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Also available on the Web in PDF and HTML formats  
© Her Majesty the Queen in Right of Canada (2007)  
Cat. No. MR2-5/2007E-PDF  
ISBN 978-0-662-46887-5

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Aussi affiché sur le Web en formats PDF et HTML  
© Sa Majesté la Reine du chef du Canada (2007)  
N<sup>o</sup> de cat. MR2-5/2007F-PDF  
ISBN 978-0-662-07289-8

Canada 

# Regional Profiles

**Atlantic Canada**



**Quebec**



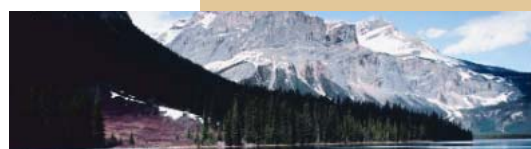
**Ontario**

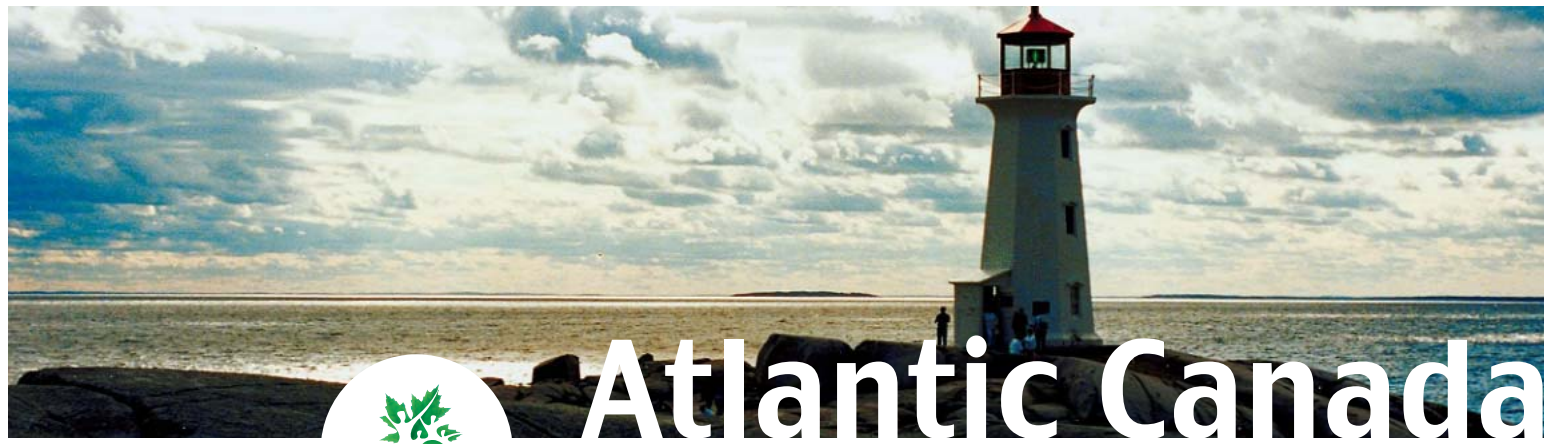


**The Prairies**



**British Columbia**





# Atlantic Canada

## Atlantic Canada at a Glance

Some of Canada's most innovative and relevant health research happens in the provinces of New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland and Labrador. CIHR awarded approximately \$22 million for health research in Atlantic Canada in 2006-07, an increase of about 120% from 2000-01. This funding supports more than 320 projects by principal investigators in 13 funded institutions.

The Canadian Institutes of Health Research (CIHR) supports health research in New Brunswick, Newfoundland and Labrador, Nova Scotia and Prince Edward Island.

### CIHR Investment in Atlantic Canada



Figures include the Canada Research Chairs and the Networks of Centres of Excellence. Figures are rounded to the nearest million.

## Funding Excellence CIHR-Funded Health Research in Atlantic Canada

Universities in Atlantic Canada are known for their expertise and research achievements in a variety of areas. Here are some examples of research in progress:

### How fast are you aging?

*Dr. Arnold Mitnitski, Dalhousie University*

You may be older than you think. Dr. Arnold Mitnitski of Dalhousie University is developing a mathematical model to calculate a person's "biological age". Biological age is determined not just by one's age but also lifestyle and health. The higher your biological age, the greater your chances of experiencing an age-related illness. With the help of CIHR funding, Dr. Mitnitski will be using several large databases to study how people's biological ages change over time. The concept of biological age could someday lead to better preventative medicine and more efficient health services.



## About CIHR

The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. CIHR's mission is to create new scientific knowledge and to catalyze its translation into improved health, more effective health services and products, and a strengthened Canadian health-care system. Composed of 13 Institutes, CIHR provides leadership and support to more than 11,000 health researchers and trainees across Canada.

### How physically active are Canadian kids?

*Dr. Mark Tremblay, University of New Brunswick (Fredericton)*

Every year, the National Physical Activity Report Card for Children and Youth provides a snapshot of the activity levels of Canadian kids. This report card helps policy-makers make informed choices about how to get kids more active. With the help of CIHR funding, Dr. Mark Tremblay of the University of New Brunswick (Fredericton) held a think tank workshop in fall 2006 to bring together interdisciplinary experts from across Canada to discuss ways of creating better report cards to improve the quality of data collected and, ultimately, create better programs for kids.

### Cranberries for healthy arteries?

*Dr. Robert Hurta, University of Prince Edward Island*

Dr. Robert Hurta of UPEI is studying whether eating cranberries can prevent hardening of the arteries, also known as atherosclerosis. Atherosclerosis occurs when the muscle cells lining arteries change the way they grow and behave, leading to the formation of plaques that can restrict blood flow and cause hypertension, heart attack, or stroke. Cranberries may contain naturally occurring compounds that prevent or slow the development of atherosclerosis. With CIHR funding, Dr. Hurta will be studying how these cranberry compounds affect the growth and gene activity of cells in the arteries of rabbits. His findings could shed light on the role that diet plays in maintaining a healthy circulatory system.

### Fighting vision loss in seniors

*Dr. H  l  ne Paradis, Memorial University*

Researchers are getting a clearer picture of the causes of vision loss in seniors. CIHR-funded researcher Dr. H  l  ne Paradis of Memorial University has identified a protein, called tubedown-1, which helps maintain healthy vision. Dr. Paradis is investigating whether patients suffering from vision loss due to age-related macular degeneration have insufficient amounts of tubedown-1. This research could lead to treatments for age-related vision loss that boost or mimic tubedown-1.



## Recognizing Regional Leaders in Health Research

### Dr. Nicole Letourneau CIHR Award Winner

Dr. Nicole Letourneau, a researcher and associate professor at the University of New Brunswick (Fredericton), designs and tests programs to promote the healthy development of children at risk, particularly those who are exposed to domestic violence or whose mothers suffer from depression. She is a Canada Research Chair (elect) in Healthy Child Development and a member of the Advisory Board of CIHR's Institute of Gender and Health. Dr. Letourneau recently received the Peter Loughheed/CIHR New Investigator Award for Canada's Premier Young Researcher. The award is CIHR's most important career development award, given to Canada's brightest young researchers at the beginning of their careers.

### Dr. Patrick John McGrath CIHR Governing Council Member

Dr. Patrick John McGrath, a professor of psychology, pediatrics and psychiatry at Dalhousie University and a psychologist at the IWK Health Centre, is a renowned expert in the diagnosis and treatment of pain in children and the innovative delivery of mental health care. As a CIHR Distinguished Investigator and a Canada Research Chair at Dalhousie University/IWK Health Centre, Dr. McGrath has received numerous honours for his outstanding research, including the Order of Canada (Officer) in 2003. He was a member of the Institute Advisory Board for CIHR's Institute of Human Development, Child and Youth Health and is on the Board of the Nova Scotia Health Research Foundation. Dr. McGrath is currently a member of CIHR's Governing Council.



For more information, go to  
[www.healthresearchatwork.cihr-irsc.gc.ca](http://www.healthresearchatwork.cihr-irsc.gc.ca)

2006-2007



## Quebec at a Glance

Health researchers in Quebec universities and hospitals are among the world's best. CIHR awarded approximately \$197 million for health research in Quebec in 2006–07, an increase of about 86% from 2000–01. This funding supports more than 2,320 projects by principal investigators in 25 funded institutions.

The Canadian Institutes of Health Research (CIHR) supports health research in Quebec.

### CIHR Investment in Quebec



Figures include the Canada Research Chairs and the Networks of Centres of Excellence. Figures are rounded to the nearest million.

## Funding Excellence CIHR-Funded Health Research in Quebec

Universities in Quebec are known for their expertise and research achievements in a variety of areas. Here are some examples of research in progress:

### Rebuilding damaged hearts

*Dr. Maryam Tabrizian, McGill University*

Researchers at McGill University want to defeat heart disease – at the sub-microscopic level. Heart disease is a devastating and costly illness, claiming a life every 30 seconds. Dr. Maryam Tabrizian is leading a CIHR-funded team of nanoscientists in the development of “functional nanostructures” that can be injected into the body to release medications and promote the regeneration of healthy heart tissue. If successful, they could revolutionize cardiovascular medicine.



## About CIHR

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### Is your environment harming your brain?

*Dr. Danielle Laurin, Laval University*

Could environmental contaminants be linked to dementia in the elderly? A CIHR-funded group of researchers headed by Dr. Danielle Laurin of Laval University will be analyzing blood samples from senior citizens to determine whether high levels of PCBs or organochlorines are related to the development of cognitive impairment and Alzheimer's disease. If the researchers find that these chemicals are linked to dementia, their results could lead to the development of public policy and new regulations related to toxic substances in the environment.

### Can your family make you sick?

*Dr. Alex Schwartzman, Concordia University*

When an illness is said to "run in families", we usually mean that it is passed down genetically from one generation to the next. But influences in one's family environment also play an important role in the onset of a wide range of mental and physical health problems. CIHR-funded researcher Dr. Alex Schwartzman of Concordia University is studying whether stress from parenting challenges, such as financial hardship or single parenthood, increases the likelihood of ill-health in parents, their children, and their children's children. The study will look at injuries, respiratory infection, and psychiatric disorder as the markers of ill-health across the three generations. This unique study will give us a greater understanding of the factors that cause illness.

### Helping the youngest hearts

*Dr. Gregor Andelfinger, Sainte-Justine Hospital, University of Montreal*

About one in 100 babies is born with a congenital heart malformation, a defect in the heart or major blood vessels that disrupts normal blood flow. Dr. Gregor Andelfinger, a CIHR-funded researcher at the University of Montreal, is looking for the genes that cause these inherited defects. This research could reveal possible new treatments or ways of preventing this widespread problem.



## Recognizing Regional Leaders in Health Research

### Dr. Jacques Corbeil Institute Advisory Board Member

Dr. Jacques Corbeil is a Professor of Medicine at Laval University and holds the Canadian Research Chair in Medical Genomics there. Dr. Corbeil's research focuses on the pathogens that cause AIDS, tuberculosis and leishmaniasis. He also studies the role that viruses play in Kaposi's sarcoma and cervical cancer. In addition, Dr. Corbeil serves on the scientific advisory boards of a number of biotechnology companies. He is currently a member of the Advisory Board for CIHR's Institute of Cancer Research.

### Dr. Arthur Porter CIHR Governing Council Member

Dr. Arthur Porter is the Director-General and CEO of the McGill University Health Centre in Montreal. His extensive international health care background includes medical practice and business and academic leadership positions in Canada, Europe, Africa and the United States. Dr. Porter currently serves on numerous boards and task forces, both in government and industry. He also served as a consultant to the World Health Organization and has worked to establish international medical research and treatment programs. In spring of 2007, Dr. Porter became a member of CIHR's Governing Council.



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# Ontario



## Ontario at a Glance

Ontario receives the largest share of CIHR funding – approximately \$292 million in 2006–07, an increase of about 103% from 2000–01. This funding supports more than 2,930 projects by principal investigators in 35 funded institutions.

The Canadian Institutes of Health Research (CIHR) supports health research in Ontario.

### CIHR Investment in Ontario



Figures include the Canada Research Chairs and the Networks of Centres of Excellence. Figures are rounded to the nearest million.

## Funding Excellence CIHR-Funded Health Research in Ontario

Universities in Ontario are known for their expertise and research achievements in a variety of areas. Here are some examples of research in progress:

### Caring for dying Canadians

*Dr. Mary Louise Kelley, Lakehead University*

For many seniors suffering from a terminal illness, a hospice becomes home in their final days. Rural seniors, however, face particular challenges, including the distance between the hospice and their families. CIHR-supported researcher Dr. Mary Louise Kelley of Lakehead University in Thunder Bay wants to know how hospice volunteers interact with seniors from rural areas and how hospice care affects these seniors' quality of life. By learning more about the role that hospice volunteers play in the lives of rural seniors, we can gain a greater understanding of how to best use hospice care in end-of-life situations. This CIHR-funded study will later be expanded to the national level.



## About CIHR

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### Heart disease – Are you at risk?

*Dr. Robert Roberts, University of Ottawa*

Coronary artery disease (CAD) is the number-one cause of death in Canada. More than half the risk of CAD lies in our genes. CIHR-supported researcher Dr. Robert Roberts of the University of Ottawa Heart Institute is trying to identify genes associated with CAD. His team has already identified 162 gene sequences that are strongly associated with the disease. Dr. Roberts is now expanding his study to confirm that these genes play a role in CAD. Once they have discovered which genes predispose a person to developing CAD, researchers will be able to identify who is at risk and develop better treatments, as well as ways to prevent CAD in the first place.

### Making difficult decisions

*Dr. Kevin Coughlin, The University of Western Ontario*

As medical technology advances, doctors are able to save extremely premature babies earlier and earlier in their development. However, with these technological advances comes an increased risk of mental and physical handicaps, particularly when infants are born at less than 25 weeks of gestation. A growing number of ethical questions surround how best to care for infants at the extreme limits of prematurity. Dr. Kevin Coughlin, a CIHR-funded researcher from the University of Western Ontario, is working with parents and health-care providers to study key steps in the difficult decision-making process they are confronted with. The research will decrease conflict and provide direction for future guidelines and health-care policies.

### Air pollution and cancer: What's the connection?

*Dr. Paul Villeneuve, University of Toronto*

Can the air you breathe affect your risk of developing cancer? While air pollution has been shown to have a negative impact on human health more generally, the relationship between long-term exposure to pollution and the risk of certain types of cancer is not well understood. Dr. Paul Villeneuve, a CIHR-funded researcher at the University of Toronto, is mining data from income tax databases, cancer incidence records and air pollution monitoring stations in ten Ontario cities to see if there is a link between pollution and cancer. Dr. Villeneuve's findings could help guide air quality policies and identify groups of people who are at the highest risk of developing air pollution-related cancers.



## Recognizing Regional Leaders in Health Research

### Dr. Cornelia Wieman CIHR Governing Council Member

Dr. Cornelia Wieman is an Assistant Professor in the Faculty of Medicine at the University of Toronto. A member of the Little Grand Rapids First Nation (Anishnawbe) in Manitoba, Dr. Wieman is Canada's first female Aboriginal psychiatrist. From 1997-2005, she practiced as a consultant psychiatrist at Six Nations Mental Health Services, a community mental health clinic based on the Six Nations of the Grand River Territory. Dr. Wieman has been actively involved in many Aboriginal health initiatives, such as the Vision 2020 strategy, a province-wide effort to train more Aboriginal physicians in Ontario. Dr. Wieman joined CIHR's Governing Council in spring 2007.

### Drs. Anne W. Snowdon and John L. Mann CIHR Award Winners

Each year, about three classrooms worth of elementary school children die in road crashes in Canada. With the support of DaimlerChrysler Canada, Dr. Anne W. Snowdon of the University of Windsor and a team of researchers developed "*Bobby Shooster Rides Safely in his Booster*", a multi-media education program for families. The education program, when tested in Ontario, led to a significant increase in parents' knowledge of accurate use of safety seats for children. The program is now being tested in six Canadian provinces. In 2006, Dr. Snowdon and Dr. Mann of DaimlerChrysler Canada received the CIHR Partnership Award for their efforts to improve child safety.



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# The Prairies



## The Prairies at a Glance

Some of Canada's most exciting health research discoveries have their roots in Manitoba, Saskatchewan and Alberta. In 2006-07, CIHR awarded approximately \$97 million in funding for health research in Canada's three Prairie provinces, an increase of more than 70% from 2000-01. This funding supports an estimated 1,220 projects by principal investigators in eight funded institutions.

The Canadian Institutes of Health Research (CIHR) supports health research in Manitoba, Saskatchewan and Alberta.

### CIHR Investment in the Prairies



Figures include the Canada Research Chairs and the Networks of Centres of Excellence. Figures are rounded to the nearest million.

## Funding Excellence CIHR-Funded Health Research in the Prairies

Universities in the Prairies are known for their expertise and research achievements in a variety of areas. Here are some examples of research in progress:

### The Manitoba Tumour Bank – A critical engine for cancer research

*Dr. Peter Watson, University of Manitoba*

Manitoba is helping researchers around the world study cancer. Tumour banks store tumour tissue samples and clinical data for cancer scientists to use in their research. Under the supervision of Dr. Peter Watson, the University of Manitoba has established the Manitoba Tumour Bank, which currently houses about 5,000 tumour samples. First established in 1993, the bank has supported over 90 research projects, involving the release of almost 100,000 thin tissue sections and extensive clinical data. CIHR is proud to help fund this important institution, which has created new opportunities for researchers to translate their findings into clinical applications.



## About CIHR

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### Joining forces to beat infectious disease

*Dr. Andrew Potter, University of Saskatchewan*

Infectious diseases account for over one-third of all deaths each year worldwide. They pose a global threat, and therefore any attempt to control these diseases will require international cooperation. The Vaccine and Infectious Disease Organization (VIDO) in Saskatoon and the Statens Serum Institut (SSI) in Copenhagen, Denmark, are both world leaders in the development of vaccines, and CIHR is funding their collaboration to develop vaccines for tuberculosis and malaria. Dr. Andrew Potter of the University of Saskatchewan will be leading the Canadian component of this effort to combat infectious disease.

### Facing off with hockey injuries

*Dr. Carolyn Emery, University of Calgary*

How is Canada's favourite pastime affecting children's health? Dr. Carolyn Emery of the University of Calgary is studying the frequency and severity of injuries in youth ice hockey due to body checking. More than 10% of male youth participate in organized hockey leagues across the country. Dr. Emery and her team will be comparing the risk and severity of injury in leagues that do and do not permit body checking. This CIHR-funded study may have important implications for minor hockey policy decisions.

### Tracking tuberculosis

*Dr. Richard Long, University of Alberta*

If tuberculosis (TB) is treatable in this modern age, why does it still continue to be a serious public health threat in Canada, especially among Aboriginal groups? Dr. Richard Long of the University of Alberta is studying the reasons why TB continues to spread in some Canadian communities. He and his team will be interviewing Canadians newly diagnosed with TB in Alberta, Saskatchewan and Manitoba and using DNA "finger printing" technology to study how TB spreads and who is at greatest risk of infection. Dr. Long hopes his research will someday lead to improved TB control programs.



## Recognizing Regional Leaders in Health Research

### Ms. Isabelle Chouinard CIHR Award Winner

Ms. Isabelle Chouinard is a doctoral student in the laboratory of Dr. Glenys Godlovitch in the Department of Community Health Services at the University of Calgary. Ms. Chouinard is also an Ethics Volunteer for the Regional Clinical Ethics Services of the Calgary Health Region Organization. Her doctoral work is focusing on developing an ethical model to guide the practice of ethically sound medicine in the Canadian health-care system. She anticipates that her research will lead to better health-care services for Canadians. In 2006 Ms. Chouinard received the CIHR Douglas Kinsella Doctoral Award for Research in Bioethics.

### Dr. Harvey Max Chochinov CIHR Governing Council Member

Dr. Harvey Chochinov, professor of Psychiatry at the University of Manitoba, holds a Canada Research Chair in Palliative Care. He established the Manitoba Palliative Care Research Unit at CancerCare Manitoba and helped spearhead the development of the Canadian Virtual Hospice, an interactive network for patients, families and health-care providers dealing with terminal illness and loss, of which he is Co-chair. His work, which examines various psychosocial aspects of palliative care including ways of preserving dignity at the end of life, has been recognized internationally. Dr. Chochinov is a member of CIHR's Governing Council.



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# British Columbia

## British Columbia at a Glance

Some of Canada's most innovative and relevant health research happens in British Columbia (B.C.). CIHR awarded approximately \$84 million in funding for health research in B.C. in 2006-07, an increase of more than 211 % from 2000-01. This funding supports more than 960 projects by principal investigators in eight funded institutions.

The Canadian Institutes of Health Research (CIHR) supports health research in British Columbia.

### CIHR Investment in British Columbia



Figures include the Canada Research Chairs and the Networks of Centres of Excellence. Figures are rounded to the nearest million.

## Funding Excellence CIHR-Funded Health Research in British Columbia

Universities in British Columbia are known for their expertise and research achievements in a variety of areas. Here are some examples of research in progress:

### Overcoming antibiotic resistance

*Dr. David Vocado, Simon Fraser University*

Antibiotics are becoming less and less effective, in part because of the increasing numbers of bacteria containing enzymes called AmpC beta-lactamases, or AmpC as they are known. These enzymes destroy some types of antibiotics, creating antibiotic-resistant bacteria. Dr. David Vocado of Simon Fraser University is trying to develop chemicals that will block the activation of AmpC and make once-resistant bacteria susceptible to antibiotics again. This CIHR-funded research will help provide another tool in the ongoing battle against antibiotic-resistant bacteria.



## About CIHR

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### Regenerating movement

*Dr. Timothy O'Connor, University of British Columbia*

Neurons play a critical role in helping the nervous system send messages but, once damaged, they typically do not regrow, leaving people with spinal cord injuries in wheelchairs. A group of CIHR-funded researchers led by Dr. Timothy O'Connor at UBC is searching for chemicals that will help neurons grow. They are using a technology known as high throughput screening, which uses a combination of robotics and high-speed computer technology to test thousands of chemicals in a day. Once Dr. O'Connor and his team have identified a chemical that will promote neuron growth, they will begin testing the chemical in animals in the hopes of developing a treatment for humans with spinal cord injuries.

### Preventing unnecessary treatment

*Dr. Marianne Sadar, University of British Columbia*

Prostate cancer is the most frequently diagnosed cancer in Canadian men. Physicians screen their male patients with a blood test for prostate-specific antigen (PSA) or a digital rectal examination. Suspected prostate cancer is confirmed by a biopsy of the prostate. However, PSA screening is leading to the over-treatment of prostate cancer, resulting in men receiving radical therapies even though they may never develop the disease. These therapies can produce negative side effects such as impotence and loss of bladder control. CIHR-funded researcher Dr. Marianne Sadar of the University of British Columbia and her team will evaluate a new diagnostic procedure that can potentially distinguish between aggressive prostate cancer and benign forms.

### The complexities of drug use

*Dr. Tim Stockwell, University of Victoria*

Drug users typically use more than one drug, yet most of Canada's drug policies and programs focus on a single drug or behaviour. CIHR-funded researcher Dr. Tim Stockwell of the University of Victoria is studying substance use and addictive behaviour from a more complex perspective. Dr. Stockwell's multidisciplinary team will be examining how drug-use patterns change with a person's age, which drug-use patterns increase a person's risk of injury and drug-use patterns among street drug users. This research will lead to more effective drug policies.



## Recognizing Regional Leaders in Health Research

### Dr. Robert E. W. Hancock CIHR Award Winner

Dr. Robert Hancock is a leader in the study of microbiology and an active entrepreneur, having established two companies as offshoots of his research, Migenix Inc. and Inimex Pharmaceuticals Inc. His research focuses on infectious diseases, which are responsible for a third of all deaths on the planet. He currently holds the Canada Research Chair in Pathogenomics and Antimicrobials at the University of British Columbia. In 2006, Dr. Hancock received the CIHR Michael Smith Prize in Health Research as Canada's Health Researcher of the Year.

### Dr. Cecilia Benoit Institute Advisory Board Member

Dr. Cecilia Benoit is a research associate with the University of Victoria's Centre for Youth & Society and the Centre for Addictions Research of BC. Dr. Benoit is currently leading several CIHR-funded projects on youth health, workers' health, and access to health care. Dr. Benoit is a member of the Advisory Board for CIHR's Institute of Population and Public Health.



For more information, go to  
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# Research Successes

**Aboriginal Health**



**Aging**



**Alzheimer's Disease**



**Arthritis**



**Cancer**



**Child Health**



**Diabetes**



**Environment and Health**



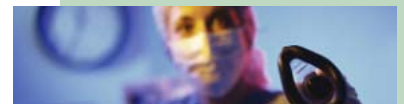
**Gender and Health**



**Genetics**



**Health-Care System**



**Heart Disease**



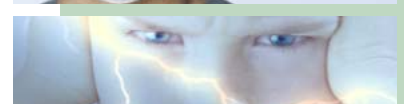
**HIV/AIDS**



**Infectious Diseases**



**Mental Health**



**Obesity**



**Population Health**





# Aboriginal Health



**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$21.5 million in 2006-07 across Canada in Aboriginal health research.**

## The Facts

Life expectancy and the burden of disease for Aboriginal Canadians differ from other Canadians. From the data that are available we know the following:

- In 2000, First Nations males had a life expectancy of 68.9 years compared to 76.6 years for females. In comparison, non-Aboriginal Canadians' life expectancies in 2001 were longer by 8.1 years for males and 5.5 years for females.\*
- The infant mortality rate among First Nations in 2000 was 6.4 deaths per 1,000 live births, compared to the total Canadian infant mortality rate of 5.5.\*
- The tuberculosis rate among First Nations people is 6.2 times higher than in the general population.\*
- Diabetes is 2.7 times more prevalent among First Nations than in the general population.\*
- First Nations peoples on reserves have reported rates of heart diseases 16% higher than the general population.\*

\* Health Canada (First Nations and Inuit Health Branch) 2000



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# Finding Solutions

### Conducting respectful research

Who "owns" the DNA samples that researchers study? According to CIHR-supported researcher Dr. Laura Arbour of the University of British Columbia, researchers must view biological samples obtained from Aboriginal communities as "DNA on loan", and any research carried out using these samples must reflect the needs and priorities of the community. Researchers should also take steps to involve community members in the research process and share any study results with the community.

### Aboriginal women suffer too many broken bones

Manitoba First Nations women are about two times more likely to have a hip fracture than non-Aboriginal women. Research from the First Nations Bone Health Study, a collaboration between the Assembly of Manitoba Chiefs and the University of Manitoba (UofM), has found that First Nations women in the province have lower-than-expected bone density. The study, led by CIHR-supported researcher Dr. William Leslie of UofM, also found lower vitamin D levels, which are thought to weaken bone (vitamin D helps absorb calcium so it gets into bones). This information is useful for health authorities to start raising awareness among First Nations women concerning the need to increase consumption of vitamin D.

### Aboriginals with HIV/AIDS – Better services needed

The rate of HIV/AIDS within Canada's Aboriginal community is on the rise. CIHR-supported researcher Dr. Randy Jackson of the University of Ottawa and head of the Canadian Aboriginal AIDS Network is identifying areas for improvement in health-care services to Aboriginal people with HIV/AIDS. A survey by Dr. Jackson found that nearly half of respondents felt they received poor care and 30% said they experienced racial prejudice or homophobia in the health-care system. An alarming 12% reported they simply do not use primary medical services. Meanwhile, 60% of respondents said they use or need traditional Aboriginal health and wellness services, such as sharing/healing circles.

### Traditional cures useful for treating diabetes

Indigenous knowledge may be of benefit in treating diabetes, according to CIHR-supported research by Dr. Pierre Haddad of the University of Montreal. His study shows that several plant extracts that have been used medicinally for centuries by Cree elders in Northern Quebec can relieve a number of symptoms that are typical of type 2 diabetes, such as frequent urination and increased thirst. With more research, scientific evidence of these traditional cures could one day be used to help reduce the burden of diabetes in Aboriginal communities.



## The Researchers

### Dr. Malcolm King – Providing mentorship for Aboriginal research

Dr. Malcolm King describes himself as having had a "good long career". But he says many problems still need his attention. One such problem is the poor health of Canada's Aboriginal peoples. Another is the state of Aboriginal health research in Canada.

"We need research that is culturally appropriate," Dr. King stresses. Historically, Canada's Aboriginal communities have had researchers who simply drop in, do their research with no involvement or benefit for the community, and leave.

Dr. King, a lung specialist from the University of Alberta (UofA), is providing leadership for a CIHR training and development initiative known as the Aboriginal Capacity and Developmental Research Environments (ACADRE) program. The program helps

Aboriginal communities become owners of their own health research by increasing the number of Aboriginal health researchers and involving Aboriginal communities in the research process.

Dr. King, who is a member of the Mississaugas of the New Credit First Nation, leads the Alberta ACADRE, one of eight such centres located across Canada.

"We started with seven network members, mostly in Edmonton, and now there are 18 investigators from across Alberta who are part of the network. We've been able to bring people in who had skills to offer and in five-to-six years we'll develop a new generation of researchers," he predicts.

The program is helping Aboriginal communities take control of their health. ACADRE member Dr. Ellen Toth of the UofA has helped Alberta's Driftpile First Nation measure the extent of the diabetes problem facing the community and is moving into the next phase of the project, health promotion.

"The community is really taking the lead and they'll manage the health promotion," Dr. King says, a clear sign that the process is working.





# Aging



**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested more than **\$85.4 million** in 2006-07 across Canada in aging-related research.**

## The Facts

- Between 1981 and 2005, the number of Canadians over the age of 65 increased from 2.4 million to 4.2 million. This number is projected to rise to 8 million over the next two decades.
- By 2056, an estimated one in ten Canadians will be 80 years or over, compared with about one in 30 in 2005.
- Life expectancy in 2004 hit a record high of 80.2 years – 82.6 for women and 77.8 for men.
- In 2003, 73% of seniors reported that their health was excellent, very good or good.
- Cancer and heart disease remain the leading causes of death among seniors, while arthritis/rheumatism and high blood pressure remain the most prevalent chronic conditions.
- Income and education can affect health. Healthy Canadians over the age of 50 with higher incomes and higher levels of education are less likely to see their health deteriorate over a two-year period, compared to those with similar health status but lower incomes or less education.





## About CIHR

The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. CIHR's mission is to create new scientific knowledge and to catalyze its translation into improved health, more effective health services and products, and a strengthened Canadian health-care system. Composed of 13 Institutes, CIHR provides leadership and support to more than 11,000 health researchers and trainees across Canada.

# Finding Solutions

### **New product helps seniors stay on their feet**

Falling is a real and dangerous risk for seniors, leading to broken bones and an end to independent living. Dr. Stephen Perry of Wilfred Laurier University has recently translated his basic research on human movement into a product that may prevent these falls and, in doing so, save many seniors' lives. As we age, we often lose sensation in our feet, making it difficult to stay balanced. With the help of CIHR funding, Dr. Perry and his colleagues have developed a simple and inexpensive special shoe insole called the Sole Sensor™. The insole has a slight ridge along its outer edge that alerts seniors when they are losing their balance. This device promises to reduce the frequency of fall-related injuries. The Sole Sensor™ will be available from Ontario-based Hart Mobility in 2007.

### **Fear of falling**

Sometimes, being afraid of something really does make it come true. CIHR-supported researcher Dr. Teresa Liu-Ambrose at the University of British Columbia is studying how cognitive impairment and fear of falling affect actual risk of falling in the elderly. In a recent study, Dr. Ambrose found that elderly women who perceived a high risk of falling in fact performed badly on tests that measure balance and mobility. This finding could help doctors and other care providers identify older individuals who are most likely to suffer an injury due to a fall.

### **How are you aging?**

Everyone ages differently and knowing how you are aging can help you make decisions about your health. CIHR-supported researcher Dr. Arnold Mitnitski of Dalhousie University has developed a mathematical model to predict how your health will change as you get older. Dr. Mitnitski and his colleagues have found that by measuring the number of health "deficits" an elderly person has, they can calculate his or her "biological" age, in effect, the estimated remaining lifespan of different body parts and components. They tested the mathematical model by studying the health of a large group of seniors over a five-year period. Doctors could someday use this type of model to help their patients avoid disease and maintain their quality of life as they age.



## The Researchers

### **Dr. Janice Keefe – Learning about caring for others**

It's no secret that Canada's population is getting older. What's less well understood is how we're going to provide care for everyone in need, says CIHR-supported researcher Dr. Janice Keefe of Mount St. Vincent University in Halifax, Nova Scotia.

Work by Dr. Keefe is giving policy-makers the help they need to make informed decisions about providing care for the elderly.

For example, previous projections about caregiving needs looked only at two factors, age and gender. Dr. Keefe's research examines other factors that create demand for caregiving and have an impact on the supply of caregivers.

"You have to look more at disability, what levels of disability there may be and what this will mean in usage of

the system," she points out. A disability can create a need for help, such as cooking or housework. Dr. Keefe's team is learning from seniors, collecting information on their mobility, learning ability, pain and dexterity, all of which will influence the type and extent of assistance required.

And then there's the boomer factor. Boomers will want and expect support, such as new workplace policies to help them provide informal caregiving to family members. In addition, there will be fewer informal caregivers. "Boomers are more likely to divorce and have fewer children than previous generations," Dr. Keefe notes. "Boomers say, 'My friends will take care of me,' but the fact is that their friends may all be in the same situation."

Ultimately, Dr. Keefe is looking for ways to provide the best care for everyone in the future. "With the work we're doing, we'll be able to come up with real evidence about strategies policy-makers can use to ensure that the informal network is supported but also that new formal caregivers are trained and hired," she concludes.





# Alzheimer's Disease



**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$22.2 million in 2006-07 across Canada in research on Alzheimer's disease (AD).**

## The Facts

- Caring for people with AD costs about \$5.5 billion each year in Canada.
- One in ten Canadians over age 65 – and one in four over age 85 – will develop AD.
- AD is the most common form of dementia, accounting for nearly two-thirds, or 64%, of all dementias.
- Twice as many women as men have dementia.
- By 2031, more than 750,000 Canadians are expected to have AD and related dementias.
- Thirty-two per cent of Canadians know someone with AD and 21% of Canadians have someone in their family with the disease.



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# Finding Solutions

## Researchers identify a new Alzheimer's gene

Dr. Peter St George-Hyslop, a CIHR-funded researcher from the University of Toronto, has helped uncover another important piece of the AD puzzle, information that could eventually lead to better diagnostic tools and treatments for AD. He and his colleagues recently discovered that variations in a gene called SORL1 are associated with the development of late-onset AD. When SORL1 is mutated, the cells of the brain produce higher levels of amyloid-beta, a toxic peptide that kills brain cells and may be involved in the development of AD.

## A sweet solution

A team of CIHR-funded researchers from the University of Toronto has identified a drug that halts AD in mice. The drug, a sugar-like substance known as "scyllo-cyclohexanehexol", blocks the accumulation of a toxic peptide called amyloid-beta in the brains of lab mice. Amyloid-beta kills brain cells and triggers the formation of the neuritic plaques that are characteristic of AD. Dr. JoAnne McLaurin and her colleagues have obtained permission from Health Canada to proceed with human trials of this promising new drug.

## Inheriting early-onset dementia

Drs. Ian MacKenzie and Howard Feldman at the University of British Columbia have identified a gene that, when mutated, causes an inherited form of early-onset dementia. The disorder, known as frontotemporal dementia (FTD), usually strikes between the ages of 50 and 60 and is inherited in about 50% of cases. FTD gradually impairs a patient's ability to speak and can result in dramatic behaviour changes. The mutations discovered by Drs. MacKenzie and Feldman prevent the progranulin gene from generating enough of the progranulin protein, which is necessary to keep brain cells alive. This CIHR-funded discovery could lead to new screening tests and treatments for FTD.



## The Researchers

### Dr. Weihong Song – Explaining the link between Alzheimer's disease and Down syndrome

Alzheimer's disease strikes about 10% of people over the age of 65. For people with Down syndrome, the situation is much worse; estimates vary, but researchers believe that most people with Down syndrome who live past middle age will develop AD.

Dr. Weihong Song, a CIHR-funded researcher at the University of British Columbia, has been investigating the connection between AD and Down syndrome. Since the two conditions are so closely related, identifying links could lead to new treatments for AD and improved quality of life for older people with Down syndrome.

"When I started my career, Alzheimer's research was a wide-open field. There were no genes that had been identified that were related to AD," says Dr. Song. "With my background

as a clinical psychiatrist and a molecular biologist, I felt I could contribute a lot."

Last year, Dr. Song and his colleagues identified a gene that may partly explain why AD is so common in people with Down syndrome. Activation of this gene, called BACE1, triggers a series of chemical reactions that produces a brain cell-killing substance called amyloid-beta protein. According to Dr. Song's research, people with Down syndrome do not transport or break down the BACE1 protein properly, so it slowly accumulates in their brains, contributing to the accumulation of amyloid-beta protein.

Based on this work, Dr. Song and his team made another important discovery about a related gene called BACE2. "What we found is that BACE2 actually degrades the amyloid-beta protein. So instead of increasing the chance of getting AD, BACE2 prevented it," said Dr. Song.

These discoveries could lead to the development of medications that prevent and treat AD in the elderly and people with Down syndrome.





# Arthritis

**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$17.4 million in 2006-07 across Canada in research on arthritis.**

## The Facts

- Arthritis comprises more than 100 conditions including lupus, fibromyalgia, gout, temporo-mandibular joint pain and scleroderma.
- The most common type of arthritis in Canada is osteoarthritis, affecting three million Canadians, or 1 in 10. Long-term disability accounted for almost 80% of the economic costs of arthritis in 1998, at nearly \$3.5 billion. The 35-64 year age group incurred 70% of these costs.
- Rheumatoid arthritis is the second most common type of arthritis, affecting 300,000 Canadians, or 1 in 100. It is an autoimmune disorder, in which the immune system attacks healthy joints, resulting in damage to cartilage, bone, tendons and ligaments. Twice as many women as men get rheumatoid arthritis. It most commonly appears between the ages of 25 and 50.
- For all age groups, arthritis disables two to three times more workers than all other chronic conditions.
- Musculoskeletal diseases cost Canadians \$16.4 billion every year, the second highest cost of disease after heart disease.



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# Finding Solutions

### Understanding the genetic causes of psoriatic arthritis

Psoriatic arthritis affects as many as 30% of persons living with psoriasis, a common skin condition. Researchers want to better understand how psoriasis can lead to arthritis. In a study of patients from Newfoundland and Labrador, CIHR-supported researcher Dr. Proton Rahman of Memorial University pinpointed a specific genetic variant for a type of protein known as vascular endothelial growth factor. Even though this growth factor is associated with the development of psoriasis, the variant seems to offer protection against psoriatic arthritis. The findings could eventually lead to new treatments for this condition.

### Rheumatoid arthritis – Better education needed for family doctors

People suffering from rheumatoid arthritis (RA) need early and aggressive treatment, using a class of drugs that is known to slow progression of this debilitating disease. However, work by CIHR-supported researcher Dr. Diane Lacaille of the University of British Columbia has found that many patients are not receiving the drugs they need, especially if they're being treated by their family doctor. In a study of close to 30,000 patients in B.C. suffering from RA, Dr. Lacaille found that only 10% of those receiving care by family physicians were prescribed disease-modifying antirheumatic drugs (called DMARDs) over a five-year period. In comparison, 76% of patients seen by rheumatologists were prescribed these drugs. These findings will help develop new ways to address these gaps in care and improve the lives of Canadians living with RA.

### The high costs of juvenile idiopathic arthritis

Juvenile idiopathic arthritis (JIA), which affects about one in 1,000 Canadian children, exacts a high cost from children and their parents. New findings by CIHR-supported researcher Dr. Sasha Bernatsky at McGill University suggests parents face an additional \$1,700 per year in costs for children with JIA compared to children without JIA. Parents of children with JIA also face salary losses three times higher than parents of children without JIA, the result of having to take time off for appointments and to care for a sick child. On average, children with JIA miss one to two weeks of school each year. Dr. Bernatsky's research will lead to a better understanding of the economic costs of this disease and help improve health-care policy and access to care.



## The Researchers

### Dr. Monique Gignac – Helping Canadians with arthritis lead productive lives

Arthritis is the leading cause of physical disability in Canada. As our population ages, the number of people with arthritis is expected to increase, particularly among adults in their highest earning years (ages 45-65).

Disability associated with arthritis costs the Canadian economy about \$4.4 billion per year. CIHR-funded researcher Dr. Monique Gignac of the University of Toronto and her team are completing a series of studies examining the economic costs of disability and efforts made by employees and employers to manage this burden.

The investigators followed almost 500 employed people with osteoarthritis, rheumatoid arthritis or both for a period of between five and six years. They determined that the average economic cost of arthritis disability is \$11,500 per

year per person. Of this average cost, 41% is due to lost productivity, 37% is a result of stopping working or changing jobs and the remaining 22% is due to decreased working hours and/or absenteeism.

The research also underlined that, while disability caused by arthritis creates major job stress, employees want to stay in the workforce and are trying to make changes that will allow them to do so.

"A few things surprised us," says Dr. Gignac. "For example, we found that many people are not giving up their jobs, but making changes at work. For instance 21% of our study participants made a permanent change from full- to part-time work."

Dr. Gignac and her team also found people making many small changes to help manage their disability. For example, some people worked a longer day to take more rest breaks. People also reorganized their work space to reduce or avoid lifting, used a stool to raise their legs or replaced their computer mouse.

Dr. Gignac expects that her team's latest study findings will be published later in 2007.





# Cancer



CIHR IRSC

**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately **\$124.8 million** in 2006-07 across Canada in cancer research.**

## The Facts

- Canada is facing a cancer epidemic over the next 20 years, due to our aging population. If current trends continue, 5.7 million Canadians will develop cancer and 2.7 million will die of the disease over the next 30 years.
- An estimated 159,900 new cases of cancer and 72,700 deaths from cancer will occur in Canada in 2007.
- Lung cancer is the leading cause of cancer death for both men and women. Overall, colorectal cancer is the second leading cause of death from cancer.
- Canadians aged 70 and over represent 43% of new cancer cases and 60% of deaths due to cancer.
- Thirty-eight per cent of Canadian women and 44% of men will develop cancer during their lifetimes based on current incidence rates.
- Twenty-four per cent of women and 29% of men, or about a quarter of all Canadians, will die from cancer, based on current mortality rates.
- Smoking is responsible for 27% of potential years of life lost due to cancer.
- Cancer costs Canadians more than \$14 billion every year. Of that total, \$2.5 billion is for direct costs such as hospitalization and medication, while \$11.8 billion is for indirect costs such as early death or disability.



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# Finding Solutions

### New drug in breast cancer fight

McGill University researchers may have found a new way to fight a form of breast cancer that affects up to 25% of all breast cancer sufferers. And, the really good news is that it uses an already-existing drug. In experiments with mice, CIHR-supported researcher Dr. Michel L. Tremblay showed that by suppressing an enzyme known as PTP1B, it was possible to delay or even completely suppress the onset of a strain of breast cancer associated with the HER-2 gene. In 1999, Dr. Tremblay's team demonstrated the role of PTP1B in metabolism regulation and several companies went on to develop drugs that could now be used as potential breast cancer therapies.

### Watching cancer grow from scratch

Doctors have to deal with the effects of cancer after it is diagnosed, but new research by Dr. John Dick of the Princess Margaret Hospital, University of Toronto, will help cancer specialists understand how this disease unfolds from start to finish. There has been growing evidence that a small number of cancer cells, so-called cancer stem cells, help the cancer grow and renew even in the face of radiation and other therapies. With the help of CIHR funding, Dr. Dick and his team successfully implanted these types of cells into mice, which then developed cancer. This result supports the theory that cancer stem cells drive the development of tumours, and also provides a powerful new tool to better understand cancer and find ways of defeating it.

### Safe, inexpensive drug a cancer killer

A drug used for decades to treat metabolic disorders has now been found to kill lung, breast and brain cancer cells – but not healthy cells. CIHR-supported researcher Dr. Evangelos Michelakis of the University of Alberta showed that dichloroacetate (DCA) shrinks tumours in both animal and human tissue experiments. DCA has numerous advantages: it can reach areas in the body that other drugs cannot and, since it is not patented, it would likely be an inexpensive drug to administer. The drug could move into human clinical trials quickly because the molecule has already been successfully tested on humans for metabolic disorders.



## The Researchers

### Dr. Peter Dirks – Not all cancer cells are created equal

Dr. Peter Dirks is changing our understanding of how some cancers grow, spread – and can be treated.

“Within a single cancer tumour, not all the cells are the same,” says Dr. Dirks, a CIHR-supported cancer researcher and pediatric neurosurgeon at the University of Toronto-affiliated Hospital for Sick Children. “And it’s understanding these differences that’s going to be key to finding more effective treatments for many forms of the disease.”

In 2003, he turned medicine’s perspective of brain cancer on its head with the discovery of brain cancer stem cells.

Like stem cells in other tissues, brain cancer stem cells are immature forms of cells capable of developing into a

variety of mature forms. Most importantly, Dr. Dirks showed that, in brain cancers, these stem cells act as cancer ringleaders.

In experiments, he found that 100,000 ordinary cancer cells couldn’t kick-start a tumour in a mouse, but as few as 100 of the cancer stem cells were able to give rise to the disease.

The discovery of such cells was pivotal to explaining why radiation therapy is often unsuccessful in treating human glioblastoma, “a particularly nasty type of brain cancer,” says Dr. Dirks. Brain cancer stem cells can survive the ionizing radiation that kills the other cancer cells and are thus able to re-start a tumour.

Dr. Dirks’ research group is now trying to understand cancer stem cells in more detail. “The true cancer ringleaders are probably a sub-population of the stem cells we’ve found so far.”



For more information, go to  
[www.healthresearchatwork.cihr-irsc.gc.ca](http://www.healthresearchatwork.cihr-irsc.gc.ca)  
2006-2007



# Child Health



**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$63.9 million in 2006-07 across Canada in research on child health.**

## The Facts

- Canada's infant mortality rate – the number of deaths in children under one year of age per 1,000 live births – in 2004 was 5.3.
- Cancer, although rare, is the most common potentially fatal illness among Canadian children and the second leading cause of death among children aged 1 to 14 (injury is the leading cause of death).
- Attention deficit hyperactivity disorder (ADHD) is the most common childhood behavioural disorder, occurring in 3 to 5% of school-aged children. Boys are four times more likely to be diagnosed with ADHD than girls.
- Autism spectrum disorder (ASD) is an important neurobehavioral condition affecting children. Although prevalence rates depend on definitions and surveillance efforts, some studies suggest rates may be as high as 60 per 10,000.
- Childhood asthma is the most common chronic childhood illness in Canada and most other developed countries. Statistics Canada reported that the prevalence of asthma in Canada has increased fourfold over the past 20 years.
- In 2004, 18% of children aged 2 to 17 were overweight and 8% were obese – accounting for more than one-quarter of all children.
- It is estimated that obesity and physical inactivity may reduce life expectancy by 3-5 years over the next 40 years – similar to the number of potential years of life lost due to cancer.
- Poverty is a major determinant of children's health. Almost all facets of health are worse among impoverished children than among children from more affluent families.





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# Finding Solutions

### Preventing childhood cancer

Can a vitamin a day help keep childhood cancer away? According to Dr. Gideon Koren, a CIHR-funded researcher at Toronto's Hospital for Sick Children, moms-to-be may be able to reduce their child's risk of developing cancer by taking prenatal multivitamins. In the first study of its kind, Dr. Koren and his colleagues compiled and analyzed the results of a large number of smaller studies on the same subject. They found that children whose mothers had taken multivitamins fortified with folic acid while pregnant had a reduced risk of developing leukemia, brain tumours and neuroblastoma, three of the most common childhood cancers.

### Identifying risk factors for teen suicide

Teenaged boys are at a higher risk for suicide than girls the same age and new CIHR-funded research suggests that, for rural teenaged boys, this risk increases the further they live from schools. The study by Laura Armstrong of the University of Ottawa also found that taking part in meaningful extracurricular activities is associated with a reduced risk of suicide for both male and female rural teens. Ms. Armstrong's research highlights the importance of giving teens the opportunity to participate in after-school programs.

### Equal care for all?

Canada's health-care system has an international reputation for being fair and accessible and, when it comes to obstetric care, the reality appears to match the rhetoric. A recent study by CIHR-funded researcher K. S. Joseph at Dalhousie University suggests that Canadian women have equal access to labour induction and caesarean delivery, regardless of their income level. Dr. Joseph also found that hospitals are offering these services to the pregnant women who need them the most. Studies like Dr. Joseph's help us monitor the quality and equity of health care that our country provides.



## The Researchers

### Dr. Nicole Letourneau – Protecting the most vulnerable

As a teenager, CIHR-funded researcher Dr. Nicole Letourneau spent a lot of time looking out for children: at the pool, on the playground, and as a counsellor. This protective instinct has never left her and has motivated her research – she simply wants to give children the best possible start in life.

Dr. Letourneau, a professor at the University of New Brunswick, is studying how to lessen the impact of domestic violence on young children.

According to the most recent Statistics Canada study, 95,326 women and dependent children sought refuge at domestic violence shelters across the country between April 1, 2003 and March 31, 2004. A survey taken on

April 14, 2004 found that 46% of the residents in Canadian shelters were children.

"We know all kinds of things about how parenting is important for early child development, but no one had ever looked at how violence in the home affects maternal-infant relationships," says Dr. Letourneau. "And I couldn't believe that!"

She is currently interviewing mothers who have been the victims of domestic violence, collecting information about their experiences and the impact on their relationships with their children. Dr. Letourneau wants to translate her findings into programs to lessen the negative impact of domestic violence on young children.

"One thing we have been hearing from mothers is that they are so glad that someone is actually studying this, because they worry about how the violence is going to affect their children's development. They want to know how they can do something to reduce the harmful effects," says Dr. Letourneau.



For more information, go to  
[www.healthresearchatwork.cihr-irsc.gc.ca](http://www.healthresearchatwork.cihr-irsc.gc.ca)  
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# Diabetes

**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$32.8 million in 2006-07 across Canada in research on diabetes.**

## The Facts

- More than two million Canadians have diabetes. By 2010, this number is expected to rise to three million.
- Type 1 diabetes is usually diagnosed in childhood and involves an abnormal autoimmune response that destroys insulin-producing cells in the pancreas, resulting in little or no insulin production.
- Type 2 diabetes typically begins in adulthood, although more and more children are developing the disease. Type 2 diabetes develops because the body's cells become resistant to the effects of insulin and the insulin-producing cells of the pancreas are unable to compensate.
- People who have a family member with diabetes, are physically inactive or are overweight are at higher risk of developing type 2 diabetes.
- Currently, about 90% of people with diabetes have type 2 and 10% have type 1. However, the number of people with type 2 diabetes is on the rise as our population ages and our lifestyles change.
- Complications of diabetes include nerve damage, cardiovascular disease, blindness, kidney disease and impotence.
- According to one study, diabetes and its associated illnesses cost the Canadian health-care system an estimated \$13.2 billion a year.



## About CIHR

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# Finding Solutions

### Easing diabetes pain with insulin

Insulin may boost nerve growth and help stop pain. Dr. Douglas Zochodne, a CIHR-funded scientist at the University of Calgary, has been investigating a new use for insulin in the treatment of diabetes. People with diabetes often develop a condition known as diabetic neuropathy, in which nerve cells in their skin begin to die off. In addition to helping maintain blood sugar levels, insulin promotes the growth of some types of cells. Dr. Zochodne and his colleagues have found that injecting low doses of insulin into a diabetic rat's spinal column can prevent nerve cell death. This research could lead to improved quality of life for diabetics and advances in the science of nerve regeneration.

### Building stronger bones

Dr. Marc Grynepas and his team of researchers at the University of Toronto have been investigating the benefits of a potential new anti-diabetic drug, known as BEOV. In addition to helping control blood sugar levels, BEOV may protect against diabetes related-bone loss. In a CIHR-funded study, Dr. Grynepas found that the new drug increases bone development in both diabetic and non-diabetic rats. While more research must be done to establish the safety and effectiveness of BEOV, it appears to be a promising advance in the treatment of diabetes and its related conditions.

### What causes type 1 diabetes?

Malfunctioning nerves may play a role in the development of type 1 diabetes. Drs. Michael Salter and Hans-Michael Dosch, researchers at the Hospital for Sick Children in Toronto, have discovered that malfunctioning nerve cells produce chemicals that trigger the immune system to destroy the insulin-producing islet cells of the pancreas. By killing the nerves with a chemical derived from chili peppers, the researchers were able to cure diabetes in mice. Drs. Salter and Dosch hope to begin testing this procedure in humans by 2008.

### Extracting modern treatments from traditional medicine

Researchers at the University of Montreal have identified several plants used in traditional Cree medicine that may help treat diabetes. CIHR-funded researcher, Danielle Spoor and her colleagues worked with aboriginal healers in northern Quebec to harvest the medicinal plants. The researchers extracted and tested chemicals from the plants and found that many of them possess anti-diabetic properties. These findings may be particularly important to members of the aboriginal community, who suffer from a high incidence of type 2 diabetes and are often not comfortable with modern medical treatments.



## The Researchers

### Dr. Ray Rajotte – Committed to developing better treatments for type 1 diabetes patients

CIHR-supported researcher Dr. Ray Rajotte of the University of Alberta is well known for his pioneering work in islet transplantation. He helped create the Edmonton Protocol, a revolutionary procedure for transplanting normal, insulin-producing islet cells into the pancreas of a person suffering from type 1 diabetes. Many transplant recipients have been able to stop or reduce their use of insulin – at least for a while.

Transplant patients must take immune-suppressing drugs to prevent their bodies from rejecting the foreign cells. But, over time, the drugs damage these cells and reduce their ability to produce insulin.

Dr. Rajotte's new challenge is preventing rejection of islet cells. He

and his team hope to eliminate the need for anti-rejection drugs by using gene therapy to create islet cells that will produce their own anti-rejection chemicals.

He's also working to increase the supply of islet cells for transplantation.

"In Canada, there are only about 400 donor pancreases, and there are 6,000 new type 1 diabetics every year," says Dr. Rajotte. "So even if we got every pancreas, we'd only be able to transplant 1-2% of the patients."

Dr. Rajotte is studying a process known as xenotransplantation, the transplantation of animal cells into humans, as a possible solution to the shortage of islet cells. This past year, Dr. Rajotte and Dr. Greg Korbutt in collaboration with Dr. Christian Larsen of Emory University in Atlanta, Georgia, showed that pig islet cells could be used to cure diabetic monkeys. If xenotransplantation proves to be safe and effective in humans, it could lead to a virtually unlimited supply of healthy islet cells to treat type 1 diabetes.





# Environment and Health



**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$7.6 million in 2006-07 across Canada to study the link between environment and health.**

## The Facts

- The accumulation of heavy metals (such as mercury, lead and cadmium), air contaminants, pesticides and other pollutants in our air, food and water has been linked to respiratory illnesses, cardiovascular disease, cancer, allergies and neurological effects.<sup>1,2</sup>
- Pollutants accumulate in the fatty tissue of large animals, making residents of Northern Canada, whose diets often include whale, seal and walrus, particularly susceptible to contamination. A recent study found that 40-65% of Inuit women had pollutant levels in their blood exceeding what Health Canada considers to be safe.<sup>3</sup>
- Health Canada estimates that 5,900 deaths in Quebec City, Montreal, Ottawa, Toronto, Hamilton, Windsor, Calgary and Vancouver can be attributed to air pollution each year.<sup>4</sup>
- Long-term exposure to air pollution may slow lung growth in children and has been linked to higher asthma rates.<sup>5</sup>
- Up to 30,000 properties in Canadian cities are currently classified as brownfields – abandoned buildings or vacant lots that have been contaminated by previous occupants.<sup>6</sup>
- Global warming is expected to cause extreme weather patterns and changes in our environment, including heat waves, droughts, floods and storms, changes to water levels and water quality and in the distribution of infectious diseases such as malaria and dengue fever.<sup>2</sup>
- Climate models project that northern latitudes, such as the Canadian Arctic, will experience more global warming than anywhere else in the world.<sup>2</sup>

<sup>1</sup> [http://www.ec.gc.ca/cleanair-airpur/Health\\_Concerns-WSC8A1FE65-1\\_En.htm](http://www.ec.gc.ca/cleanair-airpur/Health_Concerns-WSC8A1FE65-1_En.htm)

<sup>2</sup> [http://www.ec.gc.ca/cleanair-airpur/Clean\\_Air,\\_Climate\\_Change\\_and\\_Stratospheric\\_Ozone\\_Depletion-WSC6DCEC3F-1\\_En.htm](http://www.ec.gc.ca/cleanair-airpur/Clean_Air,_Climate_Change_and_Stratospheric_Ozone_Depletion-WSC6DCEC3F-1_En.htm)

<sup>3</sup> [http://www.ec.gc.ca/cleanair-airpur/Pollutants/Persistent\\_Organic\\_Pollutants\\_\(POPS\)/Linkages\\_with\\_other\\_Issues-WS88951B79-1\\_En.htm](http://www.ec.gc.ca/cleanair-airpur/Pollutants/Persistent_Organic_Pollutants_(POPS)/Linkages_with_other_Issues-WS88951B79-1_En.htm)

<sup>4</sup> [http://www.ec.gc.ca/cleanair-airpur/Health\\_Concerns-WSC8A1FE65-1\\_En.htm](http://www.ec.gc.ca/cleanair-airpur/Health_Concerns-WSC8A1FE65-1_En.htm)

<sup>5</sup> [http://www.ec.gc.ca/cleanair-airpur/Asthma-WSF0AA3018-1\\_En.htm](http://www.ec.gc.ca/cleanair-airpur/Asthma-WSF0AA3018-1_En.htm)

<sup>6</sup> <http://www.nrtee-trnee.ca/eng/publications/brownfield-redevelopment-strategy/Brownfield-Redevelopment-Strategy-eng.htm>



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# Finding Solutions

### What's in the air you're breathing?

Exposure to high levels of manganese in the air may increase a person's risk of developing Parkinson's disease. Manganese is an essential nutrient that all living things must consume to survive, but too much of this metallic element is toxic. Until 2004, manganese was a common additive in gasoline in Canada. It is still used in many industrial processes, such as steelmaking. In a CIHR-funded study, Dr. Murray Finkelstein of Mount Sinai Hospital recently found that people living near steel factories in Hamilton, Ontario, are more likely to be diagnosed with Parkinson's disease than people who live in areas with lower levels of manganese in the air.

### Smoke on the brain

The warnings on cigarette packages say it loud and clear: tobacco smoke hurts babies. But what are the long-term effects on a child who is exposed to tobacco toxins in the womb? Dr. Tomas Paus of McGill University is leading a team of CIHR-funded researchers in an extensive study of the long-term effects of prenatal exposure to cigarette smoke. They are currently administering a battery of tests, including MRIs, psychological exams and genetic screenings, to more than 400 teens to identify how a mother's smoking can affect her child's brain development.

### Smarter, healthier land use

Canadian researchers are partnering with people from around the world to help develop smarter farming practices. Dr. Marc Lucotte of the Université du Québec à Montréal and Dr. Marcel Bursztyn of the University of Brazil are working with people from small communities around Brazil, where tracts of rainforest are often burned to clear land for farming. This "slash and burn" strategy has led to an increase in mercury-contaminated fish and disease-spreading triatomine bugs. The project, which is part of the CIHR-supported Teasdale-Corti Global Health Research Partnership Program, aims to empower local residents and create healthier farming communities.

### How safe is the water?

Where your water comes from and where your sewage goes may have an important impact on your health. Dr. Kay Teschke of the Department of Health Care & Epidemiology and the School of Occupational & Environmental Hygiene at UBC is studying the water and sewage systems in the town of Langley, a mixed urban/rural community on the outskirts of Vancouver. Concerned about depleting its water supply as its population grows, the town has been mapping all the different ways in which its residents get their water and dispose of their sewage. In a CIHR-funded study, Dr. Teschke is using this data to determine how water source and sewage disposal methods are related to rates of gastrointestinal illness among residents. The results of the study will help public policy makers and engineers prevent future water-borne illnesses.



## The Researchers

### Dr. Louise Winn – Understanding the chemicals in our environment

Dr. Louise Winn, a CIHR-supported researcher at Queen's University, wants to know if the chemicals in our environment are making us sick. She is currently focusing on benzene, a contaminant that has been linked to the development of leukemia, a cancer of the blood.

Benzene is one of the more commonly found contaminants; we're exposed to small amounts of benzene every time we inhale second-hand tobacco smoke or gasoline fumes.

Benzene activates a protein in our bodies, speeding up blood cell division and potentially leading to

leukemia. Dr. Winn has already found that pregnant mice produce high levels of this problematic protein when exposed to benzene, increasing the risk that their offspring will develop leukemia. Luckily, her team has also shown that some antioxidants can block the negative effects of the chemical.

Over the past six years, CIHR has increased its investment in environmental studies such as Dr. Winn's almost nine-fold. This research is still new, and there are many unanswered questions about the consequences of exposure to environmental contaminants.

"I think it's important for us all to be aware of our surroundings, and to recognize that there are some exposures that may be difficult to avoid completely," says Dr. Winn. "Understanding how chemicals cause toxic effects may lead to the development of safer chemicals and better strategies to treat or prevent the harmful effects of environmental contaminants."



For more information, go to  
[www.healthresearchatwork.cihr-irsc.gc.ca](http://www.healthresearchatwork.cihr-irsc.gc.ca)  
2006-2007



# Gender and Health



**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$40.9 million in 2006-07 across Canada in research on gender and health.**

## The Facts

- Women experience more illness, more years of disability and more stress than men, but they also live longer. Even when diagnosed with a fatal disease, women survive longer than men.
- Life expectancy for females born in 2002 was 82.1 years, compared with 77.2 years for males. Between 1979 and 2002, life expectancy for males improved by 5.8 years while that of females improved by 3.3 years.
- Women are more likely than men to consider overall health and weight when choosing food, while men are more likely to engage in vigorous activity during their leisure time. As of 2004, 65% of males and 53% of females in Canada were considered overweight or obese based on the Body Mass Index or BMI.
- By age 65, 77% of men and 85% of women have at least one chronic condition. Arthritis is the most prevalent chronic condition.
- In 2002, more than 600,000 Canadians were dependent on alcohol and nearly 200,000 were dependent on illicit drugs. Men are more likely than women to drink heavily and use illicit drugs.
- A person's age and gender have a remarkable influence on their likelihood of experiencing poverty. Women, the young and the elderly are at the greatest risk of living in poverty. In fact, children and youth are over-represented in this group, accounting for more than 40% of the poor population.
- Between 1999 and 2003, 7% of women and 6% of men were victims of spousal abuse, representing an estimated 653,000 women and 546,000 men.



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# Finding Solutions

## Drinking and depression

Having a few drinks too many could be a sign that you are feeling blue, especially if you're a woman. CIHR-supported researcher Dr. Kathryn Graham of the Centre for Addiction and Mental Health in Toronto has found that there is a stronger link between depression and binge drinking in women than in men. As part of an international study on alcohol abuse, Dr. Graham and her colleagues surveyed more than 14,000 Canadians to see if there is a link between depression and drinking alcohol. While both men and women who had symptoms of depression were more likely to binge drink (i.e., have more than five drinks on a single occasion), this trend was stronger in women. These results could lead to a greater understanding of the connection between drinking and mental illness.

## Gender matters when it comes to the heart

Female heart attack patients may not be receiving enough of a common, life-saving medication. According to a recent study by Dr. Louise Pilote, a CIHR-funded researcher at McGill University, women need higher dosages of cholesterol-lowering drugs known as statins to receive the same benefits as men. Patients who have recently suffered a heart attack often take statins to prevent a second cardiovascular event. Early clinical trials of statins contained very few women as part of the study group, and some researchers suspected that there may be sex differences in the effects of the drugs. The results of Dr. Pilote's study now confirm that these differences exist and need to be addressed.

## Men as caregivers

What types of support do male caregivers find helpful? Dr. Anne Neufeld of the University of Alberta has been interviewing men caring for ailing wives or parents to find out. The number of people suffering from Alzheimer's disease is on the rise, and a growing number of men are stepping up to provide long-term care for close relatives with dementia. Dr. Neufeld's studies have provided a number of insights into the male caregiver's experience. For instance, many of these men find that the well-meaning assistance of friends, family and professionals is often unhelpful. Dr. Neufeld's findings will help experts create assistance programs and policies to meet the needs of men.



## The Researchers

### Dr. Marlene Moretti – Helping girls find healthy solutions to conflict

Are girls getting more violent, or is violence among teen girls just getting more attention than it used to? Dr. Marlene Moretti, a CIHR-supported researcher at Simon Fraser University, frequently hears this question and says both answers are true.

"There are data to show that the rates of violence are increasing. Girls are still lower than boys on serious violent crime, but there is something that is there, and we need to understand why," says Dr. Moretti.

She and other researchers are taking a closer look at examples of social aggression, such as excluding someone from a group, telling damaging lies or embarrassing another person in public. All of these behaviours are more common among girls than boys. Social aggression has serious implications for both victims and victimizers, who may end up being

ostracised and rejected by their peer group when their aggressive behaviour backfires.

How a girl's caregivers (e.g., her parents, teachers or mentors) handle conflict and the amount of emotional support they provide can have an impact on how that girl will respond to aggression.

For example, even though teens excel at provoking conflict with the adults around them, they still need to feel secure in their relationships with these caregivers. Lack of security or empathy from caregivers can derail an adolescent's emotional development and contribute to aggressive behaviour. Girls seem to be particularly sensitive to problems in relationships with their caregivers.

"The take-home message is that we need to learn how to use our relationships to help kids learn non-aggressive ways to deal with conflict in their own relationships," says Dr. Moretti.





# Genetics



**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$243 million in 2006-07 across Canada in research on genetics.**

## The Facts

- The human genome is made up of 3 billion (3,000,000,000) bases (letters) of DNA, split into 24 distinct chromosomes.
- This information...
  - would fill two hundred 500-page telephone directories.
  - would take a century to recite, if recited at a rate of one letter per second, 24 hours a day.
- The human genome contains about 30,000 genes.
- Between humans, our DNA differs by only 0.1%, or 1 in 1,000 bases.
- Genes contain instructions for how to make proteins which are responsible for carrying out all of the cell functions (examples – facilitating chemical reactions, controlling growth and transporting substances through the body).
- Many diseases stem from problems associated with proteins (examples – too many proteins produced, too few proteins, the protein is the wrong shape or “misfolded”).
- The proteome is the complete set of proteins produced by the genome at any one time, approximately 1,000,000.
- Proteomics is the study of proteins – what proteins look like (structure), interactions between proteins and the types of proteins expressed in healthy vs. diseased tissues.





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# Finding Solutions

### How do medications work?

Drug researchers can learn a lot from the medications that we already use. CIHR-supported researchers Drs. Charlie Boone and Brenda Andrews of the University of Toronto are building a collection of "chemical-genetic interaction" profiles, descriptions of how therapeutic chemicals affect gene activity. These profiles, which the researchers are generating using genetically altered yeast cells, could be used in the future to identify new drugs, determine how those drugs work, and anticipate possible negative side effects. These profiles have already uncovered how a common breast cancer treatment and an anti-HIV drug work.

### Conducting respectful research

Who "owns" the DNA samples that researchers study? CIHR-supported researcher Dr. Laura Arbour of the University of British Columbia studied this important issue and provided a number of recommendations that helped shape the new *CIHR Guidelines for Health Research Involving Aboriginal Peoples*. According to Dr. Arbour, researchers must view biological samples obtained from aboriginal communities as "DNA on loan", and any research carried out using these samples must reflect the needs and priorities of the community. Researchers should also take steps to involve community members in the research process and share any study results with the community.

### Using genetic technology wisely

Researchers at Laval University are looking for the best ways to put our genetic know-how to work in the fight against breast cancer. Genetic screening may help save many lives, but it is expensive and time-consuming. Dr. Jacques Simard and his team are trying to find an effective way to identify high-risk populations that would benefit most from screening for mutations in BRCA1 and BRCA2, two genes commonly linked to breast cancer. In a study of 256 French-Canadian families from around Quebec, Dr. Simard identified eight new mutations linked to breast cancer and tested the effectiveness of three mathematical models for predicting breast cancer risk. His results indicate that doctors should test patients with a family history of breast cancer for common breast cancer gene mutations, and then use the mathematical models to determine which patients should receive further testing.



## The Researchers

### Dr. Stephen Scherer – Scanning the genetic horizon

Dr. Stephen Scherer, a CIHR-funded researcher at Toronto's Hospital for Sick Children, is pretty good at predicting the future in his research field. But every now and then, something surprises him. Last year, he and his colleagues discovered much more variety in the human genome than previously thought.

Geneticists thought the genome contained two copies of most of its genes. But Dr. Scherer and his colleagues recently published a new map of the human genome showing that individuals often have multiple copies of a single gene, or even have missing genes. These repetitions and deletions are called copy number variations, or CNVs; it appears they account for much of the genetic diversity from person to person.

"I cannot believe that two years ago we didn't know that this type of

variation existed in the genome," he says. "That's something that just hit us over the head, and now it's changing the whole field."

Dr. Scherer and his team are now investigating how CNVs may contribute to disease. He's part of an international team scanning the human genome in search of the genetic causes of autism. Their effort has already pinpointed several CNVs which appear to play a role in this developmental disorder. The findings may produce improved diagnostic tests and a better understanding of how various genes interact to cause autism.

Dr. Scherer's lab will be using similar technology to study the genetic roots of many diseases, from schizophrenia to cancer. He's also focused on developing "personalized" DNA scanning technology, which may someday make full-genome diagnostic scans a medical reality.

"It's quite likely that in ten years or so we may be able to offer to sequence your newborn child's DNA before you leave the hospital," says Dr. Scherer. Who would have been able to predict that?



# Health-Care System



**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$25.5 million in 2006-07 in research on Canada's health-care system.**

## The Facts

- In 2006, Canada was forecast to spend \$148 billion on health care, an average of \$4,548 per Canadian and a 5.8% increase over 2005. Of this, private-sector health spending (insurance and out-of-pocket expenditures) was expected to increase to \$44 billion in 2006, accounting for 30% of total spending on health care.
- In 2006, health-care spending was expected to amount to 10.3% of the gross domestic product.
- Hospitals remain the single largest category of spending, accounting for almost 30% of total spending. In 2006, hospital spending was forecast at \$44 billion.
- Drug expenditures were forecast to grow by 6% over 2006, accounting for 17% of total health-care spending.
- In 2006, Canada was forecast to spend \$19.4 billion on physician services, up 7.1% from 2005.
- Most private-sector spending was expected to go to drugs and dentistry.



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# Finding Solutions

### Been to intensive care? Don't forget to keep taking your medications

Being in an Intensive Care Unit (ICU) at the hospital can be dangerous to your long-term health according to CIHR-supported researcher Dr. Chaim Bell of St. Michael's Hospital in Toronto, especially if you're a senior taking medications for chronic diseases. Dr. Bell studied a group of patients at Ontario hospitals and found that, when discharged from the hospital ICU, one-third of them had at least one of their medications unintentionally discontinued. The new information will help create changes to make sure that patients keep following their daily drug treatment routine.

### The importance of nursing leadership

Making changes to health-care practices takes several steps, such as collecting evidence to support the use of new procedures and, just as important, making sure these new clinical practices become part of the daily routine in hospitals. A study by CIHR-supported researcher Dr. Nancy Edwards of the University of Ottawa suggests that leadership from the nursing community plays a major role in the success or failure of new clinical guidelines. Successful leaders closely monitor clinical outcomes, help individual nurses use the guidelines, ensure ongoing education and serve as positive role models. Information from the research project will help nursing administrators develop practical guidelines that the nursing community can use to encourage these leadership qualities.

### Reducing infections among newborns

Newborns in hospitals are getting fewer infections thanks to innovations by Dr. Shoo Lee, a CIHR-supported researcher at the University of Alberta and head of the Canadian Neonatal Research Network, which links neonatal units in hospitals across Canada. Dr. Lee used a process known as quality improvement to increase awareness among Network members of specific risks for hospital-acquired infections. The results of the research project included recommendations on how to change practices to reduce the chance of infection. Examples included better use of antibiotics and better attention to feeding tubes or other lines among babies identified as high risk. Among hospitals participating in the project, the infection rate dropped by nearly 50% over two years.



## The Researchers

### Dr. Steve Morgan – Finding answers in sea of health-care data

When Dr. Steve Morgan, a health-care economist from the University of British Columbia, looks at the sea of data produced by the health-care system he doesn't see information overload – he sees opportunity.

"We have the biggest, most culturally diverse laboratory for studying the value of medicine. We could be miles ahead of the world in this area," he declares.

Dr. Morgan is especially interested in prescription drug use in Canada, studying how a drug is prescribed once it's approved for use.

"Clinical trials are tested in a very small population. Once a drug gets licensed, it goes into the world and

gets used by people in a different way," Dr. Morgan points out.

In 2005, his team published a major study on this subject, compiling a detailed study of prescription drug use across Canada called the *Canadian Rx Atlas*.

Drug spending is doubling every 10 years and, in 2007, Canadians are forecast to spend \$30 billion on pharmaceuticals, about 50% more than is spent on doctors. According to Dr. Morgan, the Atlas has proved a useful tool to help policy-makers understand key factors, such as which drugs accounted for the most spending and variations in per capita drug spending between provinces. Such information is useful for taking measures to control spending or make changes to insurance plans to ensure better coverage.

"The Atlas is an easy-to-understand metaphor. With a map, for example, one is far more likely to spot variations in drug use in different regions," he notes. Dr. Morgan's goal is to seek out and better understand the causes for these variations and, most importantly, their impact on Canadians' health and Canada's health-care system.





# Heart Disease

**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$100.2 million in 2006-07 across Canada in research on cardiovascular disease.**

## The Facts

- Cardiovascular disease is the leading cause of death in Canada and accounted for at least 33% of all deaths (34% among women, 32% among men) in 2002.
- Men are more likely to develop heart disease early in life; women tend to “catch up” around menopause. Women experiencing heart disease or stroke are often under-diagnosed or managed differently than men.
- According to the 2003 Canadian Community Health Survey conducted among persons aged 12 years or more, five million Canadians say they are affected by heart disease, hypertension and stroke.
- Cardiovascular disease is the most costly disease affecting Canadians. In 1998, it was responsible for \$18.5 billion in expenditures, or 11.6% of the total cost of all illnesses in Canada. Of this, \$6.8 billion was in direct costs, particularly for hospital care, and \$11.7 billion was in indirect costs, most due to premature death.



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# Finding Solutions

### Simple solutions for a healthier heart

Clogged arteries may have just gotten a lot easier and a lot less expensive to treat. A team of researchers at McMaster University has found that angioplasty, a popular procedure for unblocking coronary arteries, is no more effective than medication and lifestyle changes when it comes to preventing heart attacks and stroke. This CIHR-funded study, led by Drs. Koon Teo and William Boden, could result in big savings for the health-care system. In 2003-04, doctors performed 167 angioplasties for every 100,000 Canadians over the age of 20.

### How do you fix a broken heart?

Research by Dr. Ren-Ke Li of the Toronto General Hospital, University Health Network, may point the way to helping restore the health of heart muscles after a heart attack and preventing further heart failure. The research team discovered an "SOS" distress signal that starts the repair process after a heart attack. When damaged tissues send out this signal, a specific kind of bone marrow stem cell mobilizes and stimulates the growth of new blood vessels in the heart.

### Congenital heart disease – Not just for children

Improved surgical techniques have reduced the number of children who die from congenital heart disease (CHD), meaning that there are increasing numbers of adults living with the condition. According to CIHR-funded research by Dr. Ariane Marelli of McGill University, one in every 85 children and one in every 250 adults live with CHD, a fact that increases demands on the health-care system. CHD patients need life-long care and are more at risk for developing other forms of heart disease.

### Heart disease patients more likely to have a heavy heart

Heart disease patients routinely receive an array of medications after discharge to help their recovery and keep them healthy. But physicians need to pay attention to their mental as well as their physical health. As many as 20% of heart disease patients suffer from major depression, according to CIHR-funded researcher Dr. François Lespérance from the University of Montreal, who says family doctors should be alert to the possibility of depression and should not be afraid to include antidepressants in patients' drug treatment plan. Research by Dr. Lespérance also determined that drug therapy is more effective than psychotherapy for relieving depression among these patients.



## The Researchers

### Dr. Jack Tu – Protecting Canadians' hearts with numbers

Some physicians save lives with scalpels, some with medicines. Dr. Jack Tu saves lives with statistics and his laptop. The CIHR-supported cardiologist and health policy researcher at Sunnybrook Health Sciences Centre in Toronto is a world leader in mining hospital data to identify best practices in cardiac care. Every year the results of his research mean the difference between life and death for hundreds of Canadians with heart attacks and heart disease.

In 1999, Dr. Tu and his team released the first hospital report cards on cardiac care in Ontario. The report cards revealed major disparities between heart patient survival rates at different hospitals. A patient admitted to a hospital with top marks had three times the chance of

surviving a heart attack compared to a similar patient admitted to a hospital with the lowest score.

"The results understandably caused a bit of stir. Nobody likes to be evaluated," says Dr. Tu, also the team leader of the CIHR-funded Canadian Cardiovascular Outcomes Research Team (CCORT). "But the good news is they also caused change."

Another report card in 2004 revealed that differences in heart attack survival rate were in part attributable to how quickly and comprehensively hospitals administered key medications. The study revealed that up to 400 lives per year in Ontario could be saved if all heart attack patients quickly received "clot-busting" drugs on hospital admission, and specific medications on discharge.

In 2006, Dr. Tu and the CCORT team published the *Canadian Cardiovascular Atlas*. A Canadian first, the atlas graphically identifies regional differences in cardiac care and survival.



For more information, go to  
[www.healthresearchatwork.cihr-irsc.gc.ca](http://www.healthresearchatwork.cihr-irsc.gc.ca)  
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# HIV/AIDS



CIHR IRSC

**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$37.5 million in 2006-07 across Canada in research on HIV/AIDS.**

## The Facts

- Human immunodeficiency virus (HIV) is the virus that causes acquired immunodeficiency syndrome (AIDS). The virus mutates rapidly, creating new strains that make it hard to detect, prevent and treat. While treatments exist, they are costly and not readily available in developing countries. There is no cure for AIDS.
- The HIV virus is transmitted by the transfer of blood and semen through such activities as sexual intercourse and the sharing of needles. It can also be transmitted by infected mothers who breastfeed their infants.
- The first case of AIDS in Canada was reported in 1982. By December 31, 2005, there were a total of 60,160 positive HIV test reports in Canada.
- The Public Health Agency of Canada estimates that 27% of HIV-positive Canadians do not know they are infected.
- In 2006, around 4.3 million adults and children became infected with HIV worldwide. By the end of the year, an estimated 39.5 million people were living with HIV/AIDS. The year also saw 2.9 million deaths from AIDS.
- In Canada, HIV and AIDS disproportionately targets vulnerable populations in our society such as youth, injection drug users and Aboriginal people. For example, in 2005, 16.4% of Canadian AIDS cases with known ethnicity were Aboriginal people; Aboriginal people account for 4.4% of the Canadian population.



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# Finding Solutions

### Male circumcision prevents HIV transmission

Researchers estimate that HIV infection rates in sub-Saharan Africa could be reduced by up to two-thirds if male circumcision becomes standard practice. An international team of researchers, including Dr. Stephen Moses at the University of Manitoba, conducted a large study in Kisumu, Kenya, where 18% of the men and 25% of the women are HIV positive. Dr. Moses found that circumcised men in that community were 53% less likely to contract the deadly virus than uncircumcised men. The project, co-funded by CIHR, confirms the findings of several previous studies. The findings of these studies have collectively resulted in the World Health Organization developing recommendations regarding male circumcision.

### Message to immune system – Keep working

A CIHR-supported research team has found a way of encouraging the immune system to keep working even in the presence of HIV. Dr. Rafick-Pierre Sékaly of the University of Montreal discovered that high levels of the HIV virus prompt the body to overproduce a protein called PD-1 which, in turn, sends a message to the immune system cells to stop working. However, the research team also found a way to block this protein, in effect, turning back the clock and improving the chances that the body will eliminate the virus. The new discovery could eventually lead to new treatments in the ongoing fight against HIV/AIDS.

### Aboriginals with HIV/AIDS – Better services needed

The rate of HIV/AIDS within Canada's Aboriginal community is on the rise. CIHR-supported researcher Dr. Randy Jackson of the University of Ottawa and head of the Canadian Aboriginal AIDS Network is identifying areas for improvement in health-care services to Aboriginal people with HIV/AIDS. A survey by Dr. Jackson found that nearly half of respondents felt they received poor care and 30% said they experienced racial prejudice or homophobia in the health-care system. An alarming 12% reported they simply do not use primary medical services. Meanwhile, 60% of respondents said they use or need traditional Aboriginal health and wellness services, such as sharing/healing circles.



## The Researchers

### Dr. Catherine Worthington – Listening to those in need

When it comes to her research, Dr. Catherine Worthington of the University of Calgary gets her best ideas from the street. It's a necessity given the people she hopes to reach, those on the edge of society and most at risk for HIV/AIDS.

Researchers face major challenges translating the results of their work into meaningful programs that will have results in the "real world." Dr. Worthington feels that including the community from the start helps ensure one's results will have a positive impact.

"If you involve service providers, policy-makers and advocates right in the research process, then you can't fail at getting use of the research results, because the very people that you want to hear the message have been involved from the beginning," she explains.

Dr. Worthington, a CIHR-funded researcher, wants to know why people do or do not use health services such as HIV/AIDS prevention programs. HIV/AIDS has greatest impact on street youth, injection drug users and those from other vulnerable populations, such as Aboriginal peoples.

"With the street youth study, the community approached us, we didn't go to the community," she says. AIDS Calgary asked Dr. Worthington and colleague Dr. Bruce MacLaurin to work with them on the study.

Working closely with the people who will be affected by her research has allowed Dr. Worthington to learn a lot about them, gain an appreciation of the challenges they face and understand how they can be reached to help prevent further transmission of HIV.

"These street youth are the kids that a lot of people are wary of because they are different," says Dr. Worthington. "But there is strength and huge diversity among these groups of youth, and we have to respect that and understand that in order to provide appropriate services."





# Infectious Diseases

**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$201.4 million in 2006-07 across Canada in research on infections and immunity.**

## The Facts

- As of April 2007, there were more than 290 reported human cases of avian flu worldwide, resulting in more than 170 deaths. The infection has spread to locations in Europe and Africa. Most cases are the result of bird-to-human infection; however, human-to-human transmission has been suggested in at least one case. The virus's ability to turn into a pandemic is being closely monitored.
- A flu pandemic could make 15-35% of the Canadian population critically ill, causing up to 58,000 deaths, according to estimates by the Public Health Agency of Canada. Vaccines and antiviral medications would reduce both illness and deaths. The Government of Canada has invested more than \$1 billion in pandemic preparedness with \$21.5 million for research.
- Between 1995 and 2003, rates of multi-drug resistant *Staphylococcus aureus* (MRSA) in Canadian hospitals increased from about 0.5 cases per 1,000 admissions to 5 per 1,000 admissions. MRSA is making many antibiotics obsolete and is a threat to our ability to control bacterial infection.





## About CIHR

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# Finding Solutions

### Attack of the superantigens

What do flesh-eating disease, food poisoning and toxic shock syndrome have in common? CIHR-funded researcher Dr. Joaquín Madrenas of the London, Ontario-based Robarts Research Institute found that these rapid-onset diseases are all caused by tiny amounts of bacterial "superantigens", toxins that are secreted by some bacteria and that trigger a massive activation of immune cells throughout the body. This systemic immune response then sets off its own chain of damaging biochemical events that can lead not only to fever and vomiting but to multiple organ failure and death. The finding will help develop new drug therapies for these devastating diseases.

### Booster fuel for the immune system

CIHR-supported researcher Dr. Robert Hancock of the University of British Columbia – winner of CIHR's Canada's Health Researcher of the Year Award in 2006 – has identified and demonstrated the effectiveness of a new tool in the fight against antibiotic-resistant bacteria, which are becoming a major health risk. Using a newly discovered peptide called IDR-1, the research team was able to substantially boost the immune system. In tests in mice infected with antibiotic-resistant superbugs, the peptide significantly reduced the number of deaths caused by infection.

### Outsmarting a deadly parasite

A new study led by Dr. Lakshmi Kotra of the Toronto General Research Institute has discovered a chemical that shuts down the malaria parasite. This synthetic compound blocks the activity of a key protein required for the parasite to reproduce and survive. By targeting and killing malaria parasites, including drug-resistant strains of the disease, researchers are closer than ever to the creation of a new anti-malarial drug. This project, funded in part by CIHR, could help protect people in the developing world from this too-common disease.

### Heartburn medications may unleash deadly bacteria

A group of CIHR-funded researchers at McGill University led by Dr. Sandra Dial showed that widely-used drugs for suppressing excess stomach acid, such as heartburn medications, can increase a person's risk of *Clostridium difficile* infection. Researchers originally thought that *C. difficile* infections were most common in hospitalized patients receiving antibiotics. However, it appears that non-hospitalized individuals taking medications to reduce stomach acidity also face an increased risk of infection. The theory is that changing acid levels in the stomach encourages the growth of *C. difficile* bacteria. These findings may help physicians protect their patients against a potentially fatal bacterial infection.



## The Researchers

### Dr. Jim Lavery – Teaching scientists to communicate

When researchers and public health professionals fail to communicate effectively with the public, the results can be disastrous. For scientists trying to combat the spread of infectious diseases through communities, communication is particularly important.

For example, when the United Nations attempted to prevent malaria infection by giving pesticide-treated mosquito nets to communities in Africa, the residents refused to put the long white nets over their beds. The U.N. did not realize that the colour white is a powerful symbol of death to the people that they were trying to help.

Dr. Jim Lavery, a scientist at St. Michael's Hospital in Toronto, believes that we have to listen to the thoughts

and concerns of the people who will be affected by new technologies and health policies. "We have to be able to listen authentically and acknowledge that there may be some wisdom here that we need to incorporate," says Dr. Lavery.

Dr. Lavery and his colleagues are currently working on a project called "A Brokered Dialogue between the Rich and the Poor". The project involves separately filming health professionals and community members talking about issues like tobacco use, which they may not feel comfortable discussing in a face-to-face interview. These filmed sessions are then edited together into a simulated conversation that can help both groups gain a better understanding of the issue.

Dr. Lavery feels that we could use these brokered dialogues to prepare for an emergency situation, such as a widespread outbreak of avian flu, in which public health officials must act quickly. "It would be really useful if, in advance, people had some mechanisms of public discussion," he says.





# Mental Health



**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$53.7 million in 2006-07 across Canada in research on mental health and addiction.**

## The Facts

- Mental illness is a broad classification for several disorders, including anxiety, depression, schizophrenia, personality disorders and eating disorders.
- One out of every five Canadians will have a mental health problem at some point in his or her life.
- The onset of most mental illness occurs during childhood, adolescence and young adulthood.
- One in 100 Canadians suffers from schizophrenia and another one in 100 suffers from bipolar disorder, or manic depression; 8% of adults will experience major depression at some point in their lives, while 12% of the population is affected by anxiety disorders.
- Schizophrenia, depression, and bipolar disorder are together responsible for more than 20% of years lived with a disability in established market economies.
- About 3% of women will be affected by an eating disorder during their lifetime.
- As a group, people with mental illness are more likely to be victims of violence than to be violent themselves.
- According to a Statistics Canada survey, more than 600,000 Canadians were dependent on alcohol and nearly 200,000 were dependent on illicit drugs in 2002.
- Lost productivity from poor mental health is estimated to cost Canadian businesses \$33 billion per year.



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# Finding Solutions

### Fighting a life-long battle against depression

Despite the great advances that researchers have made in the treatment of mood disorders, depression is still a life-long battle for many people. Dr. Zindel Segal, a CIHR-funded researcher based at the University of Toronto, recently published a study suggesting that short-term emotional stress can trigger depression relapse in patients who have undergone previous treatment. By gaining a better understanding of the factors that predispose a patient to recurring depression, doctors may be able to more effectively treat this very common mood disorder.

### Taking a light approach to treatment

Artificial light treatment is just as effective as antidepressants in treating Seasonal Affective Disorder (SAD) and has fewer side effects, according to a study by CIHR-funded researcher Dr. Raymond Lam. Dr. Lam compared artificial light exposure with treatment with fluoxetine. His findings could help doctors select the most appropriate treatment for individual SAD patients.

### Reducing chronic pain

Physical injuries, diabetes, cancer and infections can all result in neuropathic pain, a condition in which a person suffers from constant pain due to nerve damage. CIHR-funded researcher Dr. Yves de Koninck of the Centre de recherche Université Laval Robert-Giffard recently published a study suggesting that a chemical produced by damaged nerve cells may trigger this excruciating condition. Dr. de Koninck's discovery could lead to improved methods for managing pain in patients with nerve damage.



## The Researchers

### Dr. Benedikt Fischer – Identifying the real risks of drug abuse

Drug addiction will never go away.

It's a harsh reality but, according to Dr. Benedikt Fischer, society must confront it to help addicts. Dr. Fischer, a CIHR-supported researcher at the University of Victoria, feels that it's time for us to set aside our preconceived notions about drug use and start looking for realistic ways to protect people from the harmful effects of addiction.

One of the biggest challenges right now is the need to create accessible treatment programs for drug addicts.

"Most drug users aren't people who will go to a hospital and present themselves to a doctor. That's not

how things work with an addicted, homeless, marginalized drug user," says Dr. Fischer. "We have to think very differently about how we offer treatment, and what we can do to retain people in treatment to make them adhere to their medications."

The cost of failing to do so is high. Drug addiction leads to other health problems, such as the spread of infectious diseases like AIDS and hepatitis C. Research by Dr. Fischer into hepatitis C reduction strategies in place for drug addicts suggest the current approaches are not working.

"Somewhere between 85 and 90% of new hepatitis C infections are drug-use related," says Dr. Fischer. "So to deal with this disease in the present and future, we have to understand the drug use aspect, because otherwise we're just looking at the tip of the iceberg."



For more information, go to  
[www.healthresearchatwork.cihr-irsc.gc.ca](http://www.healthresearchatwork.cihr-irsc.gc.ca)  
2006-2007



# Obesity



CIHR IRSC

**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately **\$23.6 million** in 2006-07 across Canada in research on obesity.**

## The Facts

- In 2004, 18% of children aged 2 to 17 were overweight and 8% were obese. Childhood obesity is a major risk factor for diabetes; one in three children born since 2000 will likely develop diabetes.
- In 2004, 23% of Canadian adults were considered obese, compared to just 14% in 1978. One in four seniors over the age of 75 was obese.
- One-quarter of Canadians who were overweight in 1994-95 had become obese by 2002-03; only 10% had returned to a healthy weight.
- Deaths attributable to complications of overweight nearly doubled between 1985 and 2000.
- Obesity is a risk factor for heart disease, stroke, type 2 diabetes, gallbladder disease and some forms of cancer. It has also been associated with hypertension (high blood pressure), osteoarthritis and sleep disorders such as sleep apnea.
- The health costs of obesity, including hospital care, physician services and drugs, were estimated to be more than \$4.3 billion in 2001, or 2.2% of total health-care expenditures for diseases in that year.
- Research has shown that environmental, behavioural, social, cultural and genetic factors all contribute to the development of overweight and obesity.



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# Finding Solutions

### Emotional eating

Are your eating habits an indicator of your mental health? Research by CIHR-funded investigator Dr. Simone Lemieux at Laval University found that a woman who eats in response to emotional stress and feels unable to stop is very likely to have a poor self-image, regardless of her weight. These findings suggest that dieting history can be used to identify women who are suffering from low psychological well-being and at risk for depression.

### Breast really is best

New mothers are used to hearing "Breast is best" when it comes to feeding their babies. Now, new research has demonstrated even more benefits. CIHR-funded researcher Dr. Gary Goldfield at the University of Ottawa has found that infants who are breastfed have a better chance of beating obesity later in life than infants who are formula-fed. Previous studies showed that being breastfed reduces a child's risk of becoming obese, but poor diet and an inactive lifestyle during childhood can override these obesity-preventing effects. However, Dr. Goldfield's study found that obese pre-teens who were breastfed as infants lose weight more easily than pre-teens who were formula-fed. These findings suggest that breastfeeding may have more long-lasting benefits than researchers originally thought.

### How does obesity harm the heart?

Too much of a hormone called leptin may be bad for your heart. Obese people typically have elevated leptin levels and CIHR-funded researcher Dr. Gary Sweeney of York University has shown that this hormone increases the size of heart muscle cells. The hormone also alters the type of cells that surround the heart. This "remodelling" of the heart may contribute to obesity-related heart failure.

### Your brain says eat!

We all know what hunger feels like, but how does our brain tell us we're hungry? Dr. Michiru Hirasawa, a CIHR-funded researcher at Memorial University, is investigating how the chemical messengers in our brains are involved in regulating hunger. In a recent study, Dr. Hirasawa examined how dopamine, a chemical produced by the brain, interacts with a specific type of brain cell to regulate hunger. She found that smaller-than-normal amounts of dopamine excited these cells in the rat brain, causing rats to eat more. However, large amounts of dopamine shut down the cells, curbing the rats' appetites. Dr. Hirasawa and her colleagues believe that a disruption in dopamine signalling could lead to overeating and obesity.



## The Researchers

### Dr. Kim Raine – Building the momentum towards a healthier world

Dr. Kim Raine at the University of Alberta is trying to uncover how your community influences your waist size. In a recent study, she looked at Edmonton's "foodscape" and found that the city's poorest neighbourhoods contain 2.7 times more fast food restaurants than its wealthiest neighbourhoods.

"It may seem counter-intuitive, but the highest obesity rates are among the poor in Canada. Our research is showing that healthier food products are actually the most expensive and the least accessible," says Dr. Raine.

Dr. Raine began her career as a nutritionist, trying to help people achieve health through balanced

diets. "I soon recognized that regardless of the good advice that I was giving the people who would come to my office, and despite their best intentions, they were really struggling to make changes," says Dr. Raine.

Dr. Raine believes we must re-examine outdated policies that influence food and physical activity to determine whether or not they are promoting obesity. As an example, she points to food policies in schools.

"Do schools allow soft drink machines? Are schools counting on those soft drink machines to subsidize the costs of their extracurricular activities because there have been cutbacks to the education budget? These are food policies that can have a huge impact," she says.

Dr. Raine is working on ways to use research to change policies. "It's exciting, because we're at the beginning of what I think could be a huge momentum of change," says Dr. Raine.





# Population Health



**The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. Through CIHR, the Government of Canada invested approximately \$49.9 million across Canada in 2006-2007 in research on population and public health issues.**

## The Facts

- Population health research takes a broad approach to understanding the factors that affect human health at individual, community and societal levels. Population health researchers focus on protecting populations from hazards in the environment; preventing disease and injury; and promoting health.
- Factors such as income and social status, education and literacy, employment, working conditions, social support networks and social and physical environments are important determinants of health at the population level.
- Here are some examples of how these factors can affect health:
  - Low birth weight infants are at increased risk for developing many diseases later in life, as well as for delays in development. Low birth weight children from privileged backgrounds, however, still have a developmental advantage over normal birth weight children from under-privileged backgrounds.
  - Smoking, obesity, high stress, low household income and low sense of community belonging all have significant negative effects on health status.
  - Individuals who lack control over their work environment are more likely to develop and die from cardiovascular disease.



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# Finding Solutions

### Scared smokeless

Smokers do pay attention to large, vivid warning labels on cigarette packages. A recent study by Dr. David Hammond at the University of Waterloo found that smokers exposed to large, graphic warnings on cigarette labels were more likely to be aware of the risks of smoking than people exposed to small, text-only warnings. Smokers who had to look at pictorial warnings every time they reached for a cigarette were also more likely to think about quitting. This CIHR-funded study suggests that warning labels are effective and that cigarette packages may be a good place to include contact information for smoking cessation services.

### Male circumcision prevents HIV transmission

Researchers estimate that HIV infection rates in sub-Saharan Africa could be reduced by up to two-thirds if male circumcision becomes standard practice. An international team of researchers, including Dr. Stephen Moses at the University of Manitoba, conducted a large study in Kisumu, Kenya, where 18% of the men and 25% of the women are HIV positive. Dr. Moses found that circumcised men in that community were 53% less likely to contract the deadly virus than uncircumcised men. The project, co-funded by CIHR, confirms the findings of several previous studies. The findings of these studies have collectively resulted in the World Health Organization developing recommendations regarding male circumcision.

### How healthy is your neighbourhood?

Where you live can affect your health. Dr. Nancy Ross, a CIHR-funded researcher at McGill University, has shown that the condition of your neighbourhood influences your health in a number of ways, including your body mass index (BMI). A BMI is a good estimate of your total body fat. In a study of Canada's 27 largest urban areas, Dr. Ross found that men and women living in communities with low education levels had higher BMIs than those living in highly educated communities. These findings highlight the importance of looking at health issues from a community perspective.



## The Researchers

### Dr. Penny Hawe – Ounce for ounce, which form of prevention is best?

Urban planners, park designers, arts and culture organizers – according to Dr. Penny Hawe of the University of Calgary, these are just a few professions that belong to the health system for the simple reason that they influence our health and well-being.

“Creating meaning in peoples’ lives has a real health impact. We’re now able to measure and quantify the value of seemingly wacky concepts like quality of life, sense of identity and social networks,” she says.

Public health programs help address these factors by changing the everyday environment to make it more supportive of good health for everyone.

“If the environment is alienating, trying to spend anytime on health is just like a drop in the ocean – it won’t help,” Dr. Hawe points out.

Dr. Hawe is the Markin Chair in Health and Society and Director of the CIHR-funded Population Health Intervention Research Centre at the University of Calgary. She sees her role as helping support public health practitioners by making sure they have the tools to properly evaluate and measure the results of their work. She insists that prevention programs must be required to show the same level of evidence demanded of treatment programs, such as new drugs or medical procedures.

“It’s our job as scientists to test if preventive interventions at the population level create an effective investment pathway, to arrest premature mortality and spiraling health care costs,” Dr. Hawe says.

The alternative, she says, waiting for people to get sick and then treating them, can no longer be afforded.



For more information, go to  
[www.healthresearchatwork.cihr-irsc.gc.ca](http://www.healthresearchatwork.cihr-irsc.gc.ca)  
2006-2007

# Knowledge Translation

**Knowledge Translation**



**Commercialization**



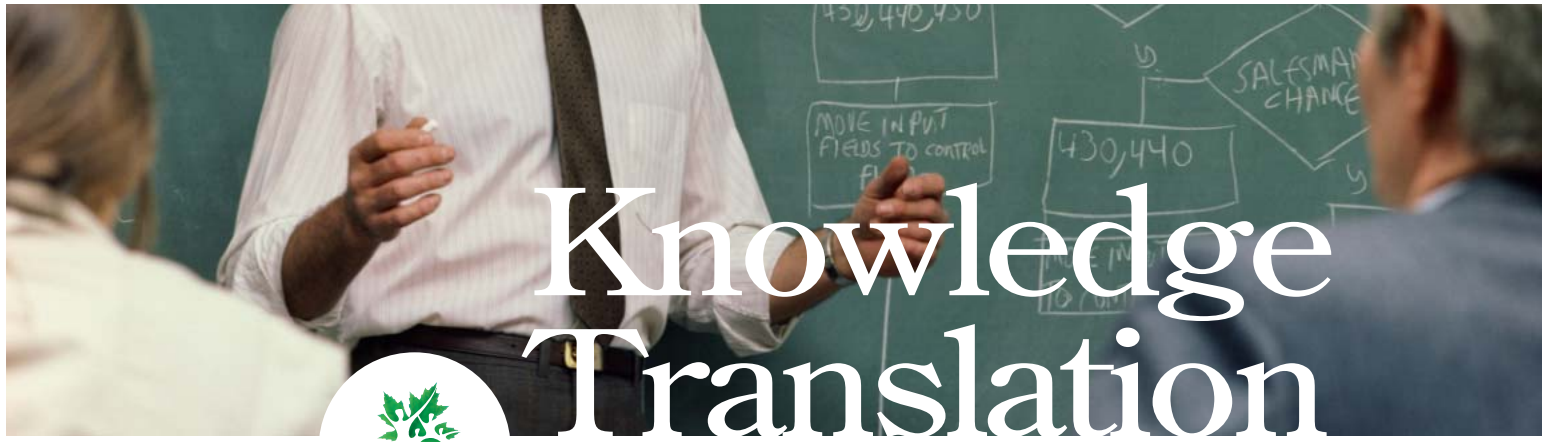
**Partnerships and Collaborations**



**Youth Outreach**







# Knowledge Translation



## Closing the Gap

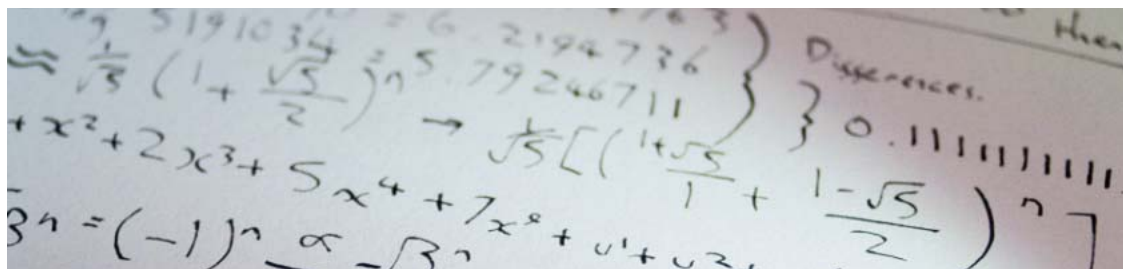
Research evidence, no matter how compelling, will never fully contribute to improved health and a strengthened economy unless new findings are translated into products, practice and policy in a timely and efficient manner. CIHR is working with researchers and our stakeholders to close the gap between what we know and what we do.

Knowledge translation (KT) plays an important role in the mandate of CIHR and is integral to the research process. KT is about making users aware of new knowledge and helping them use it to improve the health of Canadians and the health-care system. For example, research teams have been synthesizing recent health research information to pinpoint the findings that, when put into practice, are likely to have an impact on improving the health of Canadians. Similarly, other teams were already at work with decision- and policy-makers in taking high-impact research evidence and using it to change health-care practices. Other KT activities have focused on partnership building, engaging the public and helping researchers commercialize the results of their work.

## KT Activities

### So much research, so many contradictory results

Canadians are bombarded with more health studies than any time in history, but contradictory research can leave many people, including doctors, unsure what to believe. CIHR is providing funding to support the Canadian Cochrane Network, which is part of an international organization that reviews and synthesizes health research on different topics to draw conclusions about what is known. As one example, pediatricians in wealthy countries often prefer to give children with diarrhea fluids intravenously rather than orally, which results in increased trauma for children and higher health-care costs. A Canadian Cochrane review of data from 18 clinical trials has revealed that, in fact, oral re-hydration therapy – drinking a rehydration solution – is just as effective as intravenous treatment. Another review of existing research determined that acupuncture can help to relieve chronic neck pain.



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## Making a difference

CIHR's approach to moving research into action can make a difference. For example Dr. Stanley Zlotkin (recent winner of the CIHR National/International Knowledge Translation Award) developed Sprinkles – a dry, tasteless, single-serving packet that is inexpensive to manufacture and easy to distribute. Sprinkles includes a mix of iron, vitamins C, D and A, and zinc and is a vital tool in the fight against child malnutrition. Through the Sprinkles Global Health Initiative, Dr. Zlotkin is ensuring that children in rural areas of the developing world, those who are ultra-poor and other vulnerable children are receiving Sprinkles. The health impact of the program has been demonstrated in many countries, including Bangladesh and Mongolia. Another example of moving research into action is the partnership between CIHR and the provincial and territorial deputy ministers of health to examine and synthesize the research evidence around benchmarks for acceptable wait times. The results of this collaboration formed key input into the provincial agreement on wait time benchmarks.

## When does knowledge become action?

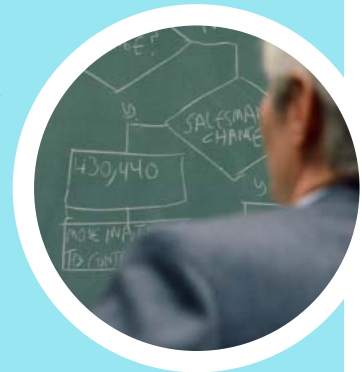
In the past year, CIHR awarded a number of grants designed to encourage joint projects between researchers and policy-makers focusing on taking knowledge gained from previous research to shape new policies and practices. In one project, CIHR-supported researcher Dr. Roland Grad of McGill University is working with partner Dr. Bernard Marlow of the College of Family Physicians of Canada to find the most effective way to inform doctors of new clinical research so that they can incorporate it into their daily work. In another project, CIHR-supported researcher Dr. Steve Manske from the University of Waterloo and Maureen Murphy from the City of Ottawa are working together to encourage Ontario high schools and public health units to adopt findings from a large-scale survey of students and teachers on smoking and physical activity.

## Encouraging science literacy

CIHR's responsibility for KT also involves efforts to raise public awareness of health research. In the past year, CIHR has launched a successful program known as Café Scientifique. The program puts researchers together with the public in an informal setting, such as a café or pub, to discuss a particular health research subject. In the past year, topics have included obesity and aging. Researchers are not allowed to use slides, must limit their talk to 10 minutes and are encouraged to speak at a level appropriate to a non-researcher audience. Interesting topics, intriguing research and lively debates in an accessible, non-threatening venue – all of these elements contribute to an effective and popular public outreach tool.

## Helping get the story out

Improving science literacy and public understanding of science also involves helping give journalists the tools and information they need to produce balanced and insightful reporting on complex subjects. In the past year, CIHR launched a new series of journalist workshops in response to interest from health and science reporters looking for new story ideas and background for complex research topics. Survey results from the workshops indicated journalists appreciated the chance to learn more about these fields and found it a good source of story ideas.





CIHR IRSC

# Commercialization

## CIHR Commercialization Strategy

CIHR's strategy for commercialization and innovation rests on the following principles:

**Research** – Make strategic investments in targeted research to realize the promise of discoveries reached through basic research.

**Talent** – Build a talented pool of commercialization professionals, people with a combination of entrepreneurial drive, research know-how and management expertise.

**Capital** – Stimulate investment in this high-risk sector by helping clarify the commercial potential of early stage technologies.

**Linkages** – Facilitate interactions and partnerships with the private sector, finance and health research communities at all stages of the innovation pipeline.

The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. The Government of Canada, through CIHR's dynamic and innovative commercialization strategy, invested \$12.6 million in 2006-07 in helping researchers take their discoveries a step closer to market.

## The Innovation Index

- In 2005, there were 532 biotechnology companies in Canada.
- Revenues in the biotechnology sector for 2005 accounted for \$4.2 billion.
- Canada's biotech industry accounted for over \$800 million in exports in 2005 and employed 75,488 people in 2003.
- In 2006, there were almost 500 biopharmaceutical products in the pipeline, the majority at the research and pre-clinical phase.
- Venture capitalists invested \$493 million in the life sciences sector in 2006.
- The average size of investment deal increased slightly to \$6.3 million in 2006.

## Investing in Success

### A better sense of sole and balance in later life

Falls are the most common cause of injuries among seniors. CIHR-supported researcher Dr. Stephen Perry of Wilfred Laurier University has developed The Sole Sensor insole, an inexpensive but highly effective tool for increasing balance. Thousands of pressure sensors on the soles of our feet provide information that helps us to balance our body weight. But as we age, we lose sole sensitivity. The Sole Sensor is like eye glasses for the feet, it improves the sole's sensory perception. Dr. Perry licensed the product to Mississauga-based Hart Mobility which is expected to be available for sale in 2007.



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### Canadian company – Best of class

Toronto-based **Amorfix Life Sciences Ltd.** was nominated as a *Technology Pioneer 2007* by the World Economic Forum, the only Canadian company, of a total of 47 nominees, selected for this year's award. The company also cracked the Top 50 list of companies on the TSX Venture Exchange for 2006. Amorfix builds on the CIHR-funded discoveries of Dr. Neil Cashman of the University of British Columbia and Dr. Marty Lehto of the University of Toronto that will help to diagnose and treat neurodegenerative diseases such as Alzheimer's.

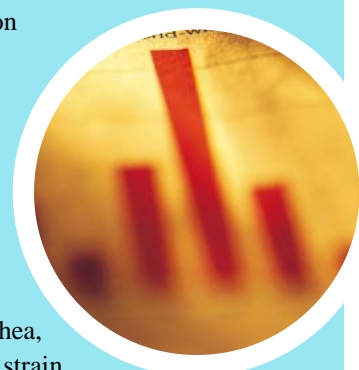
### And nothing but the beef

A vaccine that fights *E. coli* in cattle has been authorized for use in Canada by the Canadian Food Inspection Agency. The vaccine was developed by Dr. Brett Finlay of the University of British Columbia and Dr. Andy Potter of the University of Saskatchewan and commercialized by **Bioniche Life Science, Inc.** of London, Ontario. By preventing *E. coli* in cattle, the vaccine will also prevent its transmission to humans through meat products.

### Investing in New Companies

The Proof of Principle (POP) program provides funding to help bridge the growing gap between academic research and the point where seed investors enter the picture. Funding is available in two phases, POP I for early-stage projects and POP II for more advanced projects. Since 2001, more than 200 projects have been funded. Of the projects that have matured sufficiently to be evaluated, approximately 100 projects, 69 resulted in new patents being funded, 29 had intellectual property licensed to a company and 17 had intellectual property that was licensed to Canadian spin-off companies. In several cases, POP recipients have founded more than one company. Some current and recent projects are listed below.

- Dr. Andrew Macnab of the University of British Columbia, received POP funding to test a pain-free and non-invasive approach for diagnosing urinary problems, using near-infrared light instead of catheterization. Success in these early tests helped pave the way for more extensive clinical testing in Canada and the U.S. Vancouver-based Urodynamix has licensed the technology. The company is also exploring new applications for the technology, such as monitoring for excessive pressure on organs among patients in hospital intensive care units, a condition known as Abdominal Compartment Syndrome.
- Dr. David Heinrichs of the University of Western Ontario, is using POP funding to meet the urgent demand for new antibiotics that can combat powerful new hospital superbugs such as *Staphylococcus aureus*. Through previous research, Dr. Heinrichs' lab has identified how this bacterium collects iron, a nutrient critical for its survival. The team is now working on finding the best way to disrupt this process and, eventually, plans to work with an industry partner to evaluate the approach in clinical trials.
- Reoviruses can cause a wide range of respiratory and gastrointestinal problems, everything from diarrhea, to colds and pneumonia. Dr. Randal Johnston of the University of Calgary has developed a weakened strain of the virus which has shown potential for fighting cancer. Using POP funding, Dr. Johnston will be able to further test this virus and generate the type of data necessary to be able to evaluate the commercial potential of developing the virus into a new anti-cancer drug.



### Investing in Capacity

CIHR is creating the tools and programs that will help build successful commercialization and knowledge translation activities within Canada's health research community.

CIHR's Commercialization Management Grants (CMG) program helps address the need for talented business professionals among university and hospital technology transfer offices. Through two CMG competitions, 11 candidates were hired within a one year period. Six of the seven Masters of Business Administration graduates who completed their one-year placements in 2006-07 were retained by university and hospital technology transfer offices.

CIHR's Science to Business (S<sup>2</sup>B) program is now into its third round of funding. The S<sup>2</sup>B program provides grants to help business schools recruit talented PhD graduates with training in health research into health-oriented Masters of Business Administration (MBA) programs. Currently, the program is in effect in business schools in B.C., Ontario and Saskatchewan.





# Partnerships and Collaborations



## The Power of Partnerships

By working with partners, CIHR can more effectively: build capacity, translate knowledge, build support for health research, minimize redundant work and set the Canadian health-research agenda.

Partnerships, with the private sector, health charity groups, other levels of government and research agencies in Canada and abroad, play a central role in advancing CIHR's work. Effective health research needs the collective efforts of the many people and organizations committed to making Canadians healthier and building an effective health-care system. Partnerships allow CIHR to invest in more career awards for researchers and engage in industry-research collaborations. Partnerships also help Canada define strategic priorities for research on topics as diverse as mental health in the workplace and cardiovascular health. In 2006-07, CIHR signed 280 partnership agreements with 239 different partners. These partnerships contributed approximately \$90<sup>1</sup> million in additional funding for CIHR-led health research projects. In the past seven years, CIHR has been able to leverage more than \$558<sup>1</sup> million in additional funding for health research.

## Partnership Activities

The **CIHR/Rx&D Collaborative Research Program** is inspired by the longstanding successful collaboration between the pharmaceutical research industry and CIHR. Under this Program, the eligible company partner is a member of Canada's Research-Based Pharmaceutical Companies (Rx&D). Currently, the Program better enables CIHR and Rx&D to maximize the impact of clinical and translational research in Canada in order to contribute to the health of Canadians, better delivery of health research and services as well as contribute to the economy of Canada and the world. CIHR and its partner organizations have invested over \$150<sup>1</sup> million between 1999-2000 and 2006-2007 for research funded under the CIHR/Rx&D Collaborative

<sup>1</sup> Currently, these figures represent only partner funds being administered by CIHR. As in-kind partner contributions can not accurately be validated and partner contributions not administered by CIHR are not included, partner contributions are likely understated.



## About CIHR

The Canadian Institutes of Health Research (CIHR) is the Government of Canada's agency for health research. CIHR's mission is to create new scientific knowledge and to catalyze its translation into improved health, more effective health services and products, and a strengthened Canadian health-care system. Composed of 13 Institutes, CIHR provides leadership and support to more than 11,000 health researchers and trainees across Canada.

Research Program, approximately \$40 million of which was contributed by CIHR. The investments have been to valuable research projects at universities and teaching hospitals across Canada, making this the largest and most successful public-private health research program in the country.

### **Mental health in the workplace**

Mental illness is hitting Canadian businesses hard in the pocketbook, costing them \$16 billion/year in lost productivity. CIHR, in partnership with the Global Business Economic Roundtable on Addiction and Mental Health, is pursuing a research program to investigate the causes of poor workplace mental health and find solutions. The research program, which is taking place in workplaces across Canada, will provide information to help employers accurately identify individuals with or at risk for mental illness in the workplace and develop programs to help them. Key research questions include: What management practices are most unhealthy? What are the most effective treatments and how can the workplace assist employees to gain access to them? How can employers reduce the stigma associated with mental illness? The joint CIHR-Roundtable research initiative on workplace mental health brings together partners from across the spectrum, including researchers from numerous fields, workers, employers and unions.

### **Intergovernmental partnership and collaboration – Safe Food and Water Initiative**

Although Canada's food and water supplies are among the safest in the world, contamination from microbes and bacteria remains an important health and economic threat. Scares provoked by the original discovery of a single cow with bovine spongiform encephalopathy, 'mad cow disease', caused substantial damage to Canada's cattle industry. CIHR helped form a 17-member coalition to conduct research to increase the safety of these resources. The group includes partners from seven different Government of Canada departments and agencies, including Environment Canada and the National Research Council of Canada, working alongside researchers from numerous different universities. The partnership, which is ongoing, has produced a number of commercialization opportunities, including

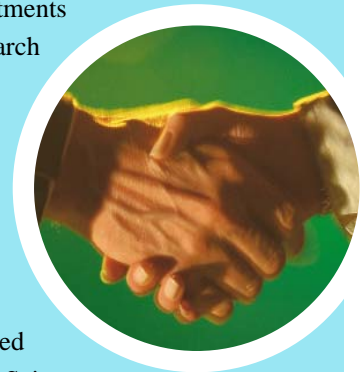
one spin-off company, and helped deepen partnerships between governments and universities.

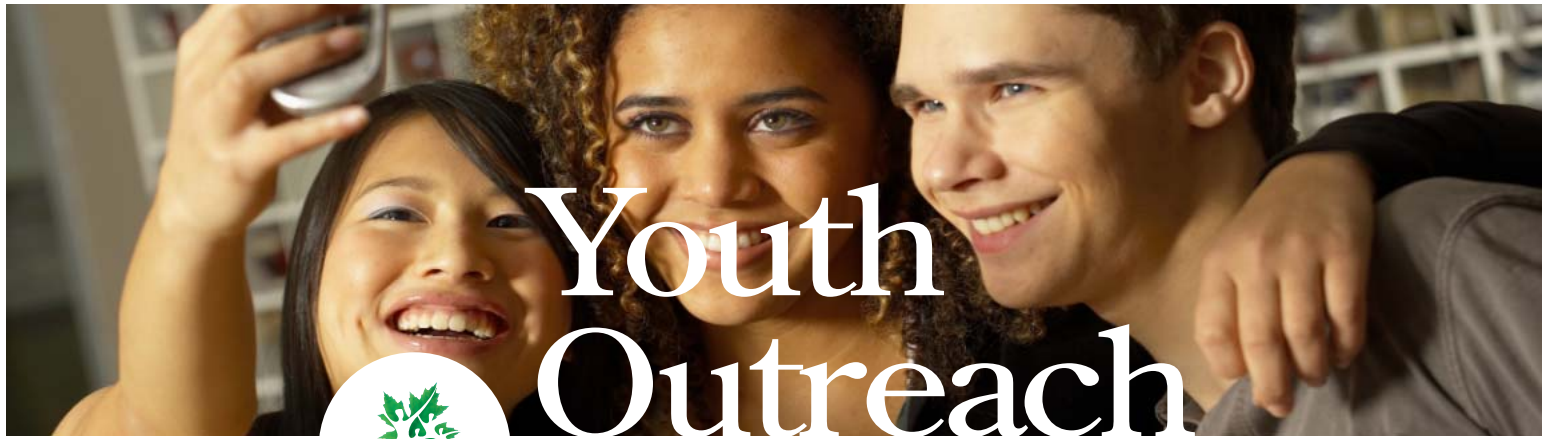
### **International partnerships – Canada-China initiatives**

Collaborations with international partners create access for Canada's health research community to international knowledge networks and help strengthen Canada's diplomatic links to nations in the developed and developing world. In 2005, CIHR signed a Memorandum of Understanding with the National Natural Sciences Foundation of China to create new health research collaborations between Canada and China. So far, two funding competitions have been held and a number of joint Canada-China research projects are underway. CIHR and China's Ministry of Education, through the Chinese Scholarships Council, signed a second agreement in 2006 for the Canada-China Norman Bethune Health Research Scholarship Program. Under the program, up to 30 scholarships will be offered annually to Chinese students to pursue PhDs in health research at Canadian universities. The first recipients are scheduled to start their training this fall.

### **Partnerships with health charities – Canadian Heart Health Strategy**

CIHR has partnerships with numerous members of Canada's health charity sector. One of CIHR's largest partners is the Canadian Heart and Stroke Foundation (HSF). In addition to partnered training, fellowships and directed cardiovascular research programs, CIHR and HSF are partners on the new Canadian Heart Health Strategy, announced last fall by the Government of Canada. The goal of the strategy is to ensure that knowledge about best practices in prevention and treatment of heart disease is available quickly and effectively to health-care providers in all provinces and territories. Heart disease remains the number-one cause of death in Canada and a new strategy will reduce disability, improve quality of life and, ultimately, save lives.





# Youth Outreach



## Reaching Out to Youth

Synapse, CIHR's youth engagement program, brings Canada's youth together with health researchers in schools, labs, summer camps and at science fairs so that they can explore the world of health research.

Canada has demonstrated that it can be a world leader in health research. For Canada to increase its international impact and to remain competitive, innovative and productive, we need a workforce literate in science and technology. As part of CIHR's knowledge translation activities, CIHR launched a new program called Synapse to help stimulate this literacy among young people and encourage a new generation of researchers. Synapse is a meeting place, a junction that brings together youth with CIHR-funded researchers. The program helps young people learn more about science and research directly from persons immersed in these issues on a daily basis.

## Youth Outreach Activities

### Identifying and training mentors

In the past year, CIHR launched a new tool for attracting and identifying potential mentors among the over 11,000 Canadian researchers currently supported by CIHR. At present, over 2000 researchers expressed interest in becoming mentors. The Synapse program matches mentors to opportunities offered by national and local science outreach organizations located across Canada. Possible projects include: science fair judging, school lectures, workshops or lab participation. To help potential mentors be more effective, in the past year CIHR began offering a special communications training workshop called *Science with Impact*. Sessions were held at universities across Canada and were attended, on average, by about 20 Synapse mentors per session.



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### Building partnerships

Synapse has established partnerships with a variety of non-profit and charitable organizations as a way for potential mentors to easily and quickly reach young people in their area. Partners include: The Science and Technology Awareness Network (STAN), Let's Talk Science, ACTUA, Youth Science Foundation, Conseil de développement du loisir scientifique and Expo-Sciences.

### Research and mentorship

The Synapse program also encourages researchers to build mentorship activities into their ongoing research programs. For the next two years, five different research teams were awarded funding to achieve this goal.

Dr. Michel G. Bergeron, director of the Infectious Diseases Research Centre at Laval University in Quebec City, launched the "Researcher for a Day: Synapse" program. Each week, the facility will welcome a new student group (Grade 11-13) for a day. Eight students and two science teachers will get the chance to learn about the latest research into infectious diseases, everything from antibiotics to new AIDS prevention techniques. The education process itself involves safe use of microscopes and lectures.

Dr. Jim Koropatnick, from the University of Western Ontario started a program called "Partners in Experiential Learning" that will give students from 38 high schools in the region a chance to receive hands-on training experience in three areas: cancer biology, circulatory systems and primary health care. Under the supervision of researchers, students can work either part-time in a laboratory over a five-month period during the school year or full-time for a two-month period in the summer.

## Mentor Profile

### Dr. Frédéric Charron - Building the next generation of health researchers

As a boy, Dr. Frédéric Charron started repairing broken stereo systems. Over the years, this passion for repair found an outlet in science. Now, at Montreal Clinical Research Institute (IRCM), he specializes in helping find ways to repair wiring problems in the central nervous system due to spinal cord injury, strokes and other neurological problems.

But Dr. Charron doesn't plan to do all of this work by himself. He has always believed in mentoring youth, so that they can contribute to health research in the future. He served as a judge at Expo-Sciences science fairs early in his career. Now Dr. Charron acts as a mentor within his lab for nine students who are either at the undergraduate, graduate, PhD or postdoctoral level.

"The lab is an environment where I think I can help students most by transmitting a passion for health research," he says.

Dr. Charron also tries to help younger students reach their scientific goals. Through Synapse, Dr. Charron met Sami Obaid, a high-school student at Cégep André-Grasset. He was impressed with Sami's interest in neurological research and his participation on Team Canada at the 2005 Intel International Science and Engineering Fair competition. Now, Sami has been offered the chance to work in Dr. Charron's lab for the summer of 2007.

"Sami is very motivated in science," Dr. Charron says. "I think he's someone who will be a good candidate here in the summer. I think this will also benefit the lab."

