2006 - 2007 ANNUAL REPORT

OTTAWA HEALTH RESEARCH INSTITUTE

Excellence in research, education and innovative patient care
Excellence in research, education and innovative patient care

2006 - 2007 OHRI ANNUAL REPORT

PAGE 1
Message from the CEO and Board Chair

PAGE 2-7
Research Highlights

PAGE 8-9
News and Activities

PAGE 10-11
Programs, Scientists and Investigators

PAGE 12
Board of Directors, Financial Summary and Peer-Reviewed Funding
MESSAGE FROM THE CEO AND BOARD CHAIR

This has been a year of incredible excitement, accomplishment and change at the Ottawa Health Research Institute (OHRI). As you’ll read in the pages of this report, our researchers have made ground-breaking discoveries that are advancing our understanding of disease and improving health care. We’ve opened the Sprott Centre for Stem Cell Research, the Kidney Research Centre and the first phase of the Centre for Research on Age-Related Blindness. We’ve also launched several initiatives to facilitate clinical research, recruited a number of promising scientists and helped researchers throughout the institute commercialize their inventions.

As CEO and as Board Chair, we both feel very privileged to have had the opportunity to contribute to this remarkable year and to the previous five years since the OHRI was formed. While one of us retired as CEO and Scientific Director at the end of March, we are confident and excited about the next phase of development under the leadership of our new CEO and Scientific Director, Dr. Duncan Stewart. As a cardiologist and scientist with a breadth of experience in clinical and basic research, Dr. Stewart is ideally positioned to lead the OHRI to the next level. His focus on regenerative medicine complements the OHRI’s growing strength in stem cell research and his experience in translating basic discoveries into new therapies will be invaluable to many OHRI researchers going through the same process.

Over the last year, our partners have played a crucial role in our success, and we are very proud to be the research arm of The Ottawa Hospital and an affiliated institute of the University of Ottawa. The Ottawa Hospital is one of the largest academic health science centres in Canada, providing specialized care to more than one million people, while the University of Ottawa is a growing research-intensive institution often referred to as “Canada’s University”. The commitment of both partners to outstanding health research has helped the OHRI grow to include more than 1,300 members with nearly $80 million in funding, including $67 million in external grants, contracts and salary awards.

We have also received tremendous support from the community, through The Ottawa Hospital Foundation. Our research successes, and in particular, the opening of our new stem cell and vision research centres, would not have been possible without the support of so many donors who believe in a better, healthier future.

Dr. Ronald Worton
CEO and Scientific Director, Ottawa Health Research Institute
Vice-President, Research, The Ottawa Hospital
Professor of Medicine, University of Ottawa

Jacquelin Holzman
Board Chair, Ottawa Health Research Institute

March 31, 2007
Decision aids help patients make personalized health care decisions

As more and more medical treatments become available, patients are often faced with difficult decisions. Health professionals can provide the facts, but in many cases, what’s best for a given patient will depend on their personal values and preferences. Researchers at the OHRI are leading the world in the development of “decision aids” to help patients evaluate their options and make personalized health care decisions. Wendy McGuire is participating in a clinical trial to evaluate an OHRI decision aid for knee replacement surgery. “Six months ago, I was walking and snowshoeing all over and then within a few months I could barely walk a block. My family doctor referred me for knee replacement surgery and I was pretty sure I wanted to do it, even though I may not have been familiar with all the details,” she said. “As part of this clinical trial, I watched a video that described all aspects of the procedure as well as the pros and cons of alternative treatments. I also filled out a questionnaire about my preferences. The whole process made me feel very informed about what to expect and very sure about my decision to have the surgery. I’ve probably had 10 or 12 surgeries in my life and by far this was the most reassuring experience. I wish these tools were available for everything else.” The Ottawa Health Decision Centre, led by Dr. Annette O’Connor, has developed dozens of decision aids, many of which are available online at www.ohri.ca/DecisionAid/. This site also includes a registry of hundreds of decision aids developed around the world.

“The whole process made me feel very informed about what to expect and very sure about my decision to have the surgery. I’ve probably had 10 or 12 surgeries in my life and by far this was the most reassuring experience.”

Wendy McGuire
New adult muscle stem cell discovered
Over the last few years, a lot research in muscle biology has focused on satellite cells, a population of cells believed be fully dedicated to muscle repair. This year, Dr. Michael Rudnicki and his team at the OHRI’s Sprott Centre for Stem Cell Research made the startling discovery that about 10 per cent of satellite cells are in fact a novel population of stem cells, and they developed approaches to purify and characterize this population. “If we can identify the genetic switch that causes a satellite stem cell to either give rise to another stem cell or a muscle cell, we could possibly develop drugs to flip that switch and restore muscle stem cell reservoirs that have been depleted by diseases such as Duchenne muscular dystrophy or through the natural process of aging,” said Dr. Rudnicki.

Providing advanced care sooner saves lives
For someone who can’t breathe, receiving advanced care at the earliest possible moment can make the difference between life and death. That is the result of a groundbreaking 8,000 person study - the largest in the world - led by Dr. Ian Stiell. The study examined patients treated for respiratory distress before and after paramedics received training to insert breathing tubes, administer intravenous drugs and perform other procedures previously available only in the emergency department. Early application of these techniques was shown not only to improve survival, but also to improve the overall condition in which patients arrived at the hospital.

A new understanding of fat cell development
Obesity rates in Canada have risen dramatically over the last 25 years, and today nearly a quarter of Canadians are considered obese. Despite the devastating consequences of obesity - including increased risk of diabetes, heart disease and stroke - the biology of fat remains very poorly understood. Dr. Robert Haché and his research group are hoping to change this, and they recently made an important step forward. “We’ve known for some time that a stress hormone called glucocorticoid plays a crucial role in the development of fat cells, and we knew that this happened through changes in DNA, but we didn’t know how,” he said. “Now, we’ve discovered that this stress hormone causes a protein called GCN5 to chemically modify another protein called C/EBP beta so that it can more efficiently turn on genes that promote fat cell development. This discovery opens a new door in the understanding of fat cell development and it could eventually lead to new approaches to fight obesity.”
A new target in the fight against Parkinson’s disease

Each of our cells is a tiny chemical factory, producing energy, building materials and signalling molecules along with potentially damaging by-products called reactive oxygen species. Dr. David Park and his research team recently identified a protein called Prx2 that plays a crucial role in deactivating these by-products and possibly in protecting against Parkinson’s disease. They found that Prx2 was often defective in mice and humans with Parkinson’s disease. Excitingly, giving brain cells a functional Prx2 protected them from dying and prevented Parkinson’s in mice. “The major symptoms of Parkinson’s disease are caused by the death of dopamine-producing cells in the brain,” explained Dr. Park. “Conventional therapies mask Parkinson’s symptoms by increasing dopamine levels in the brain, but our research suggests that increasing Prx2 activity might help prevent the damage that destroys these cells in the first place.”

“Conventional therapies mask Parkinson’s symptoms by increasing dopamine levels in the brain, but our research suggests that increasing Prx2 activity might help prevent the damage that destroys these cells in the first place.”

Dr. David Park
Research reveals how to help people breathe easier
There is no cure for chronic bronchitis or emphysema but a number of inhalers can ease breathing problems. For years, patients have been combining different inhalers in a trial and error process, without any rigorous research studies to show if the practice is safe or effective. Frustrated by the lack of information, Dr. Shawn Aaron initiated a large cross-Canada study. He found that combining two inhalers was safe, and although it did not reduce the number of disease flare-ups, it did improve patient quality of life and overall breathing ability. Now, Dr. Aaron and other respirologists across Canada can confidently advise their patients about multiple treatment options.

Unique structures discovered in insulin-producing cells
Type 1 diabetes is an autoimmune disease, caused by a misguided attack of the immune system on insulin-producing cells in the pancreas. When these cells become damaged, the body loses its ability to regulate blood sugar levels. Dr. Fraser Scott’s diabetes research group has been looking for factors that might trigger this immune attack, and recently they discovered something completely novel. They detected unique clump-like structures full of a protein called PrP in insulin-producing cells in rats. The clumps were much more common in rats prone to develop type 1 diabetes, and their size and number varied depending on blood sugar levels. If further experiments confirm a link between PrP and blood sugar control, it could open up a whole new avenue of diabetes research.

Bridging therapy at home makes surgery easier on patients
Thousands of Canadians take the blood-thinning drug warfarin to reduce their risk of developing clots, but this drug also increases the risk of bleeding during surgery. Traditionally, this has made surgery much more complicated, with patients required to spend four days in hospital beforehand and up to a week or more in hospital afterwards to manage the blood-thinning process. But today this process is far simpler thanks to research performed by Dr. Phil Wells and other members of the thrombosis research group. They have conducted a number of studies involving “bridging therapy”, a procedure in which patients taking warfarin switch to a different medication prior to surgery. In the past, patients received a medication that required constant monitoring in the hospital, but these studies showed that the blood-thinning process could be safely managed with new medications in the comfort of patients’ own homes. Hundreds of patients at The Ottawa Hospital and thousands of patients around the world have benefited.
Putting the breaks on cancer

Over the course of a day, a cancer cell can “walk” about half a centimeter, an impressive distance when you consider that the cell is minuscule – far smaller than the size of a pinhead. This ability to walk, or migrate in scientific language, is a deadly property because it allows cancer cells to spread from one area of the body to another. At the same time though, this ability may provide a unique target for the development of novel anti-cancer therapeutics.

“We have identified a protein that is essential for cell motility and migration,” said cancer research scientist Dr. Luc Sabourin. “We know that if you interfere with this protein you can prevent cancer cell migration and now we’re doing experiments in mice to see how this affects tumour growth and spread.” So far, Dr. Sabourin and his research team have been using a gene therapy approach to deactivate the protein, but they have recently begun searching for small molecule inhibitors that could be delivered to tumours more easily. Dr. Sabourin notes that it would take many years to develop a therapy based on this research, but every lead is worth investigating when you’re tackling a disease that kills more than 70,000 Canadians each year. “Cancer cells often have an enhanced ability to migrate compared to normal cells, so we believe that drugs that affect migration may be able to prevent the spread of cancer with minimal side effects on normal tissues,” he said. “Right now we’re looking at models of breast cancer, but if we are able to develop a therapy, it could be broadly applicable.”
Exploring new telephone technology to improve care

Integrated voice response systems have the potential to improve patient care without significantly increasing the workload of hospital staff. Dr. Alan Forster is working with a local company to develop and test this technology and preliminary results have been encouraging. In one clinical trial, patients with chronic diseases receive regular bloodwork results over the phone, through the integrated voice response system. They also receive instructions for updating their medication and reminders about upcoming appointments. “I think it is a great system that could benefit a lot of people,” said Dianna Siteman, a patient participating in the trial. “It really helps to be reminded of my appointments and I get my follow-up results much faster than I used to.”

Better blood analysis could improve kidney dialysis

Blood is a complex fluid, containing thousands of different proteins, metabolites and cells. Traditionally, blood quality has been assessed by measuring levels of just a few key components, but a novel research project at the OHRI is looking at the big picture in the hopes of improving the health of people with kidney disease. Dr. Réjean Munger is leading a group of vision and kidney researchers developing a new technique to rapidly recognize patterns in whole blood by measuring how it absorbs light at many different wavelengths. Pilot studies have revealed that the technique is highly sensitive and the group recently received funding to carry out further studies in several hundred dialysis patients. The hope is that more sensitive blood monitoring will allow for better customization of the dialysis blood filtration process so that complications are reduced and life expectancy is increased.

New insight into a central goal of health care

The relief of suffering is one of the central goals in all of health care, but very little research has examined how common suffering is and what it actually means to patients. To answer these questions, Dr. Keith Wilson designed a comprehensive study of nearly 400 cancer patients receiving palliative care across the country. Interestingly, 49 per cent of these patients reported that they were not suffering and 25 per cent reported only minimal or mild suffering. “Patients diagnosed with terminal cancer may assume they will experience profound suffering, but our results show that this is not necessarily the case, at least not when there is access to adequate palliative care,” said Dr. Wilson. The ground-breaking study also revealed which factors were linked to suffering and suggested ways in which care could be improved.
News and Activities

New facilities open for stem cell, kidney and vision research
It was a landmark year for the OHRI, with the opening of three new research centres. In November 2006, generous donors Eric and Vizma Sprott opened the Sprott Centre for Stem Cell Research. Its specialized laboratories will help the OHRI’s growing team of stem cell researchers decipher the secrets of stem cells and develop regenerative therapies for a wide range of diseases. Scientist Dr. Jeff Dilworth and research technician Lifang Li, pictured below, are just two of the researchers benefiting from the new facilities. One floor above the Sprott Centre, the first phase of construction of the Centre for Research on Age-Related Blindness was completed. The Centre will focus on the development of new therapies for diseases such as macular degeneration and glaucoma, which affect more than two million Canadians. Finally, in May 2007, the Kidney Research Centre opened at the University of Ottawa’s Faculty of Medicine building. The state-of-the-art, open-concept laboratory will focus on kidney disease and related conditions such as hypertension and diabetes.
Recruiting the best and brightest
This year the OHRI recruited eight outstanding new scientists specializing in a variety of research areas. Dr. Duncan Stewart was recruited in January 2007 to be the OHRI’s CEO and Scientific Director, commencing in July. As a cardiologist and scientist developing regenerative therapies for blood vessel disorders, Dr. Stewart is ideally positioned to lead to the OHRI to the next level. Other new recruits include Dr. Michael Schlossmacher, a neurologist specializing in Parkinson’s disease; Dr. Eve Tsai, a spinal cord surgeon with research interests in regenerative medicine; Dr. Quying Yang, an obstetrician-gynecologist conducting clinical and health services research; Dr. Andrew Seely, a thoracic surgeon conducting research in critical care and resuscitation; Dr. Greg Knoll, a nephrologist with research interests in kidney transplantation and dialysis; and Drs. Monica Taljaard and Tim Ramsay, both experts in epidemiology and biostatistics.

Training the next generation
As an affiliated institute of the University of Ottawa, the OHRI provided training for more than 350 graduate students, postdoctoral fellows, honours students and summer students this year. Trainees generally work on independent research projects under the supervision of scientists and senior research staff. The OHRI also provides a number of structured training opportunities, including weekly research seminars, a summer student program and an annual research day. This year, OHRI Research Day grew to its largest size ever, with more than 120 posters and 18 oral presentations. Researchers are also active in education efforts in the community through organizations such as Let’s Talk Science.

Technology transfer
In the last year, OHRI researchers filed 10 patents, disclosed 11 inventions and licensed two technologies (with another four licenses under negotiation). Over the last decade they have also contributed to the creation of five startup companies. One company, StemPath, is developing regenerative therapies for heart and muscle diseases. Another company, Jennerex Biotherapeutics, is developing oncolytic viruses for cancer treatment. Both of these companies were named on the list of Canada’s Top 10 Life Science Companies this year, compiled by the Ottawa Life Sciences Council. Start-up companies and license agreements can bring significant revenue to the OHRI, create wealth in the community and enable innovations in health care to reach patients more quickly.

Clinical research
As the research arm of The Ottawa Hospital, the OHRI is a major centre for research involving patients and the health care system. More than 1,300 clinical trials and other clinical research studies were conducted last year. In addition, OHRI and its partners launched or expanded a number of initiatives to support clinical research. These include the Clinical Epidemiology Methods Centre, The Ottawa Hospital Centre for Patient Safety, the First Annual Clinical Research Training Course and a clinical research website and pamphlet.

Leading the country and the world
The OHRI boasts a remarkable number of world-renowned scientists leading innovative research collaborations. Dr. Antoine Hakim leads the Canadian Stroke Network and the Heart and Stroke Foundation Centre for Stroke Recovery while Dr. Michael Rudnicki leads the Stem Cell Network and the International Regulome Consortium. In the field of health services research, Dr. Annette O’Connor co-chairs the International Patient Decision Aid Standards Collaboration while Dr. Jeremy Grimshaw leads the Canadian Cochrane Network and Centre and the international Cochrane Effective Practice and Organization of Care Group. In the cancer research field, Dr. John Bell leads the Canadian Oncolytic Virus Consortium and in the reproductive biology field, Dr. Benjamin Tsang has organized a number of international workshops and agreements. Dozens of national and international clinical trials are also led out of the OHRI.
Research at the OHRI is organized into six programs focusing on cancer therapeutics, chronic disease, clinical epidemiology, neuroscience, regenerative medicine and vision. Within these programs, 100 scientists and 275 investigators lead teams of more than 900 students, postdoctoral fellows, research associates and staff. Scientists and their teams dedicate most of their time to research, while investigators conduct some research studies but dedicate the majority of their time to clinical care. Dr. Alan Forster, pictured below, is a scientist in the Clinical Epidemiology Program with research interests in patient safety and quality improvement. He is also an internal medicine specialist at The Ottawa Hospital and an assistant professor of medicine at the University of Ottawa.
Cancer Therapeutics

Scientists: Michael McBurney (Director), Christina Addison, Harold Atkins, John Bell, Jim Dimitroulakos, Douglas Gray, Alain Lagarde, Ian Lorimer, Bruce McKay, Cheng Ng, Luc Sabourin, Barbara Vanderhyden, John Woulfe. Investigators: Olusegun Agboola, Lisa Bitonti, Robin Boushey, Karen Burns, Christina Canil, Jean-Michel Caudrelier, Laura Chow, Christine Cripps, Peter Cross, Susan Dent, Chan E, Samy El-Sayed, Bernd Esche, Michael Fung Kee Fung, Paul Genest, Lee Gerig, Stan Gertler, Rakesh Goel, Glenwood Goss, Laval Grimard, Shahidul Islam, Derek Jonker, Lynn Kachuki, Oliver Keller, Wayne Kendal, Gabriel Lam, Scott Laurie, Catherine Lorchin, Miller MacPherson, Robert MacRae, Shawn Malone, Joseph Mammaza, Diane Manii, Celia Marginean, Jean Maroun, Joanne Meng, Garth Nicholas, Gad Perry, Rajiv Samant, Roanne Segal-Nadler, Mary Senterman, Janos Szanto, Shailendra Verma, James Watters, Johanne Weberpals, David Wilkins, Vincent Young.

Chronic Disease


Clinical Epidemiology


Neuroscience


Regenerative Medicine


Vision

Board of Directors

The OHRI is a not-for-profit corporation governed by a Board of Directors that includes members of the University of Ottawa, The Ottawa Hospital, The Ottawa Hospital Foundation and the community.

Chair
Jacquelin Holzman

Vice Chair
Russell Mills

Treasurer
Ian Mumford

Directors
Dr. David Armstrong
Dr. Jacques Bradwejn
Dr. Adam Chowaniec
Kenneth Evans
Dr. F. David King
Dr. Jack Kitts

Dr. Louis Lamontagne
Johanne Levesque
Marlene Levine
James Morrisey
Dr. Mona Nemer
Ken Newport

Dr. Denis Prud’homme
D. Lynne Watt
Shirley Westeinde
Dr. Ronald Worton

84% External grants / contracts / salary awards
5% The Ottawa Hospital
4% The Ottawa Hospital Foundation
4% Investment income
3% University of Ottawa

67% Research project expenses
17% Scientific salaries
6% Other research expenses
6% Ammortization of capital assets
4% Administrative expenses

*For full audited financial statements see www.ohri.ca/annualreport.

Peer-Reviewed Funding

In 2006 - 2007, OHRI researchers were awarded more than 200 competitive peer-reviewed grants and salary awards from organizations such as the following (listed in order of amount of funding received):

- Canadian Institutes of Health Research
- Heart and Stroke Foundation of Ontario
- Ontario Research and Development Challenge Fund
- Canada Research Chairs Program
- Muscular Dystrophy Association (US)
- Ontario Innovation Trust
- Ontario Ministry of Health and Long-Term Care
- Ontario HIV Treatment Network
- National Institutes of Health (US)
- Kresge Foundation (US)
- Natural Sciences and Engineering Research Council of Canada
- Stem Cell Network
- Canada Foundation for Innovation
- Genome Canada
- Ontario Institute for Cancer Research
- Heart and Stroke Foundation of Canada
- Multiple Sclerosis Scientific Research Foundation