ALBERTA DIABETES INSTITUTE
ISLETCORE PROGRAM
2018 ANNUAL REPORT

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Facts and Figures 2018

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Design by Tina Dafoe

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DIRECTOR'S MESSAGE

The Alberta Diabetes Institute IsletCore was launched in 2010 with the goal of isolating and distributing insulin-producing pancreatic islets from donor organs that cannot be used for clinical transplantation. We isolate islets from a wide range of donors and distribute these exclusively for research. Studying human islets allows scientists to gain substantial new insight into metabolism, blood sugar control, and diabetes that is directly relevant to human biology.

Dr. Patrick MacDonald
Director, ADI IsletCore

Over the last year, our main focus has been on establishing sustainability and balancing our budget. We are fortunate to have received financial support from the Alberta Diabetes Foundation and the University of Alberta from 2011 to 2017. However, 2018 was our first year with no external financial support and it was incumbent on us to become self-sustaining. I'm happy to report that we nearly broke even last year, while supplying more than six million islets for research across the world. Significant strides have been made in our cost-recovery by the addition of new recipient laboratories and we hope to maintain this momentum as we plan for the renewal of equipment and the roll-out of new initiatives in the coming years.

We wish to acknowledge the support of Dr. Peter Light and the Alberta Diabetes Institute, as well as our colleagues at the Clinical Islet Laboratory: Doug O'Gorman, Dr. James Shapiro, and Dr. Tatsuya Kin. We are also extremely grateful to the organ procurement organizations across Canada, notably the Human Organ Procurement and Exchange (HOPE) program in Edmonton and the Trillium Gift of Life Network (TGLN) in Ontario for their support of basic research, on top of their work coordinating organs for transplantation. Finally, we thank the organ donors and their families for their gift to the research community.

As the ADI IsletCore continues to grow and develop, we are proud to contribute to the important scientific discoveries of laboratories across the world. We will continue our push to support research and discovery in human islet biology well into the future.

TEAM MEMBERS

Dr. Patrick MacDonald • Director
Pat established the ADI IsletCore in 2010. In addition to directing the program, he is a Professor in the Department of Pharmacology. In his spare time, he likes to run, play ice hockey, and spend time with his family.

Dr. Jocelyn Manning Fox • Project Coordinator
Joss has been with the ADI IsletCore since its inception. She oversees all of its operations and research activities. She is an urban beekeeper who enjoys discovering new foods while traveling the world.

James Lyon • Tissue Specialist
James has 24 years of experience with human organs and has performed every isolation for the ADI IsletCore. When he is not busy procuring islets, he can be found cycling, playing guitar, and coaching his kids' soccer teams.

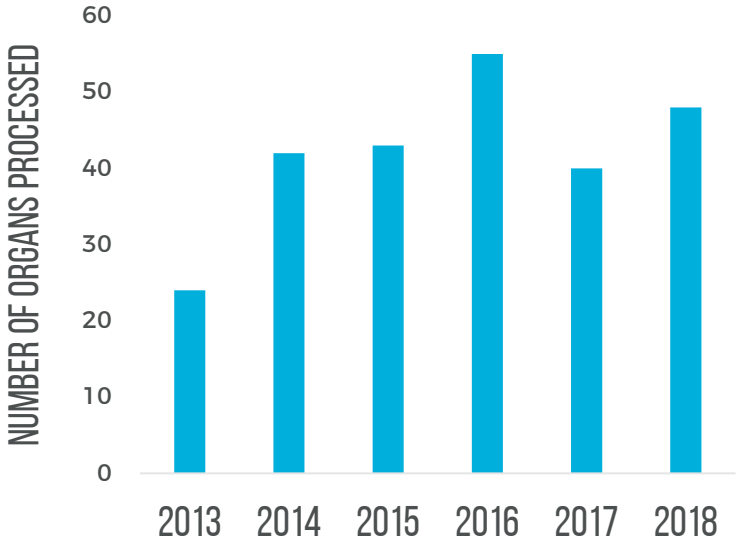
Tina Dafoe • Administrative Coordinator
Tina has been a member of the ADI IsletCore for five years. She provides administrative support to all aspects of the program. Her other passions include playing sports, teaching hot yoga, and eating carbohydrates.

Austin Bautista • Technician
Austin has been part of the ADI IsletCore since 2013. He assists with isolations and performs functional characterization of the islets. His favourite pastimes are alpine skiing, ultimate frisbee, and video games.

ISOLATION & DISTRIBUTION

Organs Processed

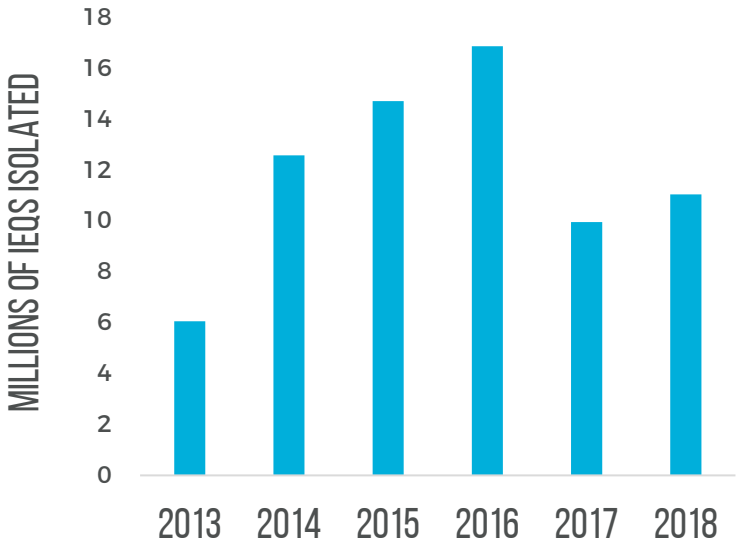
By the end of 2018, the ADI IsletCore received 297 human donor pancreases for islet isolation. In 2018, half of these were from Ontario, with a quarter coming from Alberta. Six of the 48 organs processed this year were from donors with diabetes: four with type 2 diabetes, and two with type 1 diabetes.



Islets Isolated

From the 297 organs above, we have isolated more than 76 million islet equivalents (IEQs).

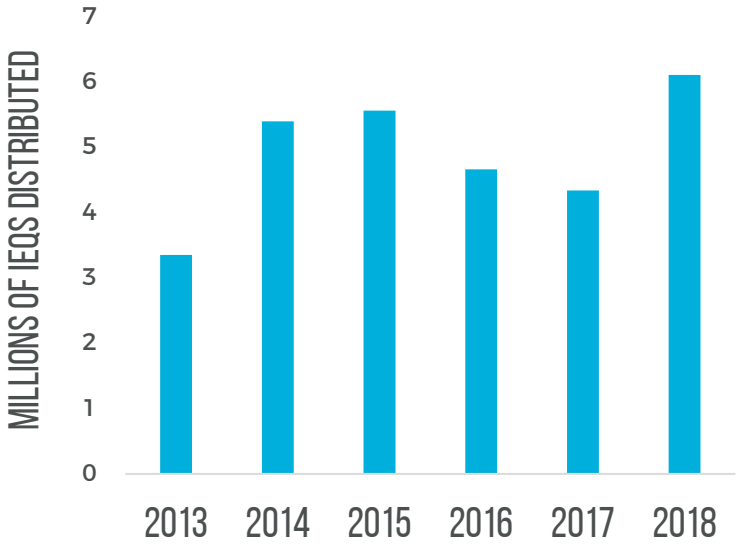
Of these isolated IEQs, we have distributed more than 32 million for research and cryopreserved a further 24 million for future use. We also maintain a biobank of biopsies, paraffin-embedded islets, snap-frozen islets, and cryopreserved islets from most of our donors.



ISOLATION & DISTRIBUTION

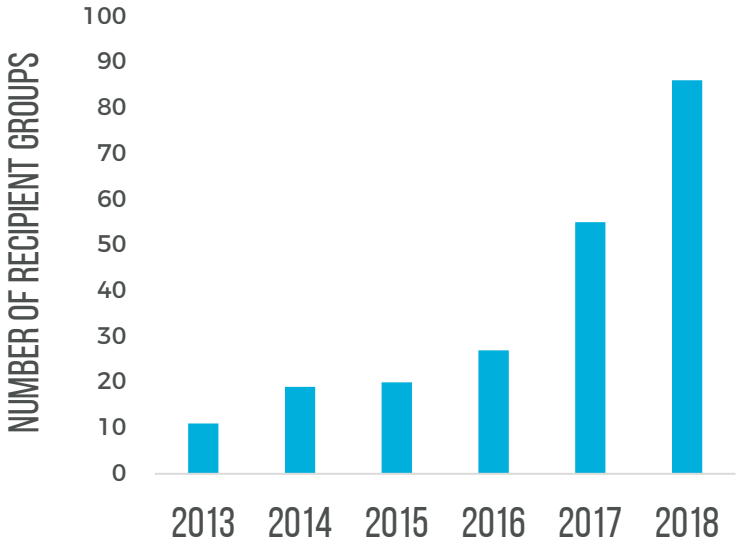
Islets Distributed

In 2018, we surpassed our record for number of islets distributed in a year. In fact, the demand for islets began to exceed our supply near the end of the year. To address this, we implemented a priority system in which groups who did not receive islets from one preparation get automatically prioritized for the next one.



Recipient Laboratories

We distribute islets to a network of recipient laboratories that has now grown to 86. In 2018 alone, we signed up an additional 34 groups, extending our network into Asia. The significant increase in the last two years is due to an initiative to make use of undistributed islets while contributing to our cost-recovery and sustainability efforts.



A growing international profile of our program represents an opportunity beyond supporting local islet research; it furthers our goal to facilitate the highest-quality and highest-impact diabetes research across North America and worldwide.

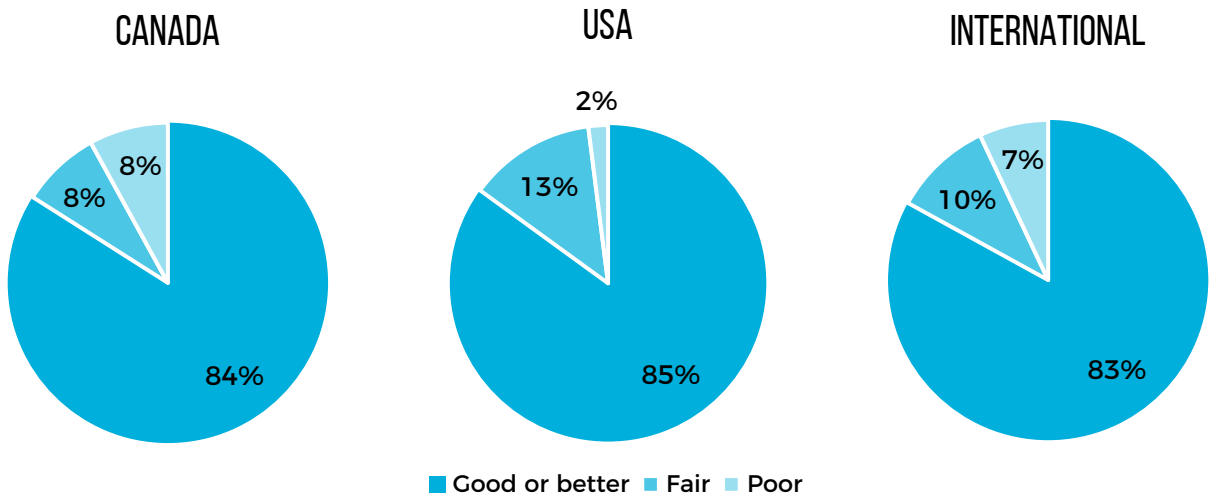
MEASURES OF SUCCESS

The main measures of success that we consider here are: 1) the quality of research tissue provided to recipient laboratories and 2) the contribution of the tissue that we isolate and distribute to the generation of new diabetes-related knowledge.

Islet Performance

It is important to us that the ADI IsletCore continues to provide high quality research tissue. Our focus on research-only islet isolation often results in preparations with higher purity and greater function than clinically-focused preparations that go to research. The average purity of our preparations has been greater than 70% over the past three years and our average stimulation index ranges from six- to ten-fold, under a range of glucose conditions.

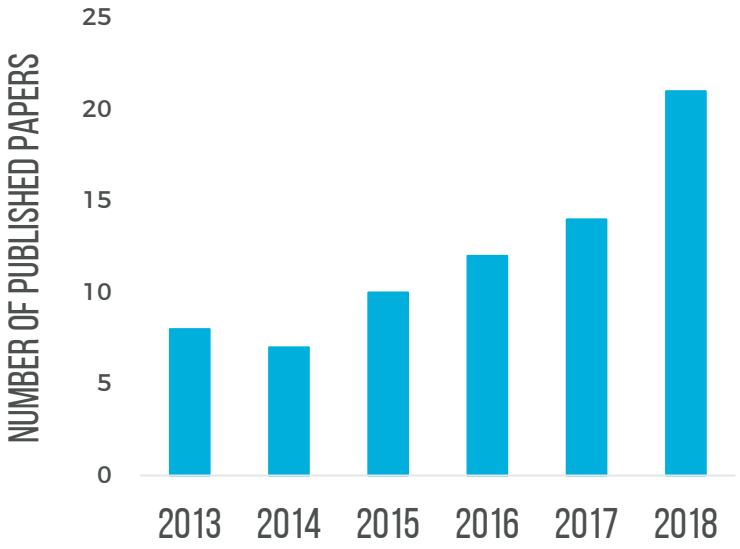
Overall quality feedback is uniformly high and largely unchanged over the past several years. In 2018, the quality of our preparations was consistently reported as excellent (42%) or good (43%). One area in which we'd like to improve is the response rate; we received feedback on only 39% of our 2018 shipments. To this end, we introduced an online feedback form in November in order to solicit feedback from our recipients in a more efficient and user-friendly way.



MEASURES OF SUCCESS

Research Outputs

The isolation and distribution of human research islets through the ADI IsletCore program is continually leading to the generation of new diabetes-related knowledge.



In this respect, our program has contributed to 79 published research papers by groups in Canada, the USA, and Europe. These have been published in top scientific journals, with 21 papers published in the last year alone.

Access to our islets also continues to contribute to successful funding applications for several of our recipient laboratories and has been acknowledged in proceedings from diabetes research conferences across the world.

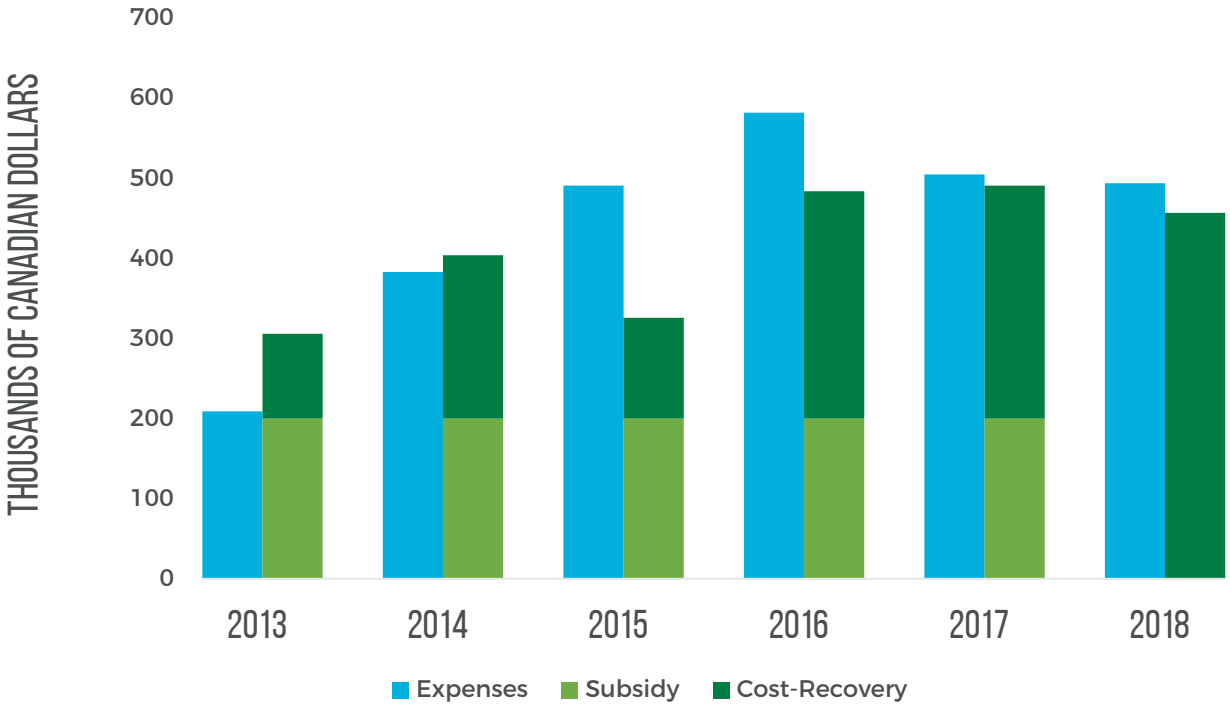
Human islets from the ADI IsletCore program are helping further global diabetes research; significant contributions in regenerative medicine, stem cells, immunology, diabetes genetics, metabolism, and transplantation have been enabled by access to the human research tissue provided by our program. This is something we take pride in and use to fuel our desire for the constant improvement of our program.

FINANCIAL INFORMATION

Income & Expenses

Our income and expenses are largely balanced. While we had been generously supported by subsidies from the University of Alberta and Alberta Diabetes Foundation from 2011, this support was completed at the end of 2017. We addressed the significant task of balancing our budget largely through increases in our user base and cost-recovery efforts. In 2018, we were happy to come very close to the break-even point between our expenses and cost-recovery.

Over the next year, we will continue efforts to be cost-efficient while maintaining the momentum in our cost-recovery program. We are close to our goal of sustainability, which will allow us to address challenges such as the repair of aging equipment and the pursuit of new initiatives in support of islet research.



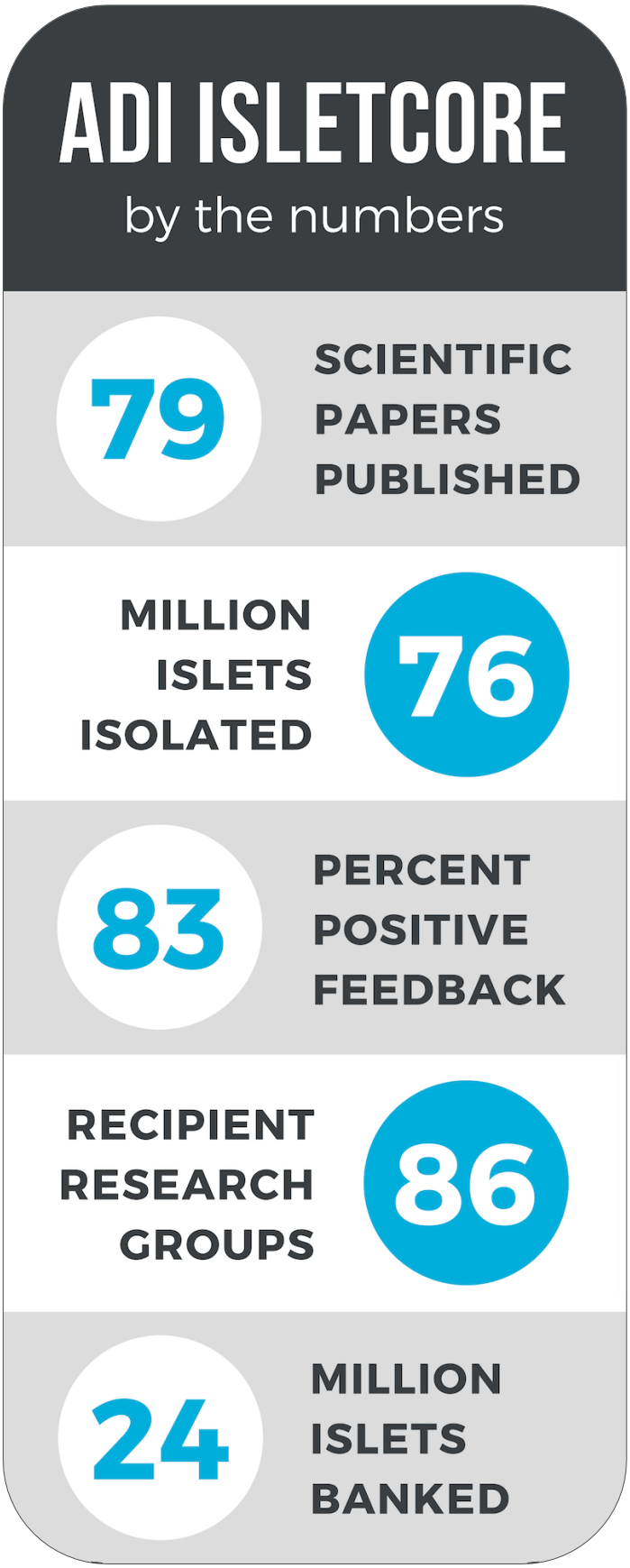
NEW INITIATIVES

ADI IsletCore Web Portal

In December 2018, Hart and Powers published a review calling for improved reporting of human islet donor characteristics and phenotyping. Top journals in the field are now implementing human islet reporting requirements for submissions.

To support this, we will be releasing a public web portal for access to all ADI IsletCore basic donor and sample information, including cold ischemia times, islet yelds, purity, insulin content, function, and user feedback. Users can then register for deeper access to data, including isolation technical parameters, quality control metrics, and images. There will also be a searchable inventory of our biopsies, fixed tissue, frozen tissue, and cryopreserved samples.

This website is expected to go live in the spring of 2019.

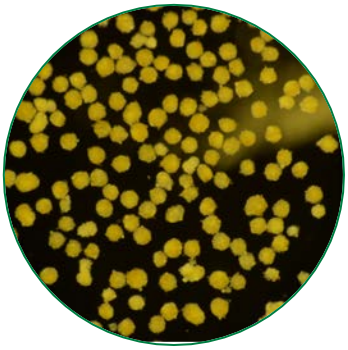


NEW INITIATIVES

protocols.io

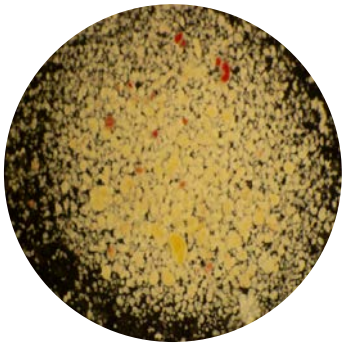
We have published several public protocols detailing our human islet isolation, sample preparation, and quality control procedures, including accompanying videos and pictures. These are searchable and citable using published digital object identifiers (dois). Links to these will be available through our new web portal, or can be found by searching the protocols.io website.

Pseudoislets



In collaboration with Mark Ungrin's group in Calgary, we have been testing the generation of engineered human pseudoislets as part of our human islet processing. We have successfully generated pseudoislets from several donors and are now moving ahead with a limited pilot program for the distribution of engineered human pseudoislets. In the future, we hope to offer these in a cost-efficient manner to interested laboratories.

T1D Islets



In 2018, we received six offers of pancreases from type one diabetic donors and performed two isolations, successfully procuring dithizone-positive islets and islet fragments at low purity for both preparations. We are now moving ahead with a limited pilot program for the distribution of T1D pancreases and islets.

CONTACT US

Our goal is to promote and facilitate human islet research. If you would like to join our human islet distribution list, please get in touch!

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For more information, please visit our website: bcell.org/human-islets.

WHAT WE OFFER

at ADI IsletCore

FRESH ISLETS

High purity, research-grade human islets from donors with and without diabetes. We process up to 50 human islet isolations per year.

CRYO-ISLETS

Cryopreserved and biobanked human islets from more than 140 donors. Useful for gene/protein expression, -omics, and limited functional studies.

BLOCKS & SLIDES

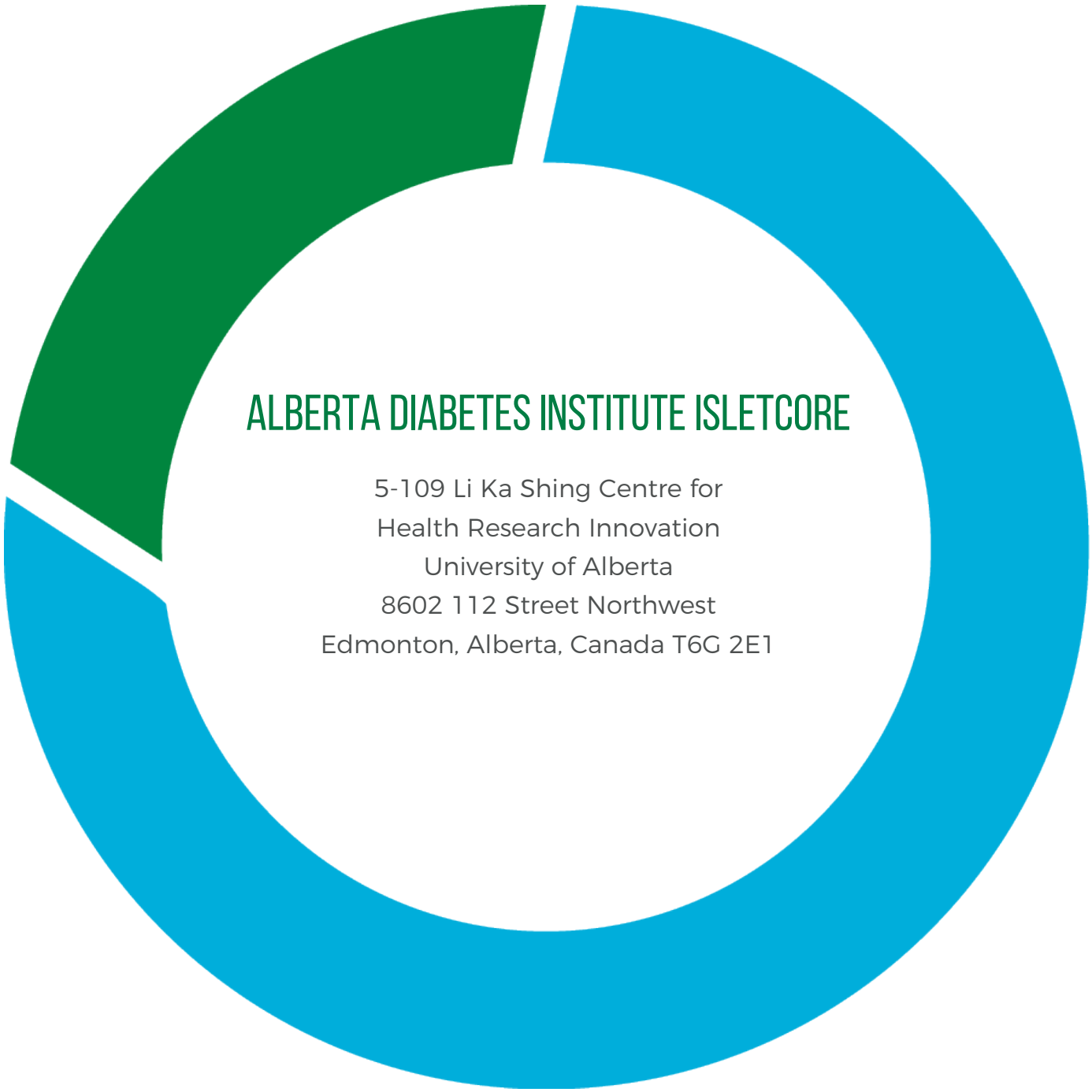
Paraffin-embedded pancreas biopsies and isolated islets from more than 200 donors. Custom fixation available upon request.

DONOR INFORMATION

Standard clinical information including donor age, sex, body mass index, HbA1c, human leukocyte antigen-typing, and disease status.

FUNCTIONAL DATA

Whole islet insulin secretion and single beta-cell function assays performed on every preparation and available upon request.



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