

inaugural
issue



Diabetes Future
Newsletter of the Alberta Diabetes Institute
Faculty of Medicine and Dentistry
University of Alberta

volume 1 | number 1



spring-summer 2006

ALBERTA DIABETES INSTITUTE

diabetes future

in this issue

- Welcome to **2**
Diabetes Future

- Meet the A team **3**

- View from the top: **4**
HRIF rises

- Diabetes news & views **6**

- A short history of **7**
diabetes research
at the University
of Alberta

- The "Alberta advantage" **10**

- Check our website! **13**

- Congratulations to our **14**
2005 winners

- ADF new frontiers **15**
symposium

- The cost of diabetes **16**



ISSN 1778-8423



Time present and time past

Are both perhaps present in time future,

And time future contained in time past.

—T.S. Eliot "Burnt Norton"

welcome!

welcome to diabetes future

diabetes future

The vision of the Alberta Diabetes Institute is to lead the world in curing diabetes.

Through scientific excellence and teamwork, we will discover new methods to prevent, treat, and cure diabetes. These discoveries will be rapidly translated into patient care in our clinics and shared world-wide.

Diabetes Future is published semi-annually by the Alberta Diabetes Institute, Faculty of Medicine and Dentistry, 750 Heritage Medical Research Centre, University of Alberta, Edmonton, Alberta T6G 2S2.

This newsletter is meant to serve as an engaging source of information on diabetes research and its future impact on health care in Canada. *Diabetes Future* is distributed to friends, supporters, partners, scientists, students, staff, and members of the community at large. Copies are available by request or online through the Alberta Diabetes Institute website at <http://www.med.ualberta.ca/adi/>

Comments and submissions are always welcome. Please write to Peter D. Taylor, Editor, *Diabetes Future*, or call us during business hours at (780) 492-0799 or fax (780) 492-0979 or peter.taylor@ualberta.ca

Photography

AHFMR; Capital Health; University of Alberta; Dawne Colwell; Richard Siemens, Creative Services; Patrick MacDonald; Laughing Dog Photography, supplied by AHFMR; Peter D. Taylor

Contributing Writers

AHFMR Research News, Illeiren Byles, Phoebe Dey, Caitlin Crawshaw, Geoff McMaster, Michael Robb, Peter D. Taylor, Nicola J. Webster.

Copyright 2006 © Faculty of Medicine and Dentistry



On behalf of the Faculty of Medicine and Dentistry and our research colleagues in the Faculty of Agriculture, Forestry and Home Economics, the Faculty of Physical Education and Recreation, and the new School of Public Health, I want to welcome you to *Diabetes Future*, the official newsletter of the Alberta Diabetes Institute.

It may seem strange to be welcoming you to a research newsletter with poetry, but the title for *Diabetes Future* was inspired by this enigmatic passage from "Burnt Norton" in T. S. Eliot's *Four Quartets* because it answers the age-old question: what good does research do for health care and for society as a whole?

The answer is simple. By exploring the present, and examining the past, research predicts the future. More importantly, it helps *change* the future.

We know, through research, that a mere *one* percent decrease in HbA1c blood glucose levels in diabetic patients over time reduces micro vascular blood vessel damage in patients so dramatically that sustaining this reduction can result in up to a *forty* percent risk reduction from atherosclerosis, cardiovascular disease, kidney failure, strokes, blindness and other future complications caused by diabetes.

By examining present evidence, and past morbidity, research can predict which strategies will improve health outcomes, and which interventions will save lives and reduce the suffering of diabetic patients and their families.

The value of research to society is enormous. Diabetes kills more than 40,000 Canadians and consumes billions of dollars in health care costs every year in Canada. More than 60,000 new patients are diagnosed each year and this number is escalating alarmingly. Our research mission is to improve this future.

Diabetes Future celebrates an important milestone at the University of Alberta with the establishment of the Alberta Diabetes Institute,

the consolidation of thirty years of successful diabetes research, and the creation of a state-of-the-art research complex in the Health Research Innovation Facility (East Building) that will open in the fall of 2007. The University's team of investigators from across four different faculties who will work together collaboratively and creatively in this new facility to fight diabetes is world class.

Researchers in the Alberta Diabetes Institute published the Edmonton Protocol in July 2000, and have developed expertise in basic and clinical transplantation, endocrinology, immunology, nutrition, cell signaling, exercise physiology, population health, and law, ethics, and public policy. More than \$200,000 is now invested each year in innovative pilot project grants through our unique fundraising partnership with the Alberta Diabetes Foundation. The ADI's 2nd Annual Research Retreat last fall was an outstanding success, attracting over 100 participants.

Finally, I would like to pay tribute to my predecessor and former dean, Dr. D. Lorne Tyrrell, under whose guidance the Health Research Innovation Facility and the Alberta Diabetes Institute were originally conceived in 2002. Under the new leadership team of Mr. Peter D. Taylor, Executive Director, and Dr. Ray V. Rajotte, Scientific Director, the future of the ADI is in good hands.

"Time past and time present/ Are both perhaps present in time future."

Only research can answer that question.

Thomas J. Marrie, MD

Dean,
Faculty of Medicine and Dentistry

meet the “A team”

ADI Advisory Board brings new community perspective

Universities are far more than research institutions. They impart knowledge to educate the young and the not so young. They pursue vital research to discover new knowledge and treatments for the health and well-being of society.

They engage in community debates on issues that will ensure the growth of our country, the future of our children, and the measured response to many challenges facing the world in which we live.

They are repositories of history and culture and art. They hold public trust because they demonstrate public value. They exist to discover, to teach, to lead, and to serve.

The Alberta Diabetes Institute has been created within this exceptional academic and service environment with the entrusted mission to bring new knowledge and treatments from science and medicine into the community for the benefit of diabetic patients and their families.

We conceptualize the ADI’s research strategy as moving “*From the Bench to the Bedside to the Boardroom to the Backyard.*” The pathways that will successfully bring new research to life in the fight against diabetes will necessarily involve the collaborative efforts of scientists, patients, industrial manufacturers, and community leaders. Only by fully engaging and integrating such resources, will diabetes be defeated.

ADI researchers are committed to fostering this “next wave” style of scientific collaboration where nutritionists will work directly with immunologists, exercise physiologists will assist transplant surgeons to improve their patients’ post-operative recovery experience, and the full creative force of basic and clinical science can be brought to bear in fighting the ravages of diabetes.

The terms of reference of the Advisory Board are to assist in setting the strategic direction of the Alberta Diabetes Institute by providing advice on the strategic plan and annual operating plan, to receive and comment on the research plan, to

promote fund development, and to promote the work of the ADI nationally and internationally.

The Advisory Board held its first meeting on January 24th and its initial projects are to assist with strategic planning, and to help develop communications and fund development plans for the Institute. ■



The A team front to back, in rows: Miss Lynn A. Hamilton, Mr. Robert H. Teskey, Dr. Ray V. Rajotte; Mr. Charles R. Allard, Dr. Edmond A. Ryan, Ms. Katherine A. Irwin; Dr. Thomas J. Marrie, Dr. Thomas E. Feasby, Dr. Andrew J. Greenshaw; Dr. H. Art Quinney, Mr. John Ramsay; Mr. Glenn Woolsey, Miss Karen Paulichuk; Mr. Peter D. Taylor; absent: Mr. Harold M. Kingston, Dr. Mamoru Watanabe.

Guiding the direction of the Alberta Diabetes Institute with input from its many community stakeholders is the Institute’s new Advisory Board under the able leadership of Mr. Robert H. Teskey, Chair, and Miss Lynn A. Hamilton, Vice-Chair. The current ADI Advisory Board membership includes:

- Mr. Robert H. Teskey**, Field Law LLP (*Chair*)
- Miss Lynn A. Hamilton**, Hamilton Aviation (*Vice-Chair*)
- Mr. Charles R. Allard**, Representative, University of Alberta
- Dr. Thomas E. Feasby**, Vice-President, Academic Affairs, Capital Health
- Dr. Andrew J. Greenshaw**, Associate Vice-President (Research)
- Ms. Katherine A. Irwin**, Development Officer, Faculty of Engineering
- Mr. Harold M. Kingston**, Kingston Ross Pasnak LLP
- Dr. Thomas J. Marrie**, Dean, Faculty of Medicine and Dentistry
- Dr. H. Art Quinney**, Deputy Provost, Provost & Vice-President (Academic)
- Dr. Ray V. Rajotte**, Scientific Director, Alberta Diabetes Institute
- Mr. John Ramsay**, Representative, Capital Health
- Dr. Edmond A. Ryan**, Department of Medicine (Endocrinology)
- Dr. Mamoru Watanabe**, Former Dean of Medicine, University of Calgary
- Mr. Glenn Woolsey**, York Realty Inc.
- Mr. Peter D. Taylor**, Executive Director, Alberta Diabetes Institute
- Miss Karen Paulichuk**, Administrative Assistant, Alberta Diabetes Institute

view from the top: HRIF rises

Health Research Innovation Facility changes campus skyline

HRIF's economic impact on Edmonton

- 6,000 new jobs by 2014
- Doubling annual research funding from \$144 to \$230 million by 2010
- Injecting \$150 million into Edmonton's economy
- Creating high-tech jobs and better health care

Lynne MacGillivray, Project Officer, briefing the Honourable Dave Hancock, Minister of Advanced Education, touring HRIF-East; with Dr. Ray Rajotte, ADI Scientific Director, Mr. Peter Taylor, ADI Executive Director, and Dr. Jody Ginsberg, Vice Dean, Faculty of Medicine and Dentistry.

What has more concrete than 44 hockey rinks, can swallow 408 family homes in a single gulp, has enough room for 11 CFL teams to play simultaneously, and more steel inside it than 1,657 half-ton trucks?

If you answered the new Health Research Innovation Facilities (east and west buildings), put yourself at the head of the class!

With construction started in 2004 and Phase I scheduled for completion in 2008, "HRIF" as it's called, is changing the skyline of the University of Alberta campus with its Wedgewood blue chimney pots and its panorama of new design rising along 87th Avenue between 112th and 114th Streets. Cost for completing Phase 1 of the two buildings is approximately \$250 million dollars.

The two new state-of-the-art research laboratory buildings have been designed as a joint project by Hamilton Filipowicz Architects Ltd. and O'Neill O'Neill Procinsky Architects, and built by PCL Construction. The Health Research Innovation Facility will book-end the existing Heritage Medical Research Centre, originally opened in 1985, and will connect on the second floor to the Heritage Medical Research Centre, the Medical Sciences Building and the Walter C. MacKenzie Health Sciences Centre.

Financial support for the buildings is coming from the Government of Alberta, the Alberta Heritage Foundation for Medical Research, the University of Alberta, the Canadian Foundation for Innovation, the Alberta Diabetes Foundation, and private donors.

The Muttart Diabetes Research and Training Centre, established in 1981 through an

endowment from the Gladys and Merrill Muttart Foundation and led by co-directors Dr. George Molnar and Dr. Alex Rabinovitch, will also be housed in HRIF-East and



will continue its research efforts in the areas of autoimmunity of type 1 diabetes, islet cell transplantation, lipid metabolism, the intestine and nutrition, obesity and cardiovascular disease, and clinical research, celebrating 25 years in 2006.

HRIF-East has seven floors above grade and 26,000 square meters (279,861 square feet) of space. HRIF-West has seven floors above grade and 39,000 square meters (419,792 square feet) of space. HRIF-East will primarily house researchers from the Alberta Diabetes Institute, and HRIF-West will house six floors of medical researchers and one floor of pharmacy researchers.

Going up! in HRIF-East:

The following diabetes-related research teams are planned for the HRIF-East building:

- SEVENTH FLOOR: Regenerative medicine (xenografts, stem cells, tissue engineering)
- SIXTH FLOOR: Immunology of diabetes, beta cells
- FIFTH FLOOR: Basic islet transplantation
- FOURTH FLOOR: Nutrition and metabolism
- THIRD FLOOR: Alberta Transplant Applied Genomics Centre
- SECOND FLOOR: Population health outcomes, prevention
- FIRST FLOOR: ADI Administration, Alberta Diabetes Foundation, gym, physical education
- BASEMENTS: Building service areas





Faculty of Medicine and Dentistry staff in HRIF-East
(left to right): Dr. Jack Jhamandas, Associate Dean of Research; Ms. Lynne MacGillivray, Project Officer; Mr. Peter D. Taylor, Executive Director, Alberta Diabetes Institute; Ms. Colleen Iwanicka, Research Administration Officer; Mr. Michael Robb, Director of Public Relations.



HRIF-East: Health Research Innovation Facility

New Horizons in HRIF-West:

These new research initiatives are planned to occupy space in HRIF-West when it opens in 2008:

- Institute of Biomolecular Design;
- Project CyberCell;
- Centre for Excellence for Viral Hepatitis Research;
- Centre of Excellence for Gastrointestinal Inflammation and Immunity Research
- Cardiovascular Translational Research Centre; and,
- Project to Restore Movement.

Other initiatives, including a Women’s and Children’s Health Research Institute, Centre for Membrane Proteins and Diseases, Viral Immunology, and an expansion of the National High Field NMR facility, are slated for Phase II occupancy.

Oh, and before you ask, there are exactly 7,679 light fixtures in the Health Research Innovation Facility. ■

The new state-of-the-art research laboratory buildings have been designed as a joint project by Hamilton Filipowicz Architects Ltd. and O’Neill O’Neill Procinsky Architects, and built by PCL Construction.



HRIF-East under construction, corner of 83 Avenue and 112 Street.

diabetes news & views

Research brings us closer to improved patient care



Chancellor Newell and Daryl McIntyre



This Suit is Made for Walking

The University of Alberta is stepping up for the Alberta Diabetes Foundation's Step Out Challenge, led by **Chancellor Eric Newell** who will be hitting the pavement along with CTV news anchors Carrie Doll, Daryl McIntyre, *Edmonton Sun* Columnist Graham Hicks, and Flaman Fitness operations manager Ted Dakin. Each has pledged to walk 10,000 paces a day. Said Mr. Newell, "I'm retired,

I'm over 60. I'm short and a little overweight and I'm a perfect candidate for type 2 diabetes...if I didn't do an exercise program, I'd probably get only 3,000 paces a day." Added Jeff Wright, development officer for the Faculty of Physical Education and Recreation, For \$30, registrants will receive a pedometer, a T-shirt, a bracelet, and a tracking calendar to monitor their steps for up to two months. Dr. Michael Mahon, Dean, Faculty of Physical Education and Recreation, outlined the Step Out Campaign's four inter-related objectives: getting people active, raising funds for diabetes, focusing attention on the value of diabetes research, and collecting valuable community-based data on fitness participation. "The *Canada Physical Activity Guide* suggests 60 minutes of light activity every day," said Mahon, "which roughly translates into 10,000 steps." Alberta Diabetes Foundation website: <http://www.afdr.ab.ca>. (Ileiren Byles, *ExpressNews*: 04/04/06).

Welcome Patrick & Rhonda MacDonald

Please give a warm western welcome to **Patrick and Rhonda MacDonald**, and their two children, Mae and Jack, who will be settling into Edmonton on June 1st when Patrick joins the Department of Pharmacology and the Alberta Diabetes Institute as our newest principal investigator. Patrick has recently



Patrick and Rhonda MacDonald and family

been a Post-Doctoral Research Scientist and European Foundation for the Study of Diabetes/AstraZeneca Fellow in Islet Biology at Oxford University in the Centre for Diabetes, Endocrinology and Metabolism (2005-2006), and completed a CIHR Post-doctoral Fellowship at Lunds Universitet in Sweden (2003-2005) under Drs. P. Rorsman and L. Eliassen. Patrick's diabetes research focuses on the imaging of islet cells, exocytosis and endocytosis, metabolic regulation of K_v channels, regulation of secretion by P13K-gamma, and is funded by AHFMR, CRC and CFI. More project detail and publications information can be seen on Patrick's website: www.bcell.org.

Puberty a key phase in diabetes risk



Dr. Geoff Ball

Dr. Geoff Ball, Faculty of Medicine and Dentistry, and director of the Pediatric Centre for Weight and Child Health, was part of a team of researchers who looked into the underlying physical and ethnicity-specific characteristics of insulin resistance in childhood and adolescence. They evaluated the dynamics of insulin sensitivity, insulin secretion, and pancreatic beta-cell function in African American and Caucasian children through the stages of puberty. The research, published in *The Journal of Pediatrics*, included investigators from the University of

Southern California, Tufts University, and the University of Alabama at Birmingham. The study took place over seven years in Alabama, where participants were part of an ongoing study of body composition, energy expenditure, and risk factors for type 2 diabetes and cardiovascular disease. The study confirmed that African-American kids are more insulin resistant than Caucasian kids. None of the boys and girls were diagnosed with type 2 diabetes, but their insulin levels were markedly different between the two ethnic groups. The measure of pancreatic beta-cell function decreased in African-American youth throughout puberty while the level remained static in Caucasian kids. Puberty is a transient phase that may act as an accelerator to increase diabetes risk in some individuals. *Journal of Pediatrics* website: <http://pediatrics.aappublications.org/> (Phoebe Dey, *ExpressNews*: 03/14/06)

Pioneer study in islet cell xenotransplantation

A team of researchers from the University of Alberta, the Yerkes National Primate Research Center of Emory University in Atlanta, Georgia and the Emory Transplant Center successfully transplanted insulin-producing neonatal porcine islet cells into monkeys, a procedure researchers say is a promising solution to the critical supply problem in islet cell transplantation. The paper appeared in an advanced on-line publication of *Nature Medicine*, February 26, entitled "Long-term survival of neonatal porcine islets in non-human primates by targeting co-stimulation pathways." Neonatal porcine islets, produced in Edmonton using a procedure that Drs. Greg Korbitt and Ray Rajotte developed in 1995, were sent to Atlanta for transplantation into diabetic rhesus macaques using an anti-rejection protocol developed by Drs. Christian Larsen and Kenneth Cardona of the Yerkes Research Center and the Emory Transplant Center. "While there is much work to be done," said Dr Larsen, "these studies

suggest that the rejection response to porcine islets can be surmounted." Dr. Rajotte added, "the next step is to prove that neonatal porcine islet cells could become a source for human transplantation. It's hoped that within the next three to five years, we will be transplanting patients with pig islets once we prove that it is safe." *Nature Medicine* website: <http://www.nature.com/nm/index.html>. (Michael Robb, *ExpressNews*: 02/27/06).

continued on page 8

Historical photographs of Drs. Banting, Best, and Collip reprinted with permission from Michael Bliss, The Discovery of Insulin, Third Edition, University of Toronto Press: Toronto: 2000, 128ff.

a short history

Diabetes Research at the University of Alberta



Dr. Charles H. Best, Dr. Frederick G. Banting and dog on the roof of the Medical Building, University of Toronto, 1921.

1921

Dr. Frederick G. Banting, Dr. Charles H. Best, Dr. James B. Collip, and Dr. John R. MacLeod collaborate at the University of Toronto on the discovery of insulin. Dr. Banting and MacLeod are awarded the 1922 Nobel Prize for Medicine, which they respectively share with Dr. Best and Dr. Collip.



Dr. James Bertram Collip, whose purification of insulin made clinical testing possible, in his lab about 1922.

1975

Dr. George Molnar is recruited from the Mayo Clinic to become Chair of the Department of Medicine at the University of Alberta. Over time, Dr. Molnar plays a key role in developing diabetes research at the University of Alberta and in creating and developing the Muttart Diabetes Research and Training Centre. He begins by recognizing the work of Dr. Ray V. Rajotte whose PhD thesis demonstrates that rat islets can be successfully cryopreserved.

1979



Dr. Ray V. Rajotte, a biomedical engineer, is cross-appointed to the Departments of Medicine and Surgery within the Faculty of Medicine at the University of Alberta with a specific research interest in the cryopreservation and transplantation of islets. He begins his research work with Dr. Molnar on hepatic glucose production.

1980



The Alberta Heritage Foundation for Medical Research (AHFMR) is established under Dr. Lionel McLeod by the Hon. Peter Lougheed with a \$300 million dollar endowment that is now over \$1.2 billion dollars. AHFMR has provided essential grant and salary support to diabetes researchers in Alberta for over 25 years.

Student wins Golden Key \$10,000 award



Shaheed Merani

Graduate student **Shaheed Merani** is one of three North American recipients of the Golden Key Graduate Scholar Award given annually by the Golden Key International Honour Society in recognition of achievement in academia and dedication to community involvement. The \$10,000 US prize, Merani says, will cover "school-related costs." The 25-year-old MD/PhD student works under the supervision of diabetes researcher, Dr. James Shapiro, and is searching for ways to make islet transplantation more effective. The process of transplanting insulin-producing islet cells into the bodies of brittle diabetics, known as the Edmonton Protocol, received international attention. "I'm specifically interested in looking at the immediate post-transplant phase and just looking at strategies we can take to improve the function of the islet transplant in that phase," Merani said. When not in the lab, Merani is the Canadian representative

continued from page 7

to the Golden Key Honour Society and is a representative in the Canadian Federation of Medical Students. Add his part-time job at Snow Valley giving skiing lessons, his position as the editor-in-chief of the *U of A Health Sciences Journal*, and his volunteer fundraising role for a children's hospital in Bangladesh, and you've got a dizzying combination. Golden Key Society website: <http://www.ualberta.ca/~goldnkey/>. (Caitlin Crawshaw, *ExpressNews*: 02/22/06)

Rats prove link between pre-diabetic state and heart dysfunction

Dr. Jim Russell, a researcher at the Alberta Institute for Human Nutrition, University of Alberta, is offering the first direct proof, published in the journal *Toxicological Sciences*, that diesel exhaust or power plant emissions can trigger cardiovascular events like heart attacks in obese people. Russell's research team, included Drs. Spencer Proctor and Sandra Kelly, collaborating with Dr. Kevin Dreher of the U.S. Environmental Protection Agency, specifically studied fine particulate matter measuring less than 2.5 microns in diameter. They compared rats that are obese and insulin-resistant with lean and metabolically normal rats. In terms of metabolism and heart disease, the animals, says Russell, "behave in every respect like your obese human." Arteries of both rat groups were exposed to particles collected downstream of the emission controls of a Birmingham, Alabama power plant burning low sulfur residual oil. On the second exposure, the arteries of the obese rat contracted directly and "very strongly," compared to the lean rats, says Russell, also a professor emeritus in the Faculty of Medicine and Dentistry. "It raises a real question about the effects of these pollutants, especially in vulnerable members of the population." *Toxicology Science* website: <http://toxsci.oxfordjournals.org/>. (Phoebe Day, *ExpressNews*, 02/01/06).



Dr. Jeffrey A. Johnson

Study confirms risks of diabetes drug

Dr. Jeffrey Johnson and his co-authors, all with the University of Alberta Institute of Health Economics, discovered that risk of death from heart attacks and other causes increases with the amount taken of sulfonylurea drugs - called chlorpropamide, tolbutamide or glyburide - a mainstay of diabetes treatment for some 40 years. Close to half a million Canadians are prescribed this class of drug. The findings appear in the *Canadian Medical Association Journal*. Examining the health records of 6,000 diabetics in Saskatchewan between 1991 and 1999, Johnson and his team compared the use of sulfonylureas to the generic metformin, a less expensive treatment used by about 50 per cent of type 2 diabetics. The results show that metformin is clearly the healthier choice. The most dramatic finding was that "the more you get of the sulfonylureas, the worse your outcomes." The study found that those taking doses as prescribed, or higher, were more likely to die than those who took less. However, Johnson does not recommend that patients on sulfonylureas stop taking the medication, only that they seek advice from a physician on their best option "Our contribution ...[is to]...move people toward making better choices." *Canadian Medical Association Journal* website: <http://www.cmaj.ca/cgi/content/full/174/2/169>. (Geoff McMaster, *ExpressNews*: 01/17/06)

New understanding of type 2 diabetes

Senior Heritage Scholar **Dr. Peter E. Light** and his research team discovered that people who have a high-fat diet or are overweight may be at increased risk for developing type 2 diabetes if they carry a genetic trait called a polymorphism. This polymorphism affects a specific potassium channel, known as the K_{ATP} channel, in the pancreas. Type 2 diabetes used to be called "adult-onset" diabetes, but today children and teens make up one third of new cases. When activated, this channel reduces insulin secretion, which results in increased blood sugar. This effect is amplified in the polymorphic potassium channel. Saturated and trans fats - the so-called "bad" fats - activate this ion channel much more than polyunsaturated fats (the "good" fats). "Potentially we have a link between diet and genetics," explains Light. "It seems plausible that people with this potassium-channel polymorphism are more susceptible to type 2 diabetes if they have a high-fat diet or are overweight. This could be developed into a screening tool to identify people at risk and then advise them about their diet. There are also anti-diabetes drugs that target this particular ion channel, so they could be prescribed selectively to people with this polymorphism." Alberta Heritage Foundation for Medical Research website: <http://www.ahfmr.ab.ca/> (*AHFMR Research News* Fall/Winter 2006; *ExpressNews*: 01/03/06) ■



Dr. Peter E. Light

a short history continued...

1981



Dr. Garth L. Warnock and Dr. Ray Rajotte successfully isolate pure islets from dog pancreases, thus setting the stage for the clinical islet transplant program to follow.

1981

The Muttart Foundation donates \$1.2 million to establish the **Muttart Diabetes Research and Training Centre (MDRTC)** at the University of Alberta, facilitating the recruitment of **Dr. Edmond A. Ryan** in 1983 and **Dr. Alex Rabinovitch**, a researcher in the prevention and treatment of type 1 diabetes, in 1988. MDRTC celebrates its 25th anniversary in 2006.

1982

The Islet Transplantation Group is started at the University of Alberta by **Dr. Ray V. Rajotte**, who is named as the group's Director. **Dr. Norman M. Kneteman**, a liver transplant specialist, and **Dr. Garth Warnock**, join the group.

1983



Dr. Edmond A. Ryan conducts a pioneering study identifying insulin resistance of pregnancy and the role of pregnant hormones in gestational diabetes. Dr. Ryan plays a leading role in the University's of Alberta transplant research and becomes Medical Director of the Clinical Islet Transplant Program in 1998.

the “alberta advantage”

Latest in diabetes research shines at fall 2005 retreat



Dr. John F. Elliott

a short history continued...

1988

The Alberta Foundation for Diabetes Research (AFDR) is registered as a charitable public foundation in Alberta by Edmonton community members with diabetic children wanting to support islet transplant research after JDRF, CDA, and other granting agencies decline to support islet transplant research.

1988

First human islet research trial preparations begin, following successful animal studies, conducted by the University of Alberta Islet Transplant Group and supported directly by public donations to the AFDR.

1989



First human islet transplant procedure in Canada is completed by the Islet Transplantation Group. The third patient receiving the procedure remains insulin-free for two and a half years using a combination of fresh and cryopreserved islet tissue.

The 2nd annual retreat of the Alberta Diabetes Institute (ADI) was buzzing with excitement as researchers gathered last September 15th at the Derrick Golf and Winter Club to share the latest in diabetes research at the University of Alberta.

In the countdown to the opening of the new Health Research Innovation Facility (east building) in the fall of 2007—when the ADI’s researchers will move together into one laboratory building—the retreat was the educational high point of last year.

Currently, ADI research groups are scattered across campus, making it difficult for scientists to meet and intermingle, explains Dr. Ray Rajotte, the ADI’s Scientific Director. “The fall retreat provides a great opportunity for researchers to get together, scientifically and socially. It’s been a tremendous success from the beginning.”

ADI researchers know that the best approach to finding new treatments and ultimately a cure for diabetes is to fight the disease on several fronts, and the fall retreat provides a perfect forum for doing just that. “The result was a thumbnail sketch covering the whole breadth and depth of diabetes research within the Institute itself,” explains Dr. Rajotte. “The quality of science and diversity of the speakers was really exceptional. We have an outstanding multi-disciplinary group of young and mid-career scientists in the ADI.”

Indeed, it is this diversity of research which makes the Alberta Diabetes Institute so unique. The ADI encompasses the four pillars of health research defined by the Canadian Institutes of Health Research—biomedical, clinical, health services and systems research, and social, cultural,

environmental, and population health—and each of these research areas was well represented in the program. It was this diversity that first attracted Merck Frosst Canada Ltd. to provide an educational grant in support of the retreat’s scientific program, and the ADI thanks Mr. Bruce Halase for helping to make the day such a resounding success.

At one end of the day’s scientific spectrum, we heard how Dr. Peter Light’s research team is working at the basic science level using single, isolated insulin-secreting cells from the pancreas to understand the link between dietary risk factors and type 2 diabetes. “We are investigating whether specific proteins involved in the electrical excitability of pancreatic cells are modulated by derivatives of fat metabolism known to be elevated in obese and type 2 diabetic individuals,” explains Dr. Nicola Webster, a post-doctoral fellow. “We are looking at the cellular level for a mechanism to account for reduced insulin secretion in obesity and type 2 diabetes,” she added. Researchers in the Light lab hope that such a discovery may ultimately identify novel drug targets for the treatment of type 2 diabetics in addition to confirming the importance of dietary management in managing the disease.

Coincidentally, graduate student Steven Johnson is currently involved in developing these



Dr. Ron Gill (centre), plenary speaker, with retreat organizers Dr. Colin Anderson and Dr. Rhonda Bell.



Mr. Bruce Halase, Merck Frosst Canada, and Dr. Ray Rajotte, ADI Scientific Director.

types of management strategies for patients with type 2 diabetes. In addition to developing dietary strategies, Johnson's latest research is attempting to further develop the effectiveness of the First Step Program, a pedometer-based, self-paced walking program designed to help people with type 2 diabetes by increasing their physical activity within recommended guidelines. "Our goal is to develop a cost-effective management strategy that uses simple tools and messages to optimize the health benefits of self-paced walking," Johnson explains during his poster presentation.

The health outcomes in patients involved in the program thus far have been modest, despite the increase in individual patient physical activity. Johnson believes this may be due to patients simply not walking "fast enough" and is now designing a strategy that will condition patients to increase their speed as well as the number of steps they take each day.

At the other end of the day's scientific spectrum, Samantha Bowker, a graduate student in the School of Public Health, is concerned with the role that current anti-diabetic therapies may play in the development of cancer in patients with type 2 diabetes.

Dr. Jeff Johnson and graduate student Samantha Bowker explore diabetes and cancer.



"It is increasingly being recognized that patients with type 2 diabetes have an increased risk of developing cancer," explains Bowker, "and several studies have demonstrated that elevated insulin levels and insulin resistance is associated with tumor growth."

By studying these two diseases simultaneously, Bowker is hoping to further explore this relationship, and identify whether drugs that reduce insulin resistance can also reduce the rate of cancer in type 2 diabetics. It is possible that Bowker's findings could lead to treatment changes for diabetes to improve patient health outcomes.

And then, of course, there is the tremendous effort being put into improving the long term

continued on page 12

a short history continued...

1994



Dr. D. Lorne Tyrrell is named Dean of Medicine at the University of Alberta on October 1. During his tenure, the independent Faculty of Medicine and Faculty of Dentistry merge together and Dr. Tyrrell expands the medical research program and begins construction on the Health Research Innovation Facility buildings.

1995



Edmonton and area

Capital Health is created in Edmonton with 10,175 staff serving 727,370 in population, and approximately \$780 million dollar budget under Alberta Health's new regional plan. Today, Capital Health has 29,000 staff and serves 1,000,000 Albertans with a budget of \$2.4 billion dollars, including **Dr. Ellen Toth's** unique mobile diabetes diagnostic facilities serving the province's Aboriginal population.

1996



Dr. Gregory S. Korbutt, a former graduate student of Dr. Rajotte's, is recruited back to Edmonton to join the Department of Surgery and the Islet Transplantation Group with a strong research background in islet physiology and new sources of islet tissue.

1997



Dr. Jonathan R. T. Lakey returns to the University of Alberta where he had previously trained in large animal and clinical isolation and cryopreservation under Dr. Rajotte and Dr. Warnock and is appointed Director of the Clinical Islet Isolation Laboratory.

1998



Dr. A. M. James Shapiro comes to Edmonton from the United Kingdom to do a Transplant Fellowship and PhD in experimental surgery under Drs. Norman M. Kneteman and Ray Rajotte and is persuaded to stay. With his background as a multi-organ transplant surgeon with experience in clinical immunosuppression and experimental islet transplant research, Dr. Shapiro is named Director of the Clinical Islet Transplant Program.

1999

Dr. Timothy Keiffer, a diabetes researcher at the University, leads a team that discovers a way to genetically alter cells in the intestines of mice to allow them to produce and release insulin, thus imitating the work of the pancreas.

success of methods for transplanting islets in the treatment of type 1 diabetes. Despite the considerable gains achieved with the Edmonton Protocol, several obstacles still prevent wider application of this therapy, explain graduate students Eric Tredget and Leilani Langer. "One obstacle is the shortage of donor islets, and another is the serious side effects associated with medications used to prevent the immune system from rejecting the transplanted donor islets."

Tredget and Langer are attempting to address both problems. Their presentations showed how the use of xenogeneic (non-human) sources of islets are becoming an attractive solution to overcoming the shortage of donor islets, and how alternative therapies might be used to prevent xenograft rejection. "Our latest findings indicate that short term administration of monoclonal antibodies specific for an immune cell surface molecule is highly effective in promoting long-term survival and function of islet xenografts in mice," explains Tredget.

Langer believes that co-transplanting islets with Sertoli cells may also provide the answer. "Sertoli cells, which are local "nurse cells" in the testes, provide beneficial co-factors to protect sperm, making the testes immuno-privileged," Langer explains. "We are interested in whether or not Sertoli cells can transfer this immunoprotection to islets." Her preliminary findings suggest that this may be possible.

continued from page 11



Dr. Nicola Webster and Dr. Peter Light and the electrical excitability of pancreatic cells.

Both students hope that their research could lead to life-long graft acceptance in type 1 diabetic patients receiving islet transplants.

For Dr. Ron Gill, Professor of Medicine and Immunology at the University of Colorado Health Science Centre and Director of UC's Transplant Immunology Program who gave the retreat's opening plenary presentation on transplantation immunobiology in diabetes, the "Alberta advantage" was evident throughout the whole day of the program. "In the same meeting



Graduate student Dereck Mok (right) presents islet xenografts in mice.



The Sertoli solution with graduate students Leilani Langer and Eric Tredget.

we heard everything from complex immunology, to health outcomes and prevention for type 1 and type 2 diabetes, to different exercise and nutritional strategies, which is something I have not seen in one place before," Dr. Gill commented with genuine enthusiasm.

But all work and no play makes for a dull day. The strategy of the Alberta Diabetes Institute for tackling diabetes is not just about conducting research on different fronts, it's about bringing people together, pooling talents, and having a little fun, too. With this in mind, the retreat's organizing committee encouraged group interaction in the form of putting competitions and a variety of creative team activities. Researchers got to "practice what they preach" as they counted steps in a team pedometer challenge and scored points by resisting the elaborate array of sugary cakes offered throughout the day.

"We wanted to provide a representation of research in the ADI in a relaxed and fun environment," explains Dr. Gina Rayat, one of the retreat's organizers. "The success of the Alberta Diabetes Institute is dependent on its members



Picking up the pace with Dr. Gordon Bell, graduate student Stephen Johnson, and Dr. Rhonda Bell.



ALBERTA DIABETES INSTITUTE

check our website!

Want to know the latest in diabetes research at the University of Alberta? Looking for the background of a diabetes investigator whose name you just can't remember? Thought you saw something lately in ExpressNews about diabetes but can't recall when you saw it?

Look no further! By this July, the Alberta Diabetes Institute will publish its web pages as part of the Faculty of Medicine and Dentistry website.

The website will have information about the activities and policies of the Alberta Diabetes Institute, useful patient reference tips, and links to other diabetes-related websites, plus a growing array of archived materials.

For a free subscription to Diabetes Future, fill out the enclosed postage free card or contact karen.paulichuk@ualberta.ca

<http://www.med.ualberta.ca/adi/>

working together and sharing ideas and the retreat was a perfect platform for our researchers to start doing just that."

The research must work. There were sugar cakes left over at the end of the day. (Nicola J. Webster) ■



2005 retreat participants outside the Derrick Golf and Winter Club.

a short history continued...

2000



New England Medical Journal advances publication of the "Edmonton Protocol" article written by eight members of the Islet Transplantation Group (Drs. James Shapiro, Jonathan Lakey, Edmond Ryan, Gregory Korbutt, Ellen Toth, Garth Warnock, Norman Kneteman, and Ray Rajotte) six weeks before schedule for the July issue. The Edmonton Protocol increases islet transplant success rates from 8% to 100% at the one year mark by using a non-corticosteroid treatment regime, and 11,000 islets/kg of patient weight.

congratulations to our 2005 winners

Alberta Diabetes Foundation Sparks Innovative Research

a short history continued...

2000

An Interim Diabetes Steering Committee is established to develop a proposed plan for the new **Alberta Diabetes Research Institute** as part of the Faculty of Medicine and Dentistry that will include researchers from the Faculties of Agriculture, Forestry and Home Economics, and Physical Education and Recreation.

2001

Clinical Trials of the Edmonton Protocol begin in ten clinical centres. By 2006, more than 550 patients will be treated using the Edmonton Protocol in approximately 50 clinical centres around the world.

2001

The construction of the Health Research Innovation Facility, HRIF East & West buildings, is announced (providing 69,500 meters²/748,090 feet² of essential research, teaching, and administration space), is announced with initial Alberta Government funding of \$110 million dollars. ADRI researchers will occupy most of the East Building. Construction begins in July 2003, to be completed mid-2008.

2002

The Academic Planning Committee of the University of Alberta approves the establishment and proposed business plan for the **Alberta Diabetes Research Institute**. Responsibility for implementing the plan is vested with the host Faculty of Medicine and Dentistry.

Through the longstanding support of the Alberta Diabetes Foundation, a community-based fundraising organization and key partner of the Alberta Diabetes Institute, the ADI has been able to disburse approximately \$200,000 annually in new pilot project grants and graduate student awards. Since its establishment in 1988, the Alberta Diabetes Foundation has funded more than \$3 million dollars in essential diabetes research at the University of Alberta, including the original human trials research leading to the success of the Edmonton Protocol.

In addition to providing support for these innovative grants and awards, the Alberta Diabetes Foundation has also undertaken a \$10 million capital campaign to support the construction of the new Health Research Innovation Facility (East Building) in which the ADF Office will be housed in 2007.

These annual pilot project grants and graduate student awards are important to the future of diabetes research for two reasons.

First, the pilot project grants provide young and upcoming researchers with needed funding to demonstrate their innovative research designs that will later help them attract larger grants from more traditional, and fiercely competitive, granting agencies. Breaking into the mainstream field of research is difficult for bright young investigators, and the innovative and consistent support that the Alberta Diabetes Foundation has injected into diabetes research in Canada has helped to generate years of valuable pilot research projects that have advanced dozens of talented and promising careers in the field of diabetes research.

Second, by providing the graduate student award, the Alberta Diabetes Foundation has generated a new link to encourage students in medicine or science, who wish to pursue a career related to diabetes, to become actively engaged in research early in their career paths. As competition for research grants becomes ever more difficult, and the need to bring talented new minds into

the fields of basic and clinical medical diabetes research, the Alberta Diabetes Foundation's strategic investments in these two critical areas will prove to have lasting importance.

The Alberta Diabetes Institute and the Faculty of Medicine and Dentistry are grateful to the Alberta Diabetes Foundation, its Board of Directors members, and donors, for their commitment and generous support. All of the Alberta Diabetes Institute's annual pilot project grants and awards are carefully adjudicated and selected through an open call for proposals that are reviewed by members of the ADI Research Coordinating Committee.

The Alberta Diabetes Institute congratulates the following 2005 pilot project grants and graduate student award winners:

Pilot Project Grants

Babita Agrawal: A novel immunomodulatory agent: Role in prevention of immune rejection and tolerance induction to islet grafts. (\$26,000)

Colin A. Anderson: Generation of stable allogenic mixed chimerism in NOD mice. (\$26,000)

Normand Boulé: Acute effects of Metformin on exercise capacity in Type-2 diabetics. (\$24,000)

Catherine J. Field: Investigating the effects of EPA and DHA on inflammation and immune dysfunction in the obese and insulin resistant JCR:LA-cp rat. (\$26,000)

Gregory S. Korbutt: Differentiation of pancreatic mesenchymal stem cells into beta cells. (\$26,000)

Ron C. Plotnikoff: Diabetes net PLAY: a physical activity website and e-counselling intervention for individuals with Type-2 diabetes. (\$26,000)

Spencer D. Proctor: Role of serum amyloid-A (SAA) during postprandial dyslipidemia in the metabolic syndrome and pre-type-2 diabetes. (\$26,000)

Graduate Student Award

Laura Kennedy: Lifestyle and metabolic assessment of teenagers with type-2 diabetes. (\$20,000) ■

ADF new frontiers symposium

“Doctor, what will happen to me if there’s a pandemic?”

The hall fell silent after the final symposium speaker left the stage and the audience questions began. One by one, individual members of the large community audience that had braved a wintry evening to listen to five diabetes researchers from the Alberta Diabetes Institute gave voice to their own fears for their future health.

“Doctor, I’m a diabetic,” said the first audience member, “what will happen to me if there’s a pandemic?” Dr. Edmond Ryan, symposium speaker and Professor of Endocrinology at the University of Alberta, responded by stating that, while it is impossible to precisely predict the future, Capital Health, the University of Alberta and the Government of Alberta are doing every possible to prepare for any eventuality and are monitoring the world situation very closely. By planning emergency care in advance with your own physician, you can safeguard your own health.

The next questions focused on personal fitness. “How many Canadians are inactive and what does it take to stay healthy?” one mother asked. Dr. Wendy Rodgers, Professor of Physical Education and Recreation, answered by stating that 53 percent of Canadians, “far too many,” are inactive and that by simply using a pedometer and adding 10,000 steps to your daily routine, you can reverse this trend in your own lifestyle.

“But how do you teach kids to be active?” another mother asked. Dr. Rodgers suggested, “in school, teach them to be active; at home, focus on planning special weekend fitness activities.”

“What about the Edmonton Protocol?” another person asked. “Is it true that transplants are less successful over time?” “Yes,” replied Dr. Ryan, who is also Medical Director of Clinical Islet Transplant Program, “after five years, approximately 80 percent of transplant patients still have about 50 percent of their islets working, although some patients are taking lower doses of insulin again.

“The good news,” he added, “is that their blood sugar levels remain more stable than before receiving their transplants.” There have now been more than 550 successful transplants in approximately 50 clinical centres around the world using the Edmonton Protocol.

A DIABETES SYMPOSIUM: NEW FRONTIERS, held at the Fantasyland Hotel on January 26th, was the brainchild of the Alberta Diabetes Foundation in partnership with researchers from the Alberta Diabetes Institute, University of Alberta. The four-hour evening symposium attracted a capacity crowd of four hundred citizens and was hosted by Mr. Jim Kanerva, Director of the ADF and author of *Dana’s Disease: A Father’s Journey into the World of Diabetes*.

Guest speakers included Dr. Ray V. Rajotte, Scientific Director, Alberta Diabetes Institute, and Professor of Surgery and Medicine; Dr. Gina Rayat, Assistant Professor of Surgery; Dr. Rhonda Bell, Associate Professor, Department of Agriculture, Food and Human Nutrition; Dr. Wendy Rodgers, Professor in the Faculty of Physical Education and Recreation; and Dr. Edmond Ryan, Professor of Medicine, Division of Endocrinology.

Judging by the extended question period and the enthusiasm of the audience, the evening was a resounding success. And what was the take home message?

- Count your calories by reading food labels conscientiously,
- Make exercise a fun and fulfilling part of your daily routine,
- Keep up with the latest diabetes research and health news through reliable sources, and
- Be an active partner in your own healthy future! ■

a short history continued...

2002



Alberta Diabetes Foundation

Alberta Foundation for Diabetes Research commits \$10 million capital fundraising to HRIF-East campaign and renames itself the **Alberta Diabetes Foundation (ADF)**. The Faculty of Medicine and Dentistry renames the **Alberta Diabetes Institute (ADI)** and commits space in HRIF-East for the ADF Office.

2003

Dr. Ray Rajotte is named Interim Scientific Director of the Alberta Diabetes Institute, (and made Scientific Director in 2004). **Mr. Brian Manning** of TkMC Consulting Ltd. is contracted as Interim Executive Director.

2003

Canadian Centre for Health Research Excellence Award is given to the Alberta Institute researchers by Health Canada in recognition of the “award-winning, internationally recognized research team” in islet cell transplantation and other “key areas of medical research.”

2004

Dr. Thomas J. Marrie becomes Dean of the Faculty of Medicine and Dentistry on July 1. Dr. Marrie provides support and guidance to the Alberta Diabetes Institute while partnering with Capital Health and the Government of Alberta to build the \$577 million dollar, 170,000 m² (1.8 million ft²) Edmonton Clinic that will serve one million patients each year when it opens in 2011.

the cost of diabetes

One in four families has a diabetic member in it

These two figures reprinted with permission from Ohinmaa A, Jacobs P, Simpson SH, Johnson JA. The projection of prevalence and cost of diabetes in Canada: 2000 to 2016. Canadian Journal of Diabetes 2004;28(1):116-123.

The number of individuals with diabetes in the general population will increase from approximately 1.4 million patients in 2000 to 2.4 million patients in 2016.

The total healthcare costs are projected to increase from Can \$4.66 billion in 2000 to \$8.4 billion in 2016 (1996 dollar values). Important

differences in diabetes-related cost trends were noted across provinces and territories.

The projected model used in this study showed that if the increase in prevalence of diabetes follows current trends, health care costs for people with diabetes in Canada will increase by 75% between 2000 and 2016. ■

a short history continued...

2004

1st Annual ADI Research Retreat Day is held on September 17th and attracts University of Alberta researchers, students, fellows, and external guests.

2005

Mr. Peter D. Taylor is hired as Executive Director and expands the ADI's structure, strategies and policies.

2005

2nd Annual ADI Research Retreat Day is held on September 16th and attracts University of Alberta researchers, students, fellows, and special guest speaker Dr. Ronald G. Gill from the University of Colorado.

2006

ADI Advisory Board holds its inaugural meeting on January 24th to review ADI policies and strategies. The GFC Academic Planning Committee approves the renaming of the **Alberta Diabetes Institute**.

2007

Opening of the Health Research Innovation Facility (east building), the new home of the ADI.

2008

Opening of the Health Research Innovation Facility (west building).

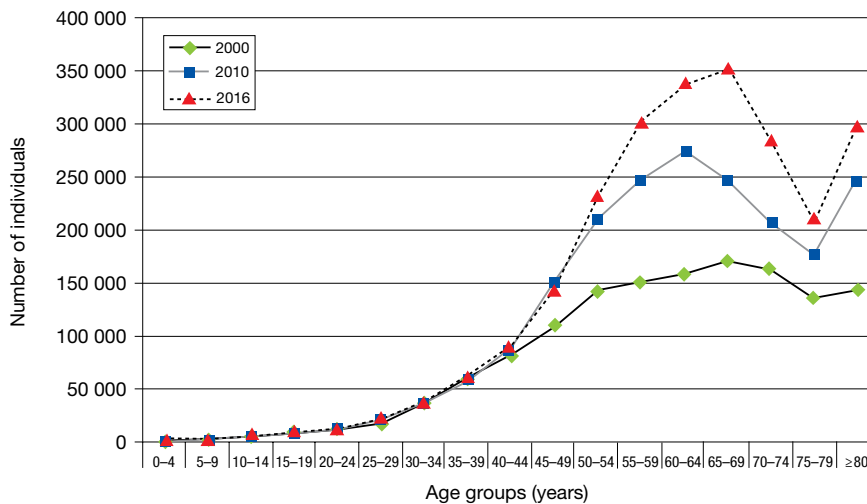


Figure 1. Predicted age-specific diabetes population in Canada in 2000, 2010, 2016.

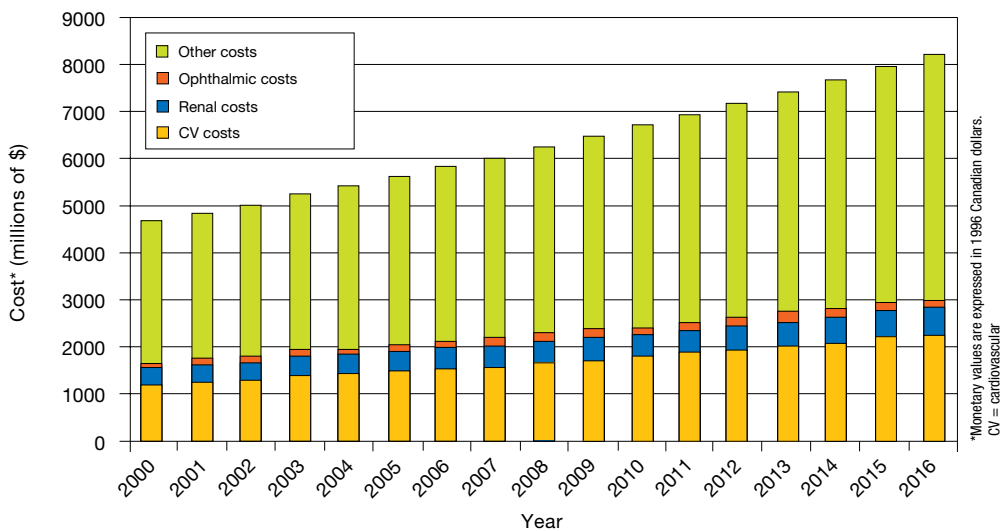


Figure 4. Distribution of the direct healthcare costs for individuals with diabetes by major comorbidities and other reasons for utilization of health services, 2000-2016.