ovary syndrome (PCOS) is a surprisingly common hormonal disorder in women of reproductive age (6 to 10 per cent in North America), the causes of which aren't well understood. Symptoms include irregular, infrequent or prolonged menstrual cycles; excessive levels of testosterone causing male pattern hair growth; and, polycystic ovaries that fail to ovulate regularly, resulting in reduced fertility. The disorder is strongly linked with obesity, dyslipidemia, cardiovascular disease and metabolic syndrome, making it a high risk factor for developing Type 2 (T2D) diabetes and gestational diabetes. For T2D patients without PCOS, metformin monotherapy improves both insulin sensitivity and dyslipidemia, but for patients with PCOS, lipid profiles are largely unaffected.

Standard of care treatment for PCOS includes diet and lifestyle alterations. It also includes prescribing a combination of metformin and the androgen receptor antagonist flutamide, which together are effective at normalizing blood glucose and lipid profiles. **Dr. Richard Lehner** and **Dr. Spencer Proctor** were part of a research group led by PCOS expert **Dr. Donna Vine** that looked at the how this combination of drugs elicited its beneficial effects, using a breed of mice prone to PCOS and metabolic syndrome. Groups of mice received metformin, flutamide or both, and were followed over a six-week period. While the group receiving metformin alone had an expected improvement in insulin sensitivity, the group receiving flutamide therapy had significant reductions in plasma triglycerides and apolipoproteins that are overproduced by the liver in T2D. This was associated with a decrease in the intestinal secretion of triglyceride, cholesterol and apolipoproteins that are known to contribute to cardiovascular disease. The group receiving the combination therapy did not show marked improvements in lipid profiles over the group receiving flutamide alone, suggesting the lipid improvements were largely associated with androgen receptor antagonism. Combination therapy led to a decrease and increase in androgen receptor and estrogen receptor α mRNA intestinal expression, respectively. It also upregulated hepatic and insulin signaling pathways, which may contribute to the improvements in lipid metabolism. Their work sets the stage for additional research that will help target interventions in women with PCOS and metabolic syndrome (*American Journal of Physiology*. Endocrinology and metabolism, 316:E16-E33; doi: 10.1152/ajpendo.00018.2018. Epub 2018 Aug 28).

Selected Publications

(*American Journal of Physiology – Endocrinology and Metabolism,* 316:E16-E33 (2019); doi: 10.1152/ajpendo.00018.2018. Epub 2018 Aug 28).

DID YOU KNOW?

The Clinical Islet Transplant Program at the University of Alberta leads the world in islet transplants and has performed more than **500 islet transplantation procedures based on the Edmonton Protocol**

Director Dr. James Shapiro (ABOVE) and Medical Director Dr. Peter Senior (RIGHT), Clinical Islet Transplant Program

Overcoming the Immune Challenge

USING REGULATORY T CELLS TO MODULATE IMMUNE-MEDIATED REJECTION OF TRANSPLANTS

One of the most significant breakthroughs in diabetes treatment since the discovery and clinical application of insulin itself was the development of the Edmonton Protocol. The team included ADI members **Drs. James Shapiro**, **Ray Rajotte**, **Greg Korbutt**, **Eddie Ryan** and **Ellen Toth**, who combined advances in beta cell isolation and transplantation with a novel combination of immunosuppressants. First performed in 2000, this procedure continues to allow recipients to become insulin-independent for years. Still, the Edmonton Protocol is not a cure for T1D, and more innovation is needed to overcome a number of shortfalls.

One challenge is the early loss of islets after transplantation due to hypoxia and a lack of vasculature. Another issue is the need to counter post-transplant rejection using immunosuppressant drugs, which have their own side effects. This limits the application of islet transplants earlier in the course of the disease. Yet another challenge is the limited supply of pancreatic islets from cadaveric donors–there simply aren't enough to meet demand.

Using cellular therapies instead, ADI scientists are looking at ways to modulate the immune system without chemical-based immunosuppressants. One approach that has been the subject of intense research in the past couple decades is the use of regulatory T cells. This is a type of lymphocyte that has a major influence on self-tolerance by tempering the action of effector T cells that are at the heart of many immune-mediated disorders. **Dr. James Shapiro**, and co-investigator **Dr. Peter Senior** are leading a clinical trial to explore the feasibility of collecting and expanding regulatory T cells (Tregs) from a T1D patient's blood, and infusing these back into patients six weeks after islet transplantation. Following a phase 1 study that will focus on dose-range finding and safety (NCT03444064), subsequent clinical trials will focus more on efficacy.

Selected Publications

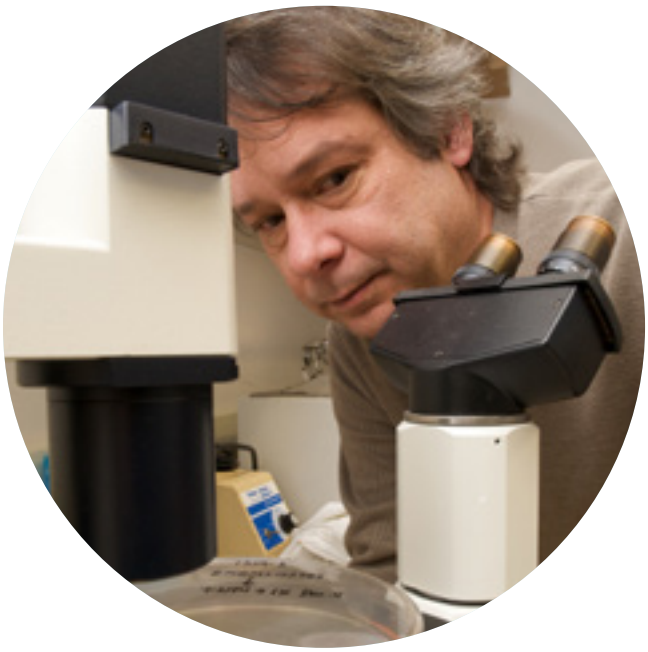
Gamble A, Pepper AR, Bruni A and Shapiro AM (2018). The journey of islet cell transplantation and future development. *Islets,* 10:2, 80-94, doi: 10.1080/19382014.2018.1428511

(ABOVE) Bob Teskey was one of the original seven patients to take part in the Edmonton Protocol, where donor islets would be transplanted into his liver and produce insulin. (Source: "Portraits of Diabetes")

Cardiac pediatrician **Dr. Lori West** is researching the immunomodulatory properties of Tregs that are derived from another source: pediatric thymuses. This organ is commonly removed and discarded during pediatric cardiac surgery; it is also a rich source of FOXPS^{+} Tregs that can be isolated, expanded and potentially offer advantages as an immunosuppressant therapy. West's team is currently developing the isolation and expansion protocol for producing Tregs from thymuses that can be translated to a Good Manufacturing Practice (GMP) compliant procedure for clinical application. Early preclinical testing suggests that the thymus-derived Tregs can be produced in abundant numbers with low contamination (e.g., activated effector T cells) and high stability under inflammatory conditions. Dr. West has also teamed with **Dr. Peter Light** and **Dr. Colin Anderson** to explore the use of lentiviral gene transfer technology to engineer thymus-derived Tregs that will specifically target beta cells and induce immune tolerance in T1D.

Selected Publications

Dijke IE, Hoeppli RE, Ellis T, Pearcey J, Huang Q, McMurchy AN, Boer K, Peeters AM, Aubert G, Larsen I, Ross DB, Rebeyka I, Campbell A, Baan CC, Levings MK and West LJ (2016). Discarded human thymus is a novel source of stable and long-lived therapeutic regulator T cells. *American Journal of Transplantation,* 16(1):58-71. doi: 10.1111/ajt.13456



(ABOVE) Dr. Greg Korbutt

XENOTRANSPLANTATION

Dr. Greg Korbutt continues to lead research around the use of neonatal porcine islets (NPIs) as an alternative to human islets for transplantation, an approach that addresses donor shortage and potentially immune-mediated rejection. He has teamed up with researchers Dr. Shane Grey (Garvan Institute of Medical Research, Sydney, Australia) and Dr. Bruce Verchere (University of British Columbia) for a collaborative research project that aims to generate genetically-modified porcine islets for xenotransplantation that are resistant to inflammatory insult and will also promote a micro-environment that achieves immune tolerance. The Korbutt lab is also studying co-transplantation of mesenchymal stem cells (MSCs) with NPIs to improve graft survival. MSCs reside in several tissues such as bone marrow and have demonstrated the ability to promote an enhanced microenvironment for transplanted islets that is anti-inflammatory, immunosuppressive and rich in growth factors. Preclinical research in Korbutt's lab has demonstrated that MSCs co-transplanted with neonatal porcine islets in diabetic mice resulted in significantly earlier normoglycemia and vascularization, improved glucose tolerance, and increased insulin content (Diabetes, 66(5):1312-1321. doi: 10.2337/db 16-1068, 2017). Korbutt is also director of Alberta Cell Therapy Manufacturing (ACTM), Western Canada's only GMP compliant production facility.

IMPROVING CLINICAL FEASIBILITY OF HEMATOPOIETIC CHIMERISM

For a number of years **Dr. Colin Anderson** has been researching mixed chimerism, a state of having both donor and recipient stem cells in a transplant recipient with the goal of achieving immune tolerance to grafts. Establishing this coexistence using allogenic bone marrow transplants is a means to induce host tolerance of grafts, including islet transplants. This has been achieved to some success in animal models, but translation to the clinic is hampered by conditioning protocols. For example, the success of achieving mixed chimerism in murine models depends on total body irradiation; thymic irradiation; anti-CD40 ligand monoclonal antibody; high dose rapamycin; or, a megadose of bone marrow cells (BMCs). All of these are highly toxic in clinical practice or impractical in the case of cadaveric islet transplantations.

Anderson explored the hypothesis that maximizing T cell depletion using donor-specific transfusion cyclophosphamide and busulfan (myeloablative conditioning agents), combined with a novel triple T cell depleting antibody combination (anti-CD4/8/90) in the host would eliminate the need for high-dose BMC or agents lacking clinical translatability. What he found was that this aggressive T cell ablation protocol allowed early and stable chimerism and donor-specific tolerance in a challenging model of type 1 diabetes, the non-obese diabetic (NOD) mouse. This was achieved with a clinically relevant amount of BMC and without inclusion of irradiation, anti-CD40 antibody or rampamycin. Immunotolerance was confirmed using a skin graft, which is highly immunogenic. Although some animals had transient chimerism, their results still opened up the avenue of identifying which candidates were likely to have unstable chimerism and in need of later intervention to circumvent transplant rejection. A number of steps in Anderson's protocol will need to be modified to translate from the mouse model to humans. Still, these findings are the most clinically feasible to date that have achieved fully allogenic mixed chimerisim in NOD mice.

Selected Publications

Lin J, Chan WFN, Boon L and Anderson CC (2018). Stability of Chimerism in Non-Obese Diabetic Mice Achieved By Rapid T Cell Depletion Is Associated With High Levels of Donor Cells Very Early After Transplant. *Frontiers in Immunology,* 9:837, doi:10.3389/fimmu.2018.00837

Laurie Kanerva (CENTER) and her husband Jim had the challenge of raising two children diagnosed with type 1 diabetes, Dana (LEFT) and Ross (RIGHT). The physical and emotional rollercoaster parents face along with their children when learning how to live with diabetes is chronicled in Jim's book, *Dana's Disease*, written while he was director of the Alberta Diabetes Foundation

Improving our Understanding of Islet Cell Biology

STRUCTURAL HOTSPOTS FOR INSULIN SECRETION IN BETA CELLS

Dr. Pat MacDonald continues to make significant contributions to our understanding of how beta cells become hampered in their ability to secrete insulin in the progression of Type 2 diabetes. Like many secretory cells, beta cells use a voltage dependent potassium channel known as $K_v2.1$ (KCNB1) whose properties make it suited to regulating secretion. Until recently the role of $K_v2.1$ in this process was thought to be limited to repolarization of beta cell action potentials, but MacDonald and others have challenged this notion with their findings, which suggest a much more direct role for the channel in exocytosis. Using fluorescence microscopy and spatio-temporal analysis, they observed patterns and actions of $K_v2.1$ channels on the islet cells along with exocytosis events. They already knew the channels formed in clusters, but what they were able to further observe was that insulin exocytosis occurred at the locale of the $K_v2.1$ clusters, thereby identifying that clustering contributes to exocytosis "hotspots" on beta cells. An equally important observation was that cell membrane clustering was severely diminished in islet cells from T2D donors and $K_v2.1$ mRNA was 80 per cent reduced. Up-regulation of $K_v2.1$ clustering rescued the exocytotic phenotype and increased insulin secretion. These findings suggest an important role for clustering in normal-functioning islets and a possible avenue to pursue for developing novel therapies aimed at re-establishing clustering via drug or gene therapies in T2D patients (*Diabetes*, 66:1890-1900, 2017). Their study used human donor islets obtained from **IsletCore**, the islet isolation and cryopreservation facility in ADI directed by MacDonald.

(ABOVE) ADI's Physical Activity Diabetes Lab

ISLET Transplantation and Exercise

RESEARCH HELPS REDUCE FEAR OF EXERCISE FOR T1D TRANSPLANT PATIENTS

"Brittle" type 1 diabetes is characterized by wide swings in blood glucose that are difficult to control adequately with exogenous insulin, putting these patients at high risk. Islet transplantation has proven to be most beneficial in these cases, reducing the incidence and severity of both hyper- and hypoglycemic events. Surprisingly, no one has every studied how well transplanted islets perform during exercise where glucose-consuming activities can induce low blood sugar levels. **Drs. Jane Yardley** and **Norm Boule** (Fac. of Kinesiology, Sport, and Recreation) teamed up with endocrinologist **Dr. Peter Senior** (Medical Director, Clinical Islet Transplant Program) to study this in a 2017 clinical trial performed at ADI's Physical Activity Diabetes Lab. Twelve islet transplant patients having a mean duration of 10.4 months since their last transplant procedure and not taking exogenous insulin and 12 healthy controls (5M/7F in each group) undertook 45 minutes of moderate aerobic exercise (60% VO_{2peak}) on an exercise bike, with blood sampled before, immediately after, and every 15 minutes for an hour during a recovery period. Although transplant patients had higher circulating plasma insulin levels and greater declines in plasma glucose concentration during exercise compared with controls, only one patient experienced a blood glucose concentration below 3.5 mmol/L. Reassuringly, all recovered quickly once the exercise stopped. Another surprising result was that transplant patients who exercised experienced a transient hyperglycemic "rebound" postprandial (i.e., after their evening meal), something not seen if they didn't exercise. Of significance was that none of the participants in the transplant group experienced nocturnal hypoglycemia. Given the fear that brittle T1D patients have of this prior to transplantation, the results of this study provide a level of confidence that opens the door for exercise to become a more regular part of their lives, possibly improving their insulin sensitivity and islet longevity. The results of their clinical study were published in the *Journal of Clinical Endocrinology and Metabolism* (104:493-502, 2019).

DID YOU KNOW?

Annual direct healthcare costs associated with obesity in Canada (including physician, hospitalization and medication costs) are estimated to be between $4.5 billion and $7.1 billion

(RIGHT) Dr. Arya Sharma, Scientific Director of Obesity Canada

Tackling Obesity

OVERCOMING BARRIERS TO ACCESSING TREATMENT OPTIONS

Diabetes is influenced by multiple factors, but there is little dispute about the number one risk factor for Type 2 diabetes and metabolic syndrome: obesity. About 90 per cent of T2D patients are overweight (Body Mass Index $\geq$ 25 kg/m^2) or obese (BMI $\geq$ 30 kg/m^2). The risk of developing T2D clearly increases as BMI rises. According to the most recent data from StatsCanada, 20.2 per cent or one in five Canadians are obese, and this number is steadily rising. Clearly addressing the obesity epidemic is tantamount to curbing the rise in diabetes, but how can we achieve this? In 2006, Health Canada published the Canadian Clinical Practice Guidelines that recommended access to and application of interventions for obese adults that include lifestyle intervention, physical exercise therapy, pharmacotherapy and bariatric surgery. In 2015 the Canadian Medical Association declared obesity to be a "chronic medical condition"–not unlike heart disease or diabetes itself–and one that clinicians should treat as such. Despite these recommendations, changes in weight management practices and their delivery in the health care system has been a slowly evolving process compared with other diseases, and ADI researchers are investigating why translation is being stymied.

With funding from Novo Nordisk Canada Inc., Obesity Canada (OC, formerly the Canadian Obesity Network)

(ABOVE) After Arun Patel immigrated to Edmonton, the cold climate meant he became far less active, but his daily food consumption didn't change. The recent decrease in people's physical activity and nutritious food consumption is credited with the rising prevalence of Type 2 diabetes. Many people are unaware of the importance of a healthy lifestyle in diabetes prevention. (Source: "Portraits of Diabetes")

generated the *Report Card on Access to Obesity Treatment for Adults in Canada 2017,* the highlights of which were presented at the fifth Canadian Obesity Summit in Banff, Alberta in 2017. The report is the product of nearly a year of extensive research by OC that examined the quality and quantity of access to publicly funded medical care for obesity, as well as interventions covered by private health benefit plans. In an interview with the *National Post* in 2017, ADI member and OC Director **Dr. Arya Sharma** said that in Canada "we're basically at ground zero," and haven't made any significant inroads into obesity management for adults from a clinical perspective since the 2006 guidelines were published. For example, bariatric surgery is available to about half a per cent of Canadians who qualify for this type of intervention; anti-obesity drugs aren't covered under provincial/territorial drug plans; and only 20 per cent of private plans allow for anti-obesity pharmaceuticals. Sharma, who is also the Obesity Research Chair at the University of Alberta, says for too long obesity has been seen as a lifestyle choice and a risk factor for other illness, when it should be treated like a chronic disease."We need to recognize that people who struggle with the problem need treatment very similar to the kind of treatment you would give to people with diabetes and other chronic disease," he said. Physicians often tell patients to lose weight, but they don't tell them how. This is a reflection of medical training programs that don't adequately provide proper training in obesity prevention and management. *The Report Card* report can be viewed online **(https://obesitycanada.ca)** and is a wealth of information related to obesity management resources in Canada that will help shape obesity management policies going forward.

Selected Publications

Canadian Obesity Network-Réseau canadien en obésité (2017). Report Card on Access to Obesity Treatment for Adults in Canada 2017. Edmonton, AB: Canadian Obesity Network Inc.

IDENTIFYING A LINK BETWEEN BLUE LIGHT AND FAT METABOLISM

Several years ago Dr. Peter Light and his team were investigating how to bioengineer fat cells (adipocytes) to produce insulin in response to blue light signaling. They discovered something very interesting: fat cells were inherently sensitive to blue light, and in a way that was highly unexpected. They found that fat cells under the skin-subcutaneous white adipose tissue, or scWAT for short-had an increased rate of breakdown of lipid in the cells and a decrease in overall lipid content when exposed to blue light (380-480 nm) for four hours a day for 13 days. There were also alterations in hormones related to lipid metabolism, notably leptin and adiponectin. The researchers were also able to determine that these intracellular changes were mediated by the photo-pigment melanopsin, coupled to transient receptor potential canonical cation (TRPC) channels.

This same pathway is triggered in the eye, leading to regulation of our circadian rhythm. A portion of the blue spectrum of sunlight is capable of reaching scWAT. So, does this mean that exposure to sunlight can help us lose weight? Or, conversely, does it mean that low sunlight exposure is linked with obesity or other related metabolic diseases like diabetes? Light suggests that perhaps it's an evolutionary adaptation so we conserve fat in winter, signalled by a seasonal decrease in sunlight. It's an intriguing theory, aligned with the fact that each generation is getting heavier while spending less time outdoors. Results are preliminary at this point and the Light team have a number of follow up studies to perform before declaring sunlight as a weight loss therapy. That being said, their research still attracted a lot of attention worldwide and was published in 2017 in *Scientific Reports* (7: 16332 | DOI:10.1038/s41598-017-16689-4).

ENCOURAGING WEIGHT TREATMENT PROGRAMS FOR CHILDREN

Preventing any disease is far more desirable than treating it. Tackling weight management in children before it leads to obesity and related complications is no exception. Canada actually has a relatively structured process for families to enrol in weight management programs that are aimed at early intervention for obese youth. Physicians can refer young patients and their parents to pediatric weight management programs in most cities (e.g., the Pediatric Centre for Weight and Health in Edmonton). But research by ADI member **Dr. Geoff Ball**, professor of pediatrics and AHS Research Chair in Obesity, and recent PhD graduate **Dr. Arnaldo Perez Garcia** showed that 62 per cent of Canadian families with obese children did not enrol in any treatment programs after being referred by their family doctor. Why is this?

Through their research with parents and participating clinics in Edmonton, Vancouver, Hamilton and Montreal, they were able to identify a number of barriers. One problem was that referring physicians typically directed parents to centres and programs, but didn't offer details about the programs or their own insight about their effectiveness. This did little to instill confidence. Another issue was a large time gap between referrals and actual appointments. These discoveries have led to real changes in how clinics are interacting with patients; participating clinics are now providing physicians with more information and are improving their patient follow-up.

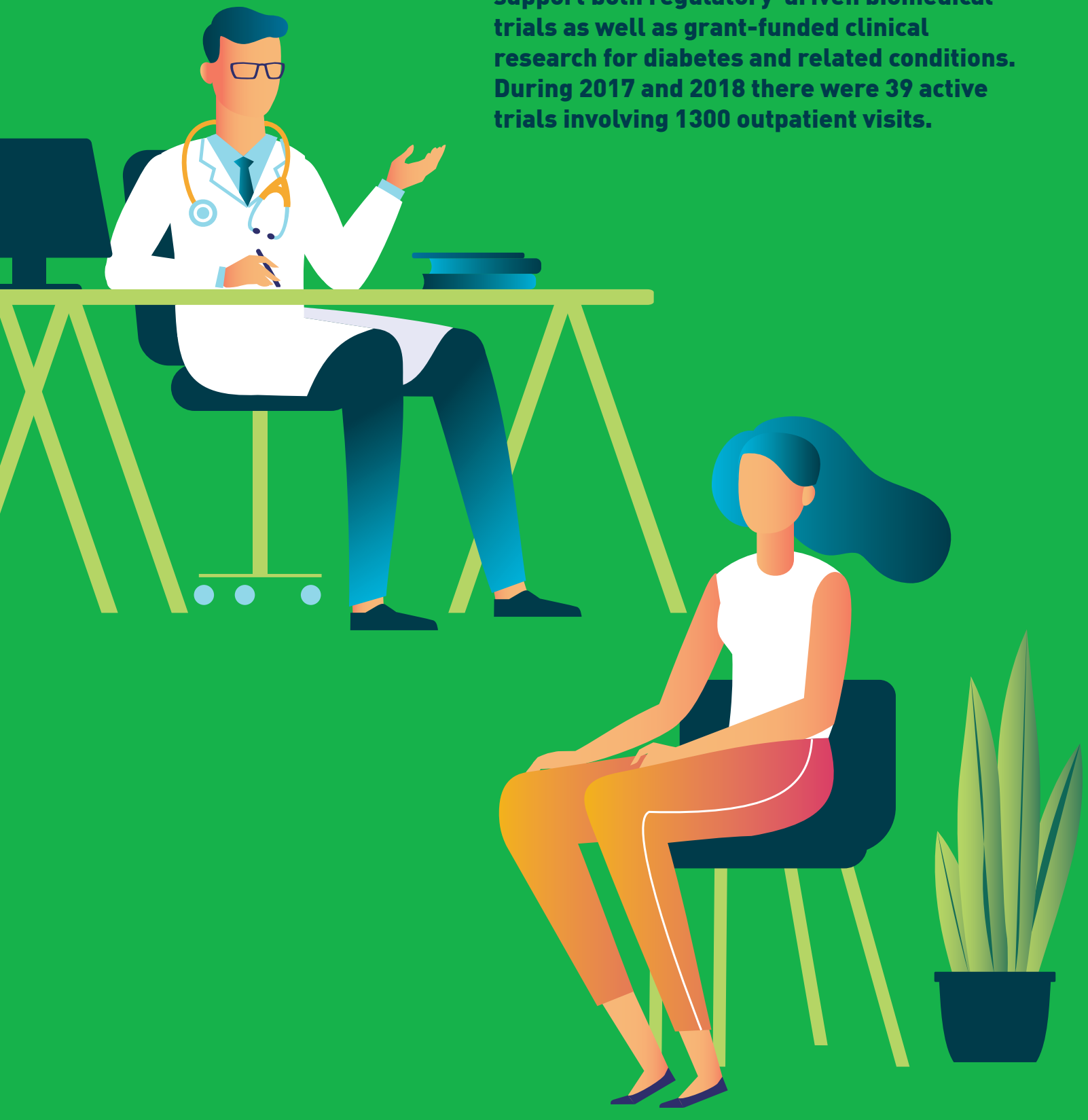
Selected Publications

Perez AJ, et al. (2018). Parent recommendations to enhance enrollment in multidisciplinary clinical care for pediatric weight management. *The Journal of Pediatrics,* 192:122-129 doi: 10.1016/j.jpeds.2017.09.025

ADI's Physical Activity Diabetes Lab (PADL) for conducting exercise intervention studies related to prevention and management of diabetes

CLINICAL RESEARCH

The ADI houses clinical research facilities that support both regulatory-driven biomedical trials as well as grant-funded clinical research for diabetes and related conditions. During 2017 and 2018 there were 39 active trials involving 1300 outpatient visits.



For more information and full details about ongoing trials, see ADI's website at www.ualberta.ca/alberta-diabetes/clinical-research.

REGULATORY BIOMEDICAL

ADI's Clinical Research Unit (CRU) offers comprehensive services and support for Phase II-IV trials for both industry sponsored trials and for academia. Experienced staff can provide complete study management and coordination from study startup and recruitment to protocol execution through to data management, close-out and file archiving. Investigators managing their own studies can also access clinical facilities and services, including administrative support; access to clinical examination rooms; pharmacy storage (monitored 24/7); phlebotomy; and, patient recruitment via CRU's contact registry. The CRU is in close proximity to the University Hospital for patient/physician access and bio-sample transport.

NUTRITION AND METABOLISM

Integrated in ADI's Clinical Research Unit is the **Human Nutrition Research Unit (HNRU)** that conducts nutritional and metabolic clinical research related to a variety of adult, child and maternal health conditions including metabolic disorders, cancer, cardiovascular disease and obesity. The unit offers specialized equipment for assessing body composition and energy utilization, including dual x-ray absorptiometry, air displacement plethysmography, a fully equipped research kitchen and a whole body calorimetry unit.

PHYSICAL ACTIVITY

The Physical Activity Diabetes Lab (PADL) features a team of exercise physiologists who investigate the impact of exercise on managing and preventing diabetes on its own or in conjunction with other medical interventions. The facility features a fully equipped fitness facility with an adjacent exercise physiology diagnostic lab that are used to conduct trials for patients with Type 1, Type 2 and gestational diabetes.

DONORS AND SPONSORS

ADI scientists have made enormous contributions towards understanding and treating diabetes, and improving the quality of life of patients. But none of this would be possible without the generosity of our donors and sponsors that support our dedicated scientists. Thank you for your continued support and for sharing our vision of being a global leader in the fight against diabetes.

FOUNDATION SUPPORT	2017	2018	TOTAL
Heart and Stroke Foundation of Canada	$597,179	$614,238	$1,211,417
Juvenile Diabetes Research Foundation	$556,880	$515,243	$1,072,124
Women and Children's Health Research Institute	$413,990	$361,190	$775,180
University Hospital Foundation	$344,662	$395,305	$739,967
Alberta Diabetes Foundation	$381,618	$315,191	$696,809
Diabetes Canada	$219,049	$275,715	$494,764
Royal Alexander Hospital	$84,167	$314,543	$398,710
EuroQol Research Foundation	$169,436	$56,400	$225,836
Canadian Liver Foundation	$107,500	$53,333	$160,833
Kidney Foundation of Canada	$83,277	$66,629	$149,906
Weston Family Microbiome Initiative	$49,809	$49,809	$99,618
Prader-Willi Syndrome Association	$13,808	$81,699	$95,507
Lawson Foundation	$34,000	$34,000	$68,000
Canadian Society for Transplantation	$33,333	$33,333	$66,666
Canadian Cancer Society	$33,258	$33,258	$66,516
Foundation for Prader-Willi Research	$56,540	-	$56,540
Canadian Foundation for Dietetic Research	$22,886	$31,438	$54,324
Simons Foundation	$52,500	-	$52,500
Alberta Cancer Foundation	-	$50,000	$50,000
Edmonton Oilers Community Foundation	$25,000	$25,000	$50,000
Cancer Research Society	-	$40,000	$40,000
Stollery Children's Hospital Foundation	$16,667	$16,667	$33,334
Danone Institute of Canada	$27,000	-	$27,000
Prostate Cancer Canada	$12,184	-	$12,184
Homeward Trust	-	$10,000	$10,000

Donors

Dr. Charles A. Allard, Chair in Diabetes

Dr. Charles Allard was one of Edmonton's most distinguished individuals. He contributed greatly to the community through a successful medical practice, impactful entrepreneurial initiatives and the establishment of the Allard Foundation in support of health research. A $3-million endowment established in 2007 from a $1.5-million contribution from the Allard family, and matching funds from the province have been used to support the recruitment of world class talent to lead the Alberta Diabetes Institute in the role of director.

C.F. "Curly" and Gladys B. MacLachlan Fund/ Paddy and Ken Webb & Family

In 1990 the MacLachlans donated $1 million to establish an endowment to fund novel research in islet transplantation and beta cell replacement therapy. Following in her parents' footsteps, daughter Paddy and her own family have helped grow the funding resource that has led to numerous innovations.

Gladys Woodrow Wirtanen Studentships

$1-million endowment established through a donation from the Wirtanens in 2008, which was used to support numerous MSc and PhD graduate students researching diabetes who have gone on to distinguished careers.

Muttart Diabetes Research and Training Centre

$1 million endowment from the Gladys and Merrill Muttart Foundation established in 1981, which was used to support graduate students as well as post-doctoral fellows researching diabetes.

Dr. Rod Eidem Diabetes Research Fund

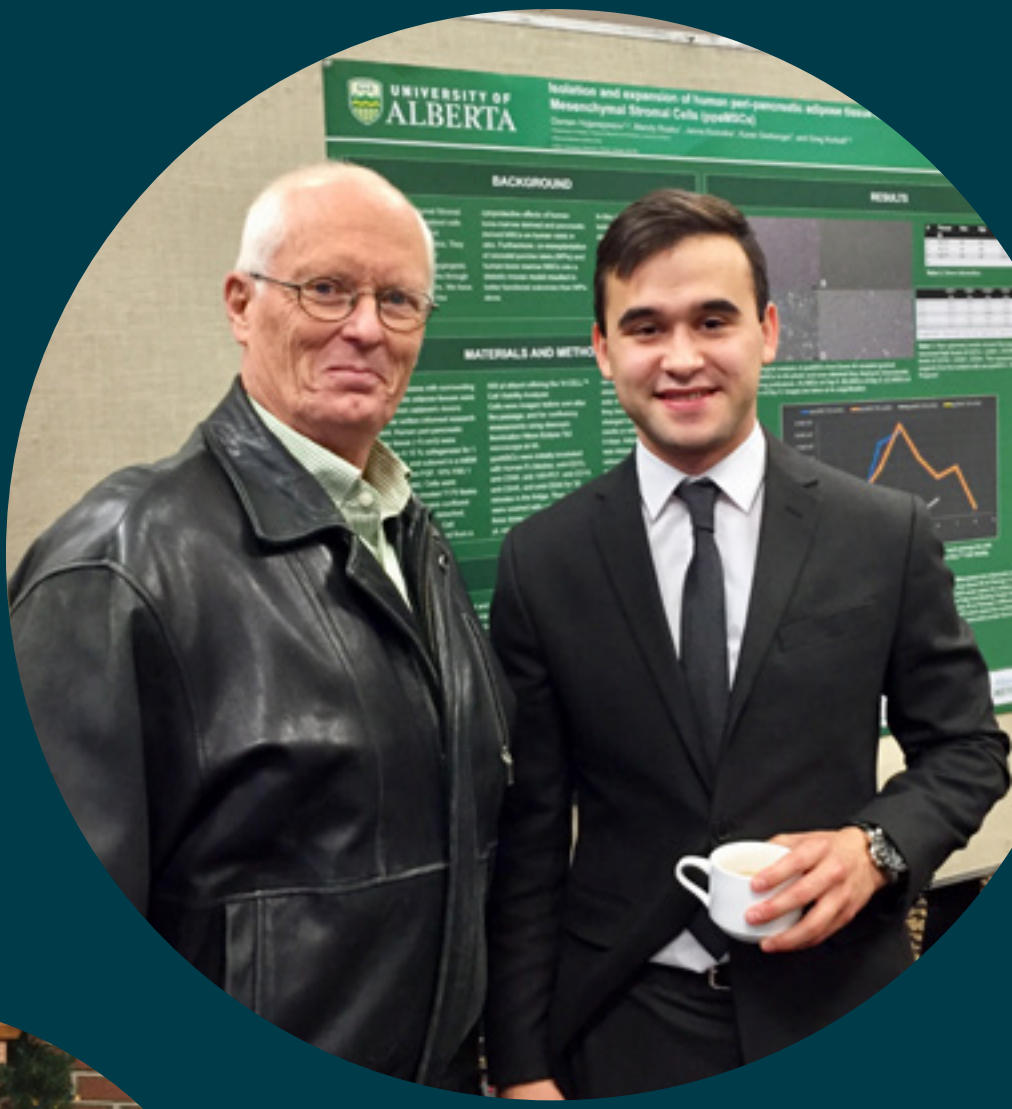
University of Alberta alumni Dr. Rod Eidem (1955) had a distinguished medical career at both the Edmonton Grey Nuns Hospital and the University of Alberta, where he retired as Professor Emeritus. Since 2015 Dr. Eidem has donated $400,000 towards diabetes research with a focus on innovation and cross-disciplinary approaches.

Blanch Graduate Award

Annual $10,000 donation for supporting graduate students researching Type 1 diabetes, funded by Morley and Val Blanch.

Sponsors

We would like to acknowledge our industry sponsors **Merck** and **Eli Lilly** who graciously provide funding each year in support of ADI's Annual Research Day and weekly Research in Progress seminar series.

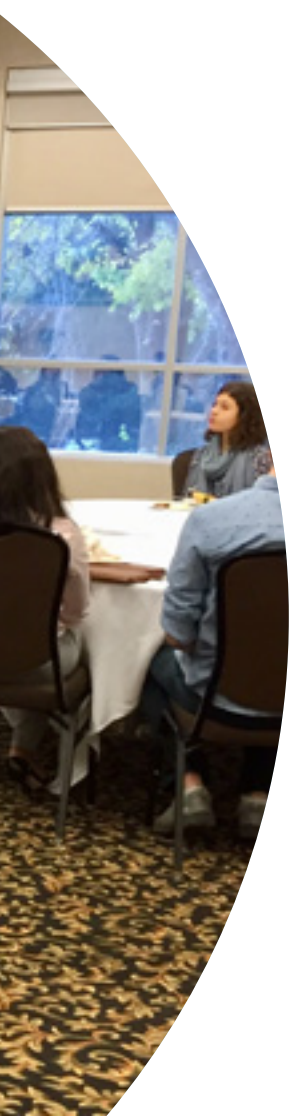


(LEFT) Dr. Peter Light with Dr. Rod Eidem

(ABOVE) MSc student, Osman Hojanepesov, with Morley Blanch

TRAINEE SUPPORT

The ADI strives to help the next generation of diabetes researchers achieve excellence through funding support and professional development.



ADI Trainee Working Group

In 2018, a call was sent out to ADI trainees requesting their interest in forming an *ADI Trainee Working Group (TWG)* that could better represent their needs during their time at the ADI. The response was overwhelming, and a short time later an initial group instituted a Terms of Reference and nominated an Executive body of the ADI TWG. This is a significant undertaking for our trainees due to the diverse faculties that make up the ADI; however, the ADI TWG plans to host events and functions that will unify all trainees within the ADI, allowing for more collaboration and student networking.

From hosting various social events, to helping organize the ADI Annual Research Day event, the ADI TWG is already an active and vibrant part of the ADI. The ADI will continue working with the TWG to provide ongoing support for summer students, undergraduate/graduate students and post-doctoral fellows, including career development and additional networking opportunities.

Funding

Graduate Scholarships

Each year, the ADI offers a number of scholarships in support of full-time graduate students and post-doctoral fellows studying under ADI members. This funding support is made possible by the generosity of our donors.

Travel Bursaries

ADI recognizes the importance of attending scientific conferences where trainees can network with other researchers and learn to present their research. ADI provides financial assistance for travel to national and international scientific conferences.

Summer Studentships

In an effort to attract the next generation of diabetes researchers, ADI offers studentships to undergraduate students who are interested in conducting research during the summer months in a participating lab.

Research Forums

The ADI hosts a number of events that give our trainees the opportunity to network and develop their presentation skills:

ADI Seminar Series

This weekly seminar series held from September to May, promotes collaboration and exchange of ideas during a forum where ADI trainees present their research to colleagues.

ADI Research Day

An annual event which provides all Trainees the opportunity to present their research in either a poster or oral platform. Trainees compete and are judged for best poster and podium presentation awards in a friendly and encouraging all-day symposium environment. With the creation of the ADI TWG, the trainees themselves are more involved in the organization of this event, from selecting and inviting the keynote speaker to organizing the "Trainee Lunch with the Speaker" event.

A-BC Islet Workshop

The ADI helps sponsor the Alberta-British Columbia Islet Workshop, which brings together investigators and trainees from across Western Canada to share their newest research on pancreatic islet biology and diabetes. Topics include stem cells and regeneration, cell biology and signaling, transplantation, biomaterials, and more. The event is held at a resort in the beautiful Canadian Rockies, where attendees also get to hit the ski slopes.

International Experience

Together with the Helmholtz Center in Munich, the ADI is establishing an international graduate school that complements regular MSc/PhD programs with professional development training and international networking. The goal is to better equip graduates for a career related to diabetes, whether that is in government, industry or an academic setting. Details of the International Research School for Diabetes can be found on ADI's website.

(TOP) Keynote speaker Dr. Richard Dimarchi and ADI trainees (2018 ADI Research Day), Trainee Lunch with the speaker

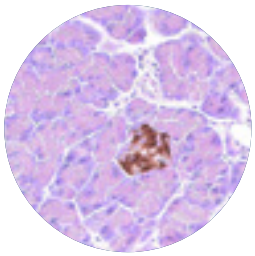
(ABOVE) Visiting students from Helmholtz Center in Munich (May 2018)

Junior Researchers for a Day Sarah on left and Siyapreet on right (TOP) mentored by researcher Dr. Greg Korbutt (ABOVE LEFT) and clinical coordinator Caroline Lyster (ABOVE RIGHT)

CORE FACILITIES

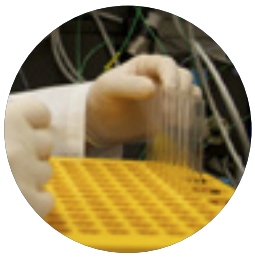
The ADI operates several core services that provide investigators and trainees with access to extensive equipment, expertise and services in support of research on a fee-for-service basis.

See ADI's website for additional information at
www.ualberta.ca/alberta-diabetes/core-services



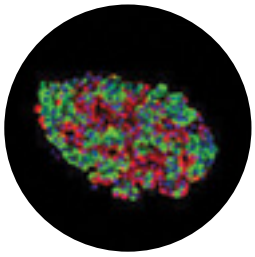
HISTOLOGY (HISTOCORE)

Provides paraffin processing and staining of tissues for histopathology and cryo-sectioning, as well as protocol development and services for immunohistochemistry and immunofluorescence. HistoCore is managed by histologist **Lynette Elder**, accredited with the College of Medical Laboratory Technologists of Alberta.



MOLECULAR BIOLOGY (MOLBIOCORE)

Offers equipment, training and method development for the synthesis and analysis of nucleic acids, peptides and proteins. Core Manager **Dr. Kuni Suzuki** provides expert technical assistance for plasmid DNA preparation and adenoviral gene delivery.



HUMAN RESEARCH ISLETS (ISLETCORE)

This human islet isolation facility processes and banks donor pancreases not used for transplantation, making islets available to researchers across Canada and internationally. Since its inception in 2010, IsletCore has isolated more than 65 million islets for research from 249 human organ donors (types 1 and 2). Contact **Dr. Jocelyn Manning Fox** for more information.

IMMUNOLOGY (IMMUNOCORE)

Services include cell sorting, flow cytometry, T-lymphocyte killing and maintenance of an antibody biobar. Technical training and assistance for instrumentation self-use, as well as assistance on method development, can be arranged through Core Director **Dr. Colin Anderson**.

CELL IMAGING (ADMINISTERED BY THE FACULTY OF MEDICINE AND DENTISTRY)

Offers a comprehensive array of equipment and services related to the imaging and analysis of live or fixed cells and tissues, with technical assistance provided by **Dr. Greg Plummer**.

FIVE-YEAR STRATEGIC PLAN

IN LATE 2017, THE ALBERTA

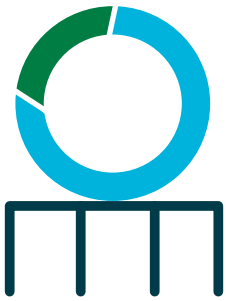
Diabetes Institute published a five-year strategic plan that focused on how it can better enable its members to achieve excellence in diabetes research and development. Details of the plan can be found on our website, but the following are the areas of strategic focus during the next five years:

RESEARCH COORDINATION

ADI scientists work in numerous, diverse areas of research where innovation can lead to a new technology or a change in health care practices. There are many steps and barriers to knowledge mobilization and the practical application of something new. The ADI will dedicate more resources towards supporting knowledge mobilization, including the protection of intellectual property, collaboration with outside expertise, developing proof of concept research and navigating regulatory hurdles.

SUSTAINABILITY

Sustainability is reflected by many things, but none as important as members having access to research funding. The ADI will take a more active role in exploring collaborative opportunities with government, industry, other research institutes and donors both nationally and internationally to better leverage investment and philanthropy. This means actively managing ADI's vast research portfolio and meeting regularly with stakeholders to identify evidence-based market and clinical needs.



DEVELOPING RESEARCH STRENGTHS

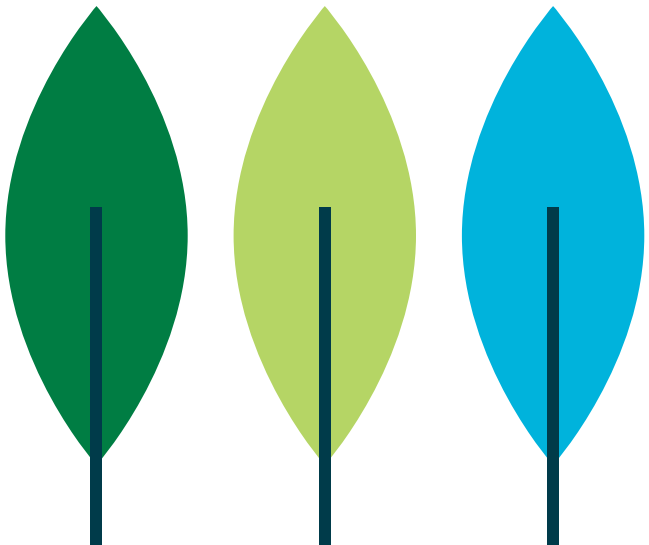
With additional investment and capacity-building, there are a number of specific research themes that are well-poised for translation to human application in the next five years. Immunoregulation is one such area. It is key to overcoming the autoimmunity associated with Type 1 diabetes, as well as improving the outcomes of transplant recipients whose immune systems reject donor islets. Examples of research in these areas include: regulatory T cell proliferation; mesenchymal stem cell co-transplantation; and, mixed chimerism. This, combined with earlier detection of Type 1 diabetes onset and strategies for beta cell regeneration, will be areas of intensified focus with the goal of getting to clinical trials

COMMUNICATIONS

The ADI has a remarkable legacy of achievement and a wealth of expertise; however, unless those stories are told, the ADI will remain one of the university's best-kept secrets. Over the next few years, the ADI will increase its public community engagement. This will be done through a series of public Q&A sessions centered on Type 1, 2 or gestational diabetes, while highlighting opportunities for clinical research participation. Increased attendance at conferences will bolster national and international recognition, and regular upkeep of social media will be maintained. Additionally, internal communications for our members will be strengthened by developing an online forum where investigators can better collaborate on team-based opportunities.

EXCELLENCE

Excellence means doing everything right: having a strong research pipeline, translating research and leveraging our success through partnerships and communication. It means striking a balance between curiosity-driven research and moving discoveries to practical application. The ADI draws strength from an interdisciplinary makeup, and future success in diabetes research will rely even more on the intersection of diverse fields. Perhaps most importantly, the ADI will strive for excellence by giving our trainees a world-class experience that includes more international professional development and broader thinking through new programs and initiatives. Our goal is to produce the next generation of ADI success stories.



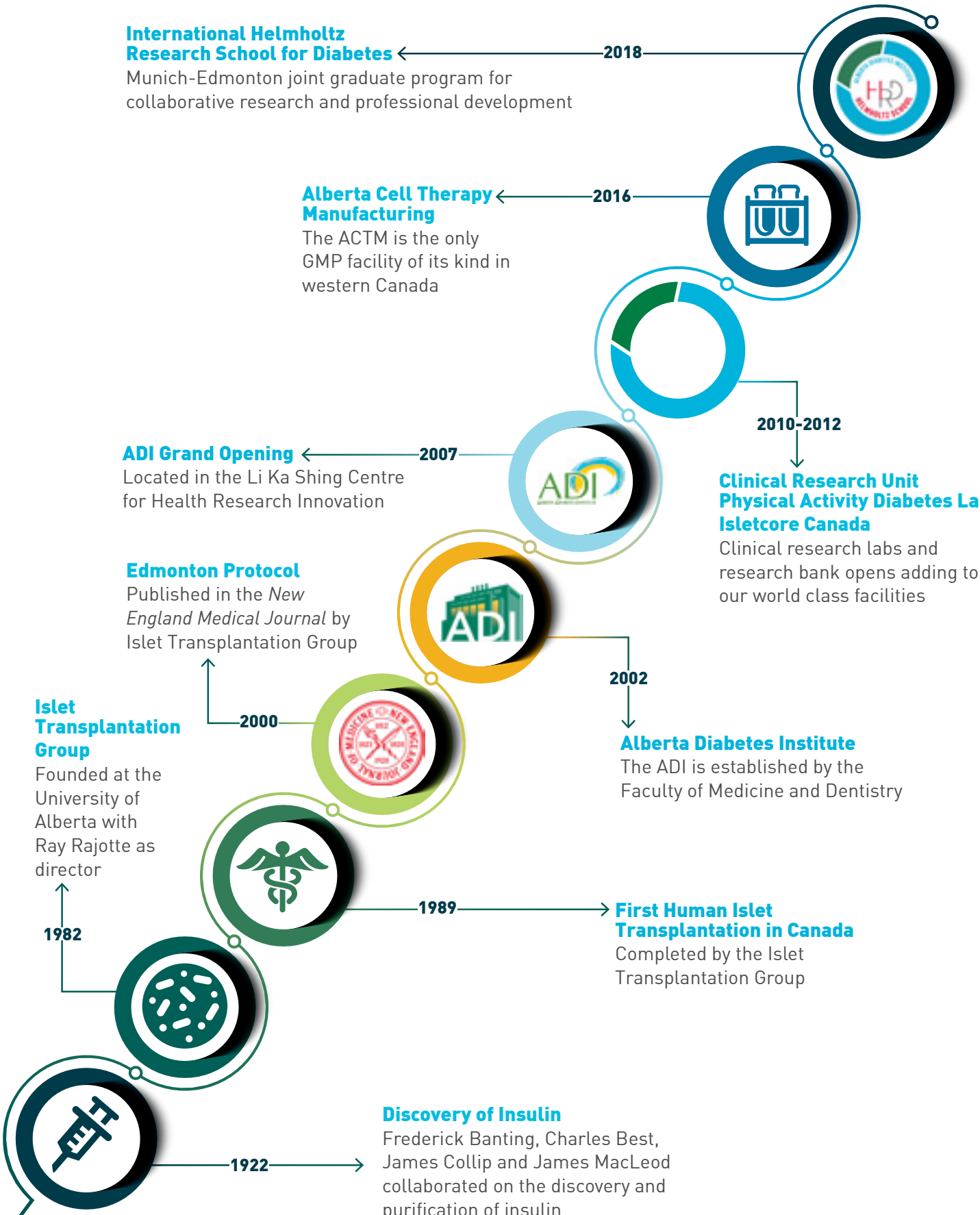
OUR MISSION

Our mission is to better enable our scientists to pursue excellence in diabetes research, not only through infrastructure support, but also by working on their behalf to identify opportunities for collaboration and partnerships, prospects for grant funding and investment, and translational research support. For our roughly 200 graduate students and post-doctoral trainees, the ADI strives to offer a world-class multidisciplinary environment and professional development experience.

OUR TEAM

The ADI is led by Director Dr. Peter Light and a team that includes Director of Operations Dr. Vincent Rogers, Executive Assistant Colleen Ruptash and Office Coordinator Matthew Barnett.

OUR ACHIEVEMENTS IN DIABETES RESEARCH



2018

International Helmholtz Research School for Diabetes
Munich-Edmonton joint graduate program for collaborative research and professional development

2016

Alberta Cell Therapy Manufacturing
The ACTM is the only GMP facility of its kind in western Canada

2010-2012

Clinical Research Unit
Physical Activity Diabetes Lab
Isletcore Canada
Clinical research labs and research bank opens adding to our world class facilities

2007

ADI Grand Opening
Located in the Li Ka Shing Centre for Health Research Innovation

2002

Alberta Diabetes Institute
The ADI is established by the Faculty of Medicine and Dentistry

2000

Edmonton Protocol
Published in the *New England Medical Journal* by Islet Transplantation Group

1989

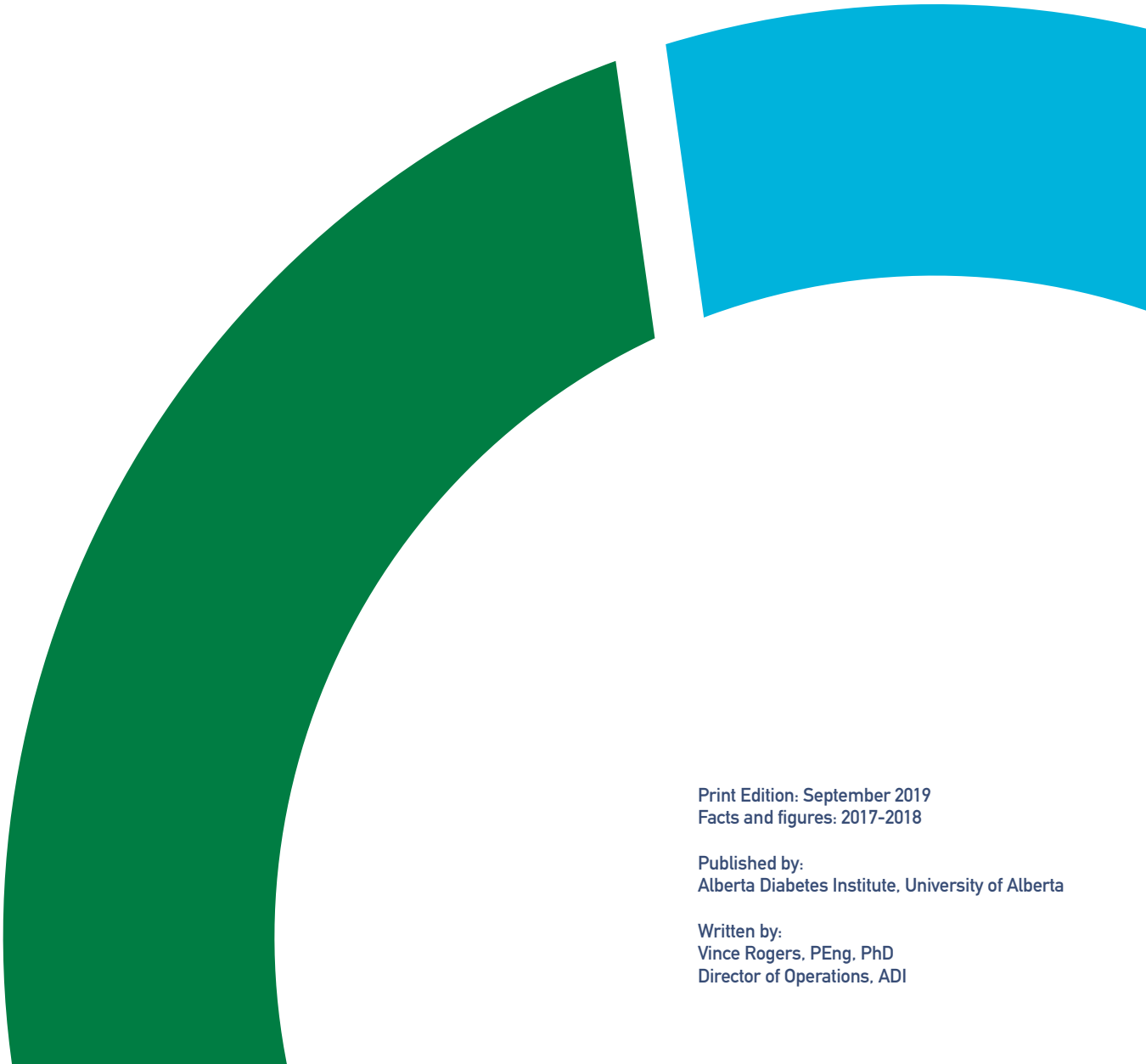
First Human Islet Transplantation in Canada
Completed by the Islet Transplantation Group

1982

Islet Transplantation Group
Founded at the University of Alberta with Ray Rajotte as director

1922

Discovery of Insulin
Frederick Banting, Charles Best, James Collip and James MacLeod collaborated on the discovery and purification of insulin



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