



**ALBERTA DIABETES INSTITUTE**  
**ISLETCORE PROGRAM**  
**2018 STATUS REPORT**



## ALBERTA DIABETES INSTITUTE ISLET CORE STATUS REPORT 2018

Facts and Figures 2018

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# TABLE OF CONTENTS

- 02 DIRECTOR'S MESSAGE
- 03 TEAM MEMBERS
- 04 ISLET ISOLATION & DISTRIBUTION
- 06 MEASURES OF SUCCESS
- 08 FINANCIAL INFORMATION
- 10 RECENT ACCOMPLISHMENTS
- 12 FREQUENTLY ASKED QUESTIONS
- 13 CONTACT US

# DIRECTOR'S MESSAGE

The Alberta Diabetes Institute IsletCore was launched in 2011 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 is important, as it 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

In the last year, we have made significant strides in increasing our reach by adding [28 more recipient laboratories](#) and expanding the range of information and tissues that we can make available to our users. In 2017, we were certified by the [Canadian Tissue Repository Network](#) and reached an agreement with the [International Institute for the Advancement of Medicine](#) for the procurement of pancreases from donors with type 1 diabetes.

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. Funding from the Alberta Diabetes Foundation and University of Alberta has been critical in the development of this program. We are also grateful to the organ procurement organizations across Canada, including the Human Organ Procurement and Exchange program in Edmonton and the Trillium Gift of Life Network 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 toward sustainability in our operations so that we can continue 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 23 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 • Research Administrative Coordinator**

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



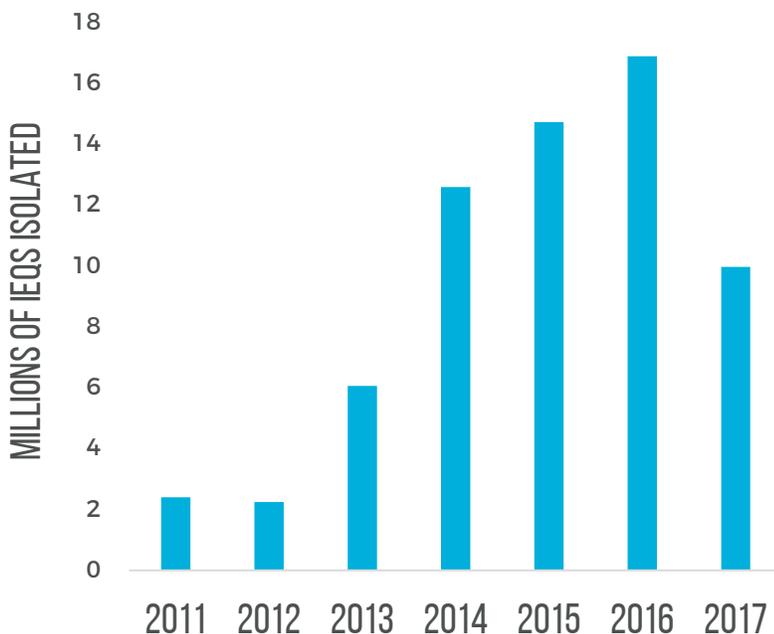
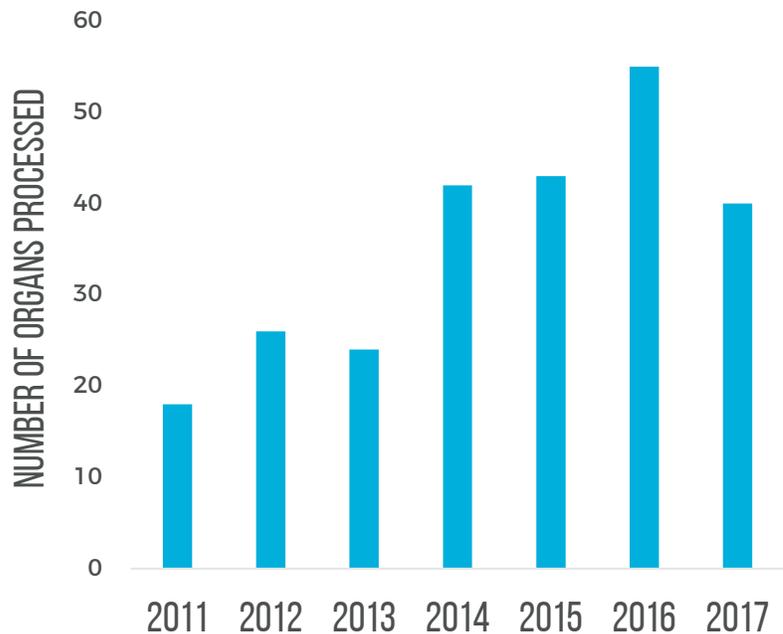
**Austin Bautista • Technician**

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.

# ISLET ISOLATION & DISTRIBUTION

## Organs Processed

As of the end of 2017, the ADI IsletCore received 249 human donor pancreases for islet isolation. In 2017, sixty-seven percent of the organs were obtained from Ontario, with the other thirty-three percent coming from Western Canada. [One-quarter of these organs were from donors with type 2 diabetes.](#)



## Islets Isolated

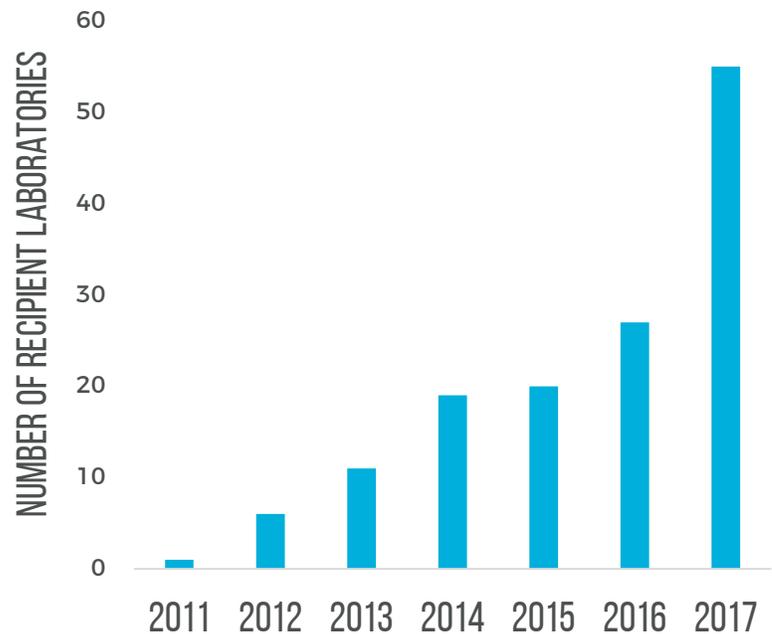
From the 249 organs above, we have isolated more than [65 million islet equivalents \(IEQs\)](#). The recent drop in IEQs isolated results in part from a greater selectivity in organs accepted for processing, as well as from production issues early in 2017 that have since been resolved.

Of the 65 million IEQs that we have isolated so far, [we have distributed more than 26 million for research](#) and cryopreserved a further 24 million for future use.

# ISLET ISOLATION & DISTRIBUTION

## Recipient Laboratories

We distribute islets to a [network of recipient laboratories that has now grown to 55 and counting](#). This significant increase is largely due to a push to sign up more groups in order to: [1\) make use of islets that we have not been distributing](#) and [2\) contribute to our cost-recovery efforts and ongoing sustainability](#).



A growing international profile of our human islet 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](#). To this end, the ADI IsletCore continues to develop an international network of scientists and cultivates innovative programs to support diabetes research.



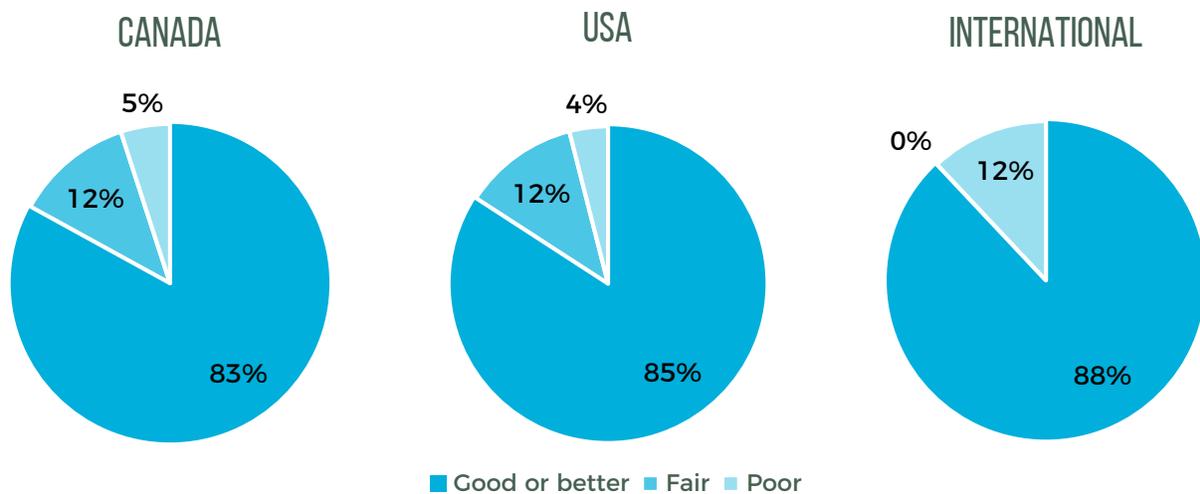
# MEASURES OF SUCCESS

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 provides research tissue of the highest caliber. 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 two years and our average stimulation index ranges from six- to ten-fold, under a range of glucose conditions.

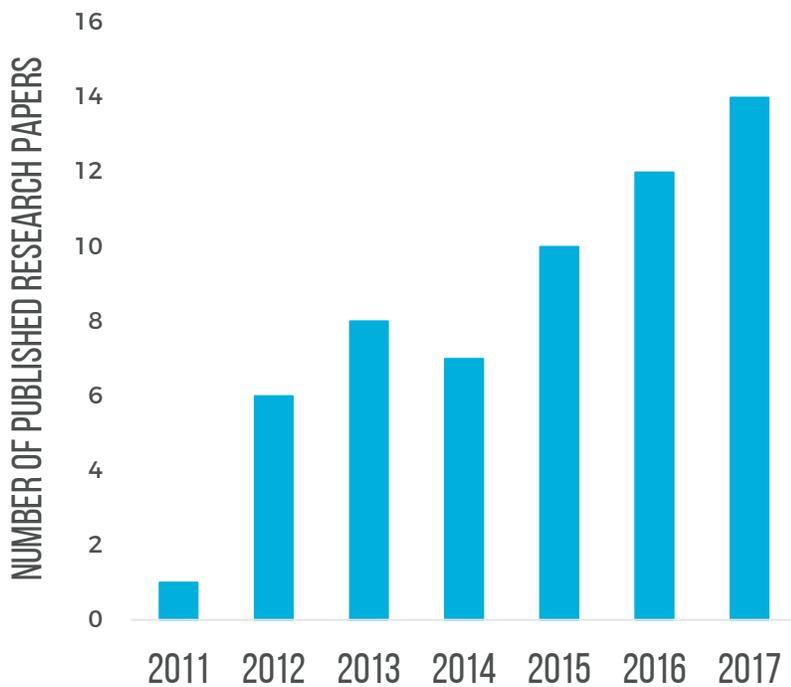
Overall quality feedback—assessed through feedback forms for each preparation—is uniformly high and largely unchanged over the past several years. In 2017, the majority of our feedback was positive, with the quality of our preparations regularly being reported as ‘Excellent’ (46%) or ‘Good’ (37%).



# MEASURES OF SUCCESS

## Research Outputs

The isolation and distribution of human research islets through the ADI IsletCore program is leading to the generation of new diabetes-related knowledge. In this respect, our program has contributed to **58 published research papers** by groups in Canada, the USA, and Europe. We believe that this reflects a growing contribution of our human islets to diabetes research worldwide.



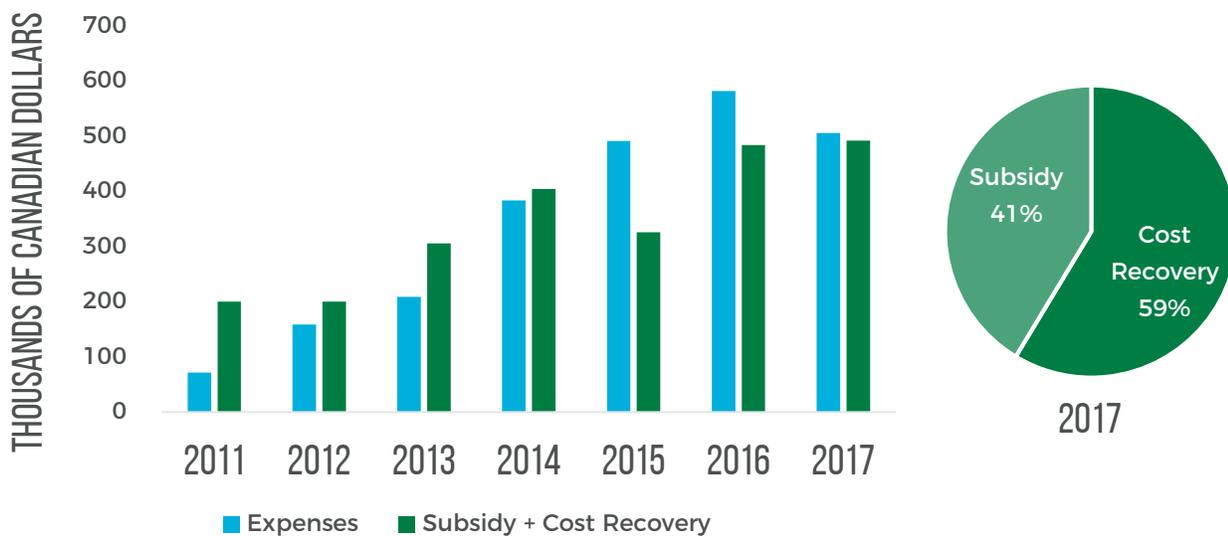
Significant contributions in **regenerative medicine, stem cells, immunology, diabetes genetics, metabolism, and transplantation** have been enabled by access to the human research islets provided by our program.

These papers have been published in top scientific journals. 15 papers came out in 2017 alone, appearing in *The American Journal of Human Genetics*, *Cell*, *Cell Metabolism*, *Diabetes*, *Diabetologia*, and *Nature Communications*, among others.

# FINANCIAL INFORMATION

## Income & Expenses

The income and expenses of the ADI IsletCore from 2011 to 2017 are [largely balanced](#). We were generously supported by subsidies from the University of Alberta and Alberta Diabetes Foundation over the past seven years. Now that this funding has ended, we are continuing our efforts to maintain the sustainability of the program. We are confident that the gap between our expenses and cost-recovery will narrow further in 2018 and beyond, given our [continued cost-efficiency efforts and the recent growth in our user base](#) (page 5).



Enzymes, buffers, and culture media continue to account for approximately half of our supply expenses. Our 2017 goal of reducing expenses was achieved by being more selective in the donor organs we received, as well as by accepting fewer organs overall (page 4). At the same time, production issues limited our ability to distribute—and receive cost-recovery from—islets of some preparations. Over the next year, we will continue being selective in which pancreases we accept by choosing those with the [most ideal timing and projected interest](#) from our network of recipient researchers.

# FINANCIAL INFORMATION

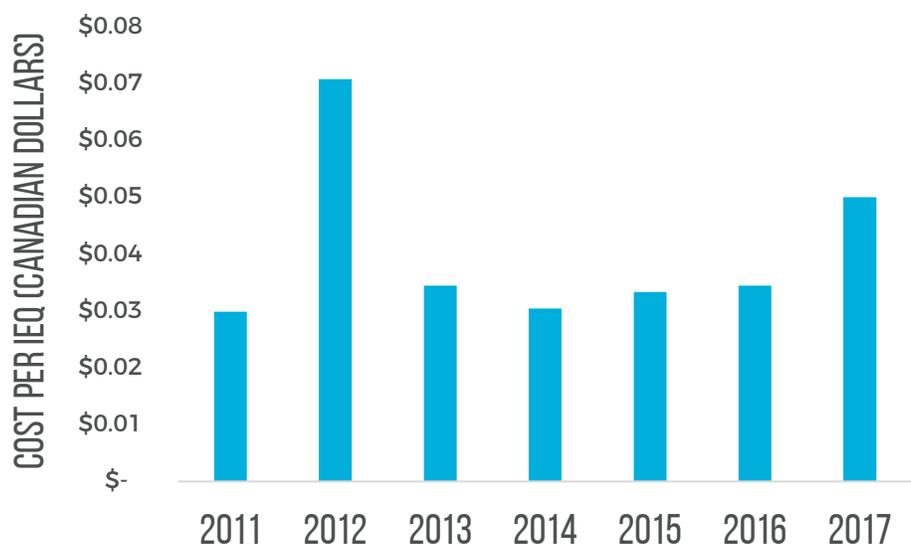
## Cost per Islet Equivalent

A key goal of the ADI IsletCore is to [broadly facilitate human islet research by making human islet studies more affordable](#). We currently charge cost-recovery of \$0.10 to \$0.12 (CAD) per IEQ, which is less than other sources. Our actual cost per isolated IEQ rose slightly in 2017 due to a number of preparations with lower-than-expected islet yields.

We have been making progress in distributing a greater proportion of islets that we isolate with two approaches. Firstly, as detailed on page 4, we have reduced the overall number of organs we process in order to lessen over-supply.

Secondly, as detailed on page 5, we have increased the total number of recipient laboratories that we serve. In 2016, we distributed only 28% of the islets we isolated. [This was up to 44% in 2017.](#)

Given that many groups have come online late in 2017, we expect to continue shipping out a greater proportion of isolated islets with each preparation.



In summary, [the financial outlook of the ADI IsletCore is positive](#). Nonetheless, we continue to focus on limiting expenditures and maintaining our initiative to sign up new recipient laboratories.

# RECENT ACCOMPLISHMENTS

## ADI ISLETCORE

by the numbers

58

SCIENTIFIC  
PAPERS  
PUBLISHED

MILLION  
ISLETS  
ISOLATED

65

82

PERCENT  
POSITIVE  
FEEDBACK

RECIPIENT  
RESEARCH  
GROUPS

55

24

MILLION  
ISLETS  
BANKED

## Certification by the Canadian Tissue Repository Network (CTRN)

Our program obtained certification by the [Canadian Tissue Repository Network](http://www.ctrnet.ca) (www.ctrnet.ca) and is now listed at the [Biobank Resource Centre](http://www.biobanking.org) (www.biobanking.org). This process involved demonstrating that our program meets best practice standards for tissue and information handling and storage, information privacy and security, and safety.

## Improving and Formalizing Donor Information

We recently completed a data-sharing agreement with the [Trillium Gift of Life Network](http://giftoflife.on.ca) (giftoflife.on.ca), which formalizes the extent and nature of donor information that we can share with end-users under suitable information transfer agreements. The major change that islet recipients will see is that we now provide [detailed HLA-typing information for most of our isolations](#), which previously had been a highly-requested piece of information by many of our users.

# RECENT ACCOMPLISHMENTS

## Agreement with the International Institute for the Advancement of Medicine

The [International Institute for the Advancement of Medicine](http://www.iiam.org) (www.iiam.org) is a non-profit organization that connects organ procurement organizations across the United States with researchers. Spanning the end of 2017 and early 2018, we finalized an agreement with IIAM for the [procurement of pancreases from donors with type 1 diabetes](#). We are working now to establish this pipeline and funding structure to proceed with the isolation and distribution of research islets from type 1 diabetic donors.

## Gold Certification by the Green Spaces Program

Spearheaded by Dr. Manning Fox, we have achieved our [Green Spaces Gold certification](#) from the Office of Sustainability at the University of Alberta. This demonstrates our commitment to integrating sustainable practices into our workflow, including [a reduction of laboratory waste and an increase in energy conservation](#). This ties into our overall goal of improved efficiency in our operations.



# FREQUENTLY ASKED QUESTIONS

## What documentation is required to receive human islets?

- A brief project description
- Your biosafety approval for working with human tissue
- Your human ethics approval (or Institutional Review Board exemption letter)
- A completed Request for Islets form
- Your shipping address and FedEx account number

## Is a material transfer agreement (MTA) required?

Yes. Once the other documentation is in place, the University of Alberta will coordinate with your tech transfer office to create an MTA.

## How much do the islets cost?

Islets are offered on a cost-recovery basis: \$0.12 (CAD) per IEQ for normal donors and \$0.18 per IEQ for diabetic donors. We also provide the option of signing up for a prepaid subscription of \$10,000 CAD for 100,000 IEQ (\$0.10 per IEQ).

## What information is provided with the islets?

Donor age, sex, body mass index, HbA1c (if available), human leukocyte antigen (HLA)-typing (if available), and any relevant medical history (e.g. diabetes diagnosis or pancreatitis) are provided. Preparation information such as purity, culture time, and photos of dithizone-stained islets are also included.

## How are the islets shipped?

Islets are shipped with CMRL media in a 50 mL tube at ambient temperature, via FedEx. Recipients in Canada and the United States will receive the islets the next day, while international recipients typically receive them within 48 hours.

## What kind of quality assurance do you perform on your islet preparations?

- Quantification and purity assessment via dithizone staining
- Immunohistochemistry
- Functional assessment via electrophysiology and insulin secretion assays
- Contamination assessment via culture of samples and supernatants

# CONTACT US

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

## Dr. Patrick MacDonald

ADI IsletCore Director

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ADI IsletCore Project Coordinator

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For more information, please visit our website at [bcell.org/isletcore](http://bcell.org/isletcore).

# 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 100 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. Special fixation available upon request.



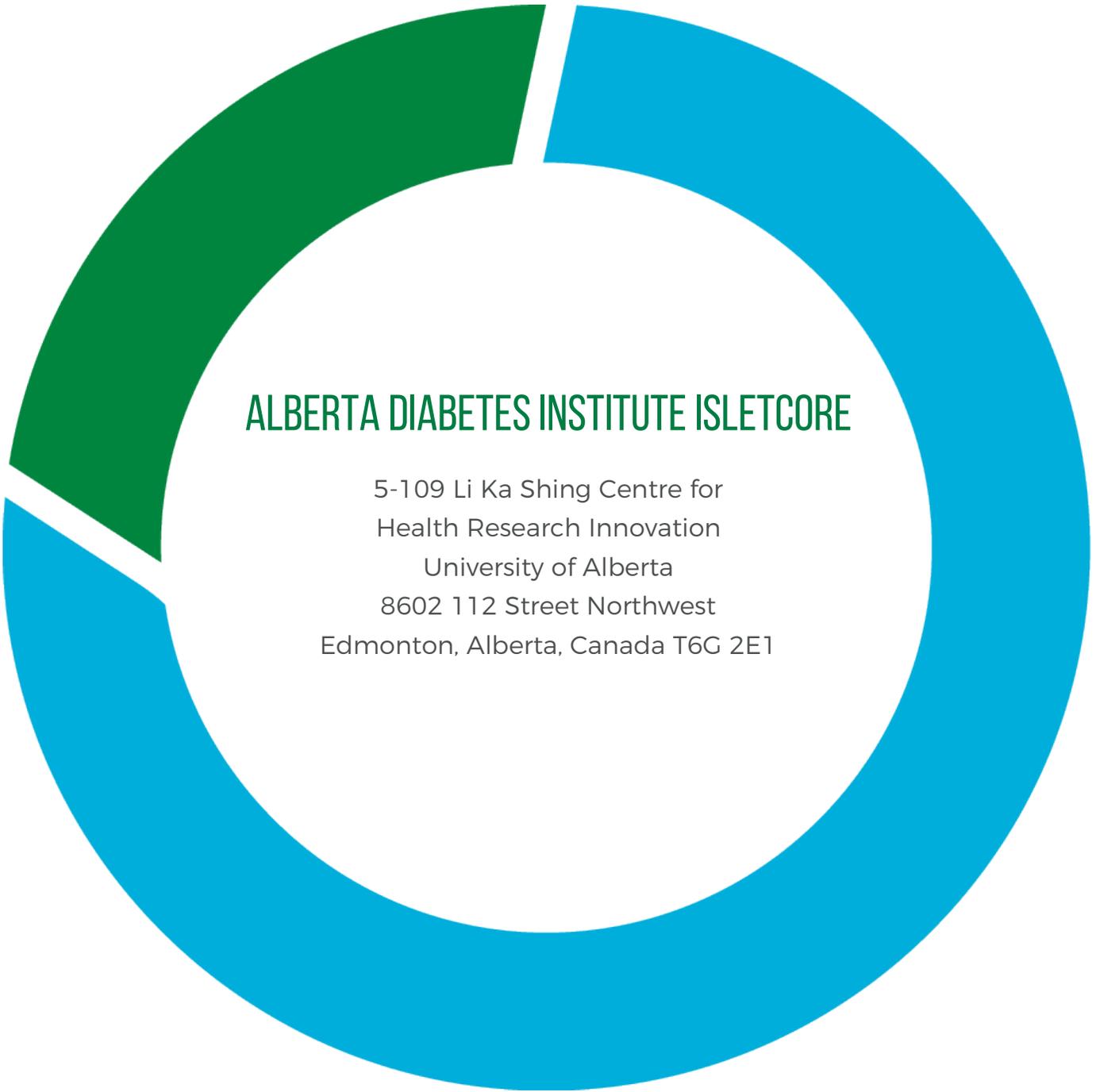
## DONOR INFORMATION

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.



## ALBERTA DIABETES INSTITUTE ISLETCORE

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