Almost every major news story or public-policy issue today has a scientific angle. How do non-scientists find their way through the debate?

Cool tools
Take a look at some of the cutting-edge equipment used by AHFMR researchers.

Responding to the Reader
A reader asks if there is any new research on essential tremor and how it affects the brain.

Rese archers in making
How does language help children learn about their world?

Follow up
Check in with two clinical dietitians on their work to prevent eating disorders in children.

**Features**

6 Taking the sting out of summer
Dr. Tom Hobman looks for a new approach to fight West Nile and other viruses.

8 Individualizing the treatment of stroke
Time is of the essence for stroke victims. The longer the brain is deprived of oxygen, the greater the risk of permanent damage.

Cover story
10 Aboriginal health research
Aboriginal communities and health researchers are working together to find solutions to health problems.

20 A tool to improve lives
A rating tool for surgery referral could improve the quality of life for people suffering from partial epilepsy.

AHFMR MISSION
AHFMR supports a community of researchers who generate knowledge, the application of which improves the health and quality of life of Albertans and people throughout the world. AHFMR's long-term commitment is to fund health research based on international standards of excellence and carried out by new and established investigators and researchers in training.

TRUSTEES
Kirk Barber
Art Froehlich
Nancy Mannix
Indira Samarasekera
Robert Seidel
David Shragge
Gail Surkan (Chair)
Harvey Weingarten
Ralph Young

Interim President and CEO
Jacques Magnan, Ph.D.

CONTACT US
Your comments, views, and suggestions are welcome.
Please forward them to:
The Editor, AHFMR Research News
Alberta Heritage Foundation for Medical Research
Suite 1500, 10104 - 103 Avenue
Edmonton, Alberta T5J 4A7

Phone: (780) 423-5727
Fax: (780) 429-3509
E-Mail: info@ahfmr.ab.ca
Internet: www.ahfmr.ab.ca

© Contents copyright of AHFMR.
ISSN 1700-6236 (print) ISSN 1703-5604 (online)
Canadian Publications Agreement 1140064910

Return undeliverable Canadian addresses to:
AHFMR 1500, 10104-103 Avenue
Edmonton, AB T5J 4A7
Almost every major news story or public-policy issue today has a scientific angle. How do non-scientists find their way through the debate?

Take a look at some of the cutting-edge equipment used by AHFMR researchers.

A reader asks if there is any new research on essential tremor and how it affects the brain.

How does language help children learn about their world?

A reader asks about new research on MS.

McLeod Scholarship winner Michael Galic studies the effect of inflammation on the developing brain.

"Back pain: don’t take it lying down": how effective was the message?
A legacy of learning

Father Casimir Przybylski wanted to contribute to scientific knowledge and education by making a bequest in his will to health research. How did he decide where to leave his money? This magazine helped show him the way.

STORY BY JANET HARVEY / PHOTO COURTESY OF THE PRZYBYLSKI FAMILY

“Learning is not a product of schooling, but of the lifelong attempt to acquire it.” This statement is attributed to Albert Einstein, but it could just as easily have been uttered by Casimir Przybylski. A Catholic priest with a keen interest in health, science, and history, Father Casimir personified the concept of lifelong learning.

As his brother Carl Przybylski remembers, “He was always in the books when he was young. And when he was supposed to be working: ‘Just give me a few minutes; I have to finish this book,’ he would say.” That love of learning continued into his later life; Casimir taught himself Latin, Hebrew, and Russian to add to the Polish and English he already knew. He entered the priesthood at the age of 30, and for 44 years he served as a parish priest in northern British Columbia and, later, in the Whitelaw-Fairview area of northern Alberta.

Through his love of learning, Father Casimir came to know of AHFMR. A subscriber to Research News for many years, he was inspired by the magazine to leave a gift to help promote health research and increase scientific knowledge in this province. When he passed away in 2008, he left his entire estate to the Alberta Foundation for Health Research (AFHR), a companion organization to AHFMR. Because AHFMR is not a registered charity, the AFHR was established as a non-profit charitable organization to receive public
Father Casimir’s legacy will be used to support neuroscience

already made a name for itself in this field with such world-class research centres as the Hotchkiss Brain Institute at the University of Calgary and the Canadian Centre for Behavioural Neuroscience (CCBN) at the University of Lethbridge. In the fall of 2008, Alberta’s strength in neuroscience grew even greater when AHFMR’s inaugural Polaris prize brought world-renowned neuroscientist Dr. Bruce McNaughton to Lethbridge to join the CCBN.

Since its establishment in 1994 the AFHR has received more than $800,000 in donations from Albertans who wished to make contributions to health research. Their generosity has helped generate new learning in such areas as perinatal health, tuberculosis, obesity, and brain research.

To obtain more information on the Alberta Foundation for Health Research, or to make a donation, please contact the Foundation at (780) 423-5727 or check our website at www.ahfmr.ab.ca/donations.php

Multiple Sclerosis

A reader asks about new research on MS.

STORY BY TARA NARWANI / ILLUSTRATION BY CAROLYN FISHER

“The task of the human immune system is to protect the body from foreign organisms and substances. When the system breaks down, immune cells can attack and damage the body’s own tissues, causing autoimmune diseases such as multiple sclerosis (MS). We asked Dr. Hanne Ostergaard, an AHFMR Scientist working in immunology at the University of Alberta, why research in MS has focused on T cells of the immune system, and whether recent work with another type of cell, the B cell, holds any promise for MS patients.

“Multiple sclerosis is a disease where the immune system attacks the central nervous system (CNS),” Dr. Ostergaard explained. Nerve cells of the brain and spinal cord form a network by means of which the CNS and the rest of the body communicate. The
cable-like extensions of the nerve cells, called axons, have a protective covering made out of myelin that transmits signals efficiently.

In MS, the body’s own immune system damages the myelin, interrupting the electrical impulses that travel along axons. The result is the range of symptoms associated with MS, including loss of muscle control, vision problems, and difficulty with balance.

To treat—and ultimately cure—MS, researchers have to identify the parts of the immune system that go haywire and start destroying nerve cells. This is no easy task because so many different types of cells are involved.

Two cell types are essential to a functioning immune system: T cells and B cells. Both work at detecting foreign substances (antigens) in the body. But once they recognize the antigens—such as bacteria, viruses, toxins, and even transplanted tissues—T cells and B cells initiate quite different immune responses.

Over the years, researchers have thought that B cells played a limited role in the immune system: recognizing antigens, then producing antibodies to neutralize them. By contrast, they have regarded T cells as the more important players, because of two things they do: they kill infected cells and they help B cells make antibodies. In other words, because T cells can regulate other immune responses.

In MS, the electrical impulses that travel along axons are interrupted.
To determine whether T cells or B cells cause MS, researchers have used a model called EAE (which stands for Experimental Autoimmune Encephalomyelitis) to represent MS development in humans. Ethical considerations prevent direct experimentation on humans.

“People focused on T cells in MS because you want to treat the cell you think causes the disease. By transferring T cells from an EAE model to a healthy model, you can trigger MS in the healthy model. That suggested T cells cause MS,” says Dr. Ostergaard. Since parallel experiments with antibodies from B cells didn’t induce the disease, subsequent research attention was directed almost exclusively at the role of T cells in MS.

With the advent of new genetic tools, though, more experiments with B cells have become possible. Results show that B cells may do different things during the early and later stages of MS. “In the triggering stage, B cells may be protective; whereas, at the disease-progression stage, they may actually contribute to the disease,” Dr. Ostergaard says, adding that we don’t yet know whether B cells play the protective role in humans. However, the apparent dual action raises the idea that B cells might do more than secrete antibodies. They’re now viewed, along with T cells, as possible regulatory cells.

Conclusions drawn from new experiments suggest that reducing B cells in humans could halt the progression of MS. In fact, a Phase II clinical trial for the drug rituximab (already approved for use in non-Hodgkin’s lymphoma) was recently completed with MS patients as subjects. It came into being because that drug had been observed to reduce levels of B cells. The results of the trial showed reduced number of lesions in the central nervous system of MS patients who had taken the drug. This is a key indicator of the progression of the disease. Also, more than half of the patients saw a reduction in the recurrence of their disease symptoms over 24 weeks.

A Phase III clinical trial for rituximab in MS patients has now been approved, to look at the long-term effects of the drug. Dr. Ostergaard is optimistic, but cautious. “You could make a person so immunocompromised that they don’t have MS, but they might not survive a simple infection. Those are the kinds of things they’ll be looking at in Phase III.”

More experiments with B cells have become possible

About this column
AHFMR frequently receives letters requesting information about Heritage research or about various medical conditions. “Responding to the reader” is a Research News feature intended to provide up-to-date information related to readers’ questions, with the help of experts in the Alberta research community. AHFMR cannot provide medical advice, however; please consult your family physician about your specific health concerns.

About the researcher
AHFMR Scientist, Dr. Hanne Ostergaard is a full professor in the Department of Medical Microbiology and Immunology in the Faculty of Medicine and Dentistry at the University of Alberta.

Recommended website
Multiple Sclerosis Society of Canada
http://www.mssociety.ca
For most of us, it’s a seasonal thing. As summer approaches, our thoughts turn to the outdoors—barbecues on the deck, camping, a day at the lake. And mosquitoes. And West Nile virus. But unlike most of us, AHFMR Scientist Dr. Tom Hobman doesn’t wait for summer to think about West Nile virus; he thinks about it year-round. He has been studying it since 2005.
“Although most strains of West Nile are relatively harmless, the strain that has gained a foothold in North America is more likely to make people sick,” says Dr. Hobman, a researcher at the University of Alberta. “Because there is no specific treatment or vaccine, West Nile virus infection is a significant medical concern.”

According to the US Centers for Disease Control and Prevention, roughly 80% of people who are infected with West Nile virus do not show clinical symptoms. However, a small but significant number develop severe illness, including neurological effects—such as vision loss, tremors, numbness, and paralysis—that may be permanent. According to the Public Health Agency of Canada, the most serious effects can even be fatal. These conditions include meningitis (inflammation of the membranes surrounding the brain), encephalitis (inflammation of the brain itself), and acute flaccid paralysis (a polio-like syndrome that can result in the loss of function of one or more limbs).

“Current research is focused on understanding how the virus causes disease,” says Dr. Hobman. “This is where my lab comes in. I’m interested in the consequences of the interactions between proteins made by the virus and proteins that are in the cells infected by the virus.

“It’s important to understand that the goal of a given virus is not to cause disease. Rather, the virus needs to find a susceptible host cell, get into it, replicate its own genome (hereditary information), get out, and find another host cell in which to repeat the process. Viral disease is a result of harmful interactions that occur when the virus is replicating.”

Dr. Hobman’s team studies a class of proteins made by certain viruses including West Nile. The proteins are called capsids, and their main job is to bind the viral genome and place it in a protective shell. Capsids have long been thought of as inert building blocks. But this view is changing, because the research of Dr. Hobman and others has linked capsids to causing death in neurons (nerve cells) and other types of cell, implicating them in the neurological effects caused by West Nile virus.

“Now we are trying to find out which proteins in the host cells interact with the viral capsids,” says Dr. Hobman. “Then we can look for ways to disrupt these interactions.” This represents a new approach to dealing with viral infections. Currently most antiviral drugs target viral proteins. The problem is that many viruses, West Nile and influenza included, mutate very rapidly and, consequently, can quickly develop resistance to drugs. If we target the host-cell proteins, viruses should be much less likely to develop drug resistance.”

Notes Dr. Hobman: “This field is in its infancy, and I think it will flourish. It’s not clear at this point how the research will develop into practical treatment; but it’s safe to say, the applications go beyond West Nile virus. For example, the capsid proteins of West Nile virus are similar to the capsids of the viruses that cause dengue and hepatitis C. This is a promising avenue of research.”

West Nile infection is a significant medical concern

About the researcher
AHFMR Scientist
Dr. Tom Hobman is a full professor in the Department of Cell Biology in the Faculty of Medicine and Dentistry at the University of Alberta.

Selected publication

Recommended reading
Public Health Agency of Canada: West Nile virus
Individualizing the treatment of stroke

Dr. Michael Hill wants to extend the existing treatment window for stroke patients on the basis of their individual circumstances.

You have probably heard it said that “time is money”. But what about the phrase “time is brain”? The expression is commonly used by experts to refer to the sense of urgency involved in treating stroke.

Ischemic stroke (the most common type) occurs when a blood vessel in the brain becomes blocked, usually by a clot, and blood flow to the brain is interrupted. If blood flow is not restored, brain cells start dying and brain function becomes impaired. Patients generally have only a few hours to receive treatment before damage to the brain is irreparable. AHFMR Health Scholar Dr. Michael Hill is investigating ways to extend the treatment time frame.

Doctors use thrombolysis—a treatment that Dr. Hill describes as “Drano for the brain”—to dissolve blood clots. “Most commonly, we give an intravenous infusion of a clot-busting drug such as tPA so that it flows with the blood. The whole body gets exposed to it, but enough gets into the brain clot that it dissolves and blood flow is restored,” explains Dr. Hill.

Since the brain is being deprived of essential oxygen, access to treatment is critical; the sooner treatment is administered, the better the outcome for the patient. Most stroke patients are already ineligible for tPA (tissue plasminogen activator) treatment before they reach the hospital, because it must be given within four and a half hours. This is known as the safety window: the length of time fol-
Dr. Hill wants to treat patients on the basis of their individual “tissue window” following the onset of a stroke in which treatment can be administered with minimum risk and maximum benefit. A patient receiving tPA more than six hours after a stroke is at increased risk for bleeding in the brain. “On average, once you get three or four hours beyond the onset of stroke, it starts to become unsafe to dissolve the clot, and of no benefit to dissolve it because the damage has already occurred,” notes Dr. Hill.

However, that three- to four-hour window is an average marker. Some patients have shown improvement when drugs were administered as late as 12 hours after the onset of stroke; other patients have shown brain impairment after only 90 minutes. “The individual variation in physiology is important. Sometimes people can have a clot in the brain, but they have lots of other blood vessels bringing blood—so the actual area of brain threatened is very small. And some people can have a huge area of brain threatened by one blocked artery,” says Dr. Hill.

Using imaging technology such as MRI (magnetic resonance imaging) and CT scans (computerized tomography), doctors can determine the severity of brain damage. Dr. Hill explains, “By looking at pictures of the blood vessels, we can understand exactly where and what the problem is. If a patient has a clot in an artery, I need to know which artery, where, how much, and how it is affecting the brain—in order to decide the best approach to therapy.”

Dr. Hill wants to move away from a time-window method of treating stroke patients; instead, he wants to treat patients on the basis of their individual “tissue window”, as determined by brain imaging. “The four-and-a-half-hour window is a population average. But the average doesn’t necessarily apply to the individual person. For example, I can do an MRI on a patient eight hours after the onset of stroke and see that the brain isn’t dead. There is salvageable brain, and if I bring the blood flow back, there might be a big improvement for this patient.”

“If we start to treat people individually, based on their physiology, it should open up treatment to a greater number of patients. My hope is that we can treat more stroke patients with thrombolysis, to prevent more disability and save people from the tragedy that is stroke.”

**About the researcher**

**AHFMR Health Scholar Dr. Michael Hill** is associate professor in the Department of Clinical Neurosciences at the University of Calgary. He is director of the Stroke Unit, and also of the Calgary Centre for Clinical Research.

**Selected publication**


**Recommended websites**

Heart and Stroke Foundation
http://www.heartandstroke.ca

Canadian Stroke Network
http://www.canadianstrokenetwork.ca

**Stroke in the Cinema**

In February, AHFMR hosted its first Science in the Cinema event at the Plaza Theatre in Calgary: a screening of The Diving Bell and the Butterfly. The movie depicts the true story of Jean-Dominique Bauby, who suffered a stroke that paralyzed his entire body—apart from his left eye and eyelid. Using his one controllable eyelid, Bauby blinked his memoirs to a team of helpers who read the letters of the alphabet aloud. Following the movie, Dr. Michael Hill led an audience discussion about a wide range of related topics, including ethics, stroke prevention, and the evolution of stroke treatments during the past decade. “It was kind of like a book club. You watch the movie, then you discuss it, and there’s an exchange of ideas. It was a good experience for the audience, and it was fun for me,” adds Dr. Hill.

For more information on upcoming Science in the Cinema events visit www.ahfmr.ab.ca/communications/scienceinthecinema.php
The gap between the health of Aboriginal Canadians and that of non-Aboriginal Canadians is well known, but not particularly well understood. Understanding could come from research—but that has been problematic. The biomedical approach to research, which focuses on the diseases themselves, is clearly not the key to improving the health of Aboriginal Canadians. Now the emphasis is shifting: Aboriginal communities are getting involved in the research.

Aboriginal communities and health researchers are working together to find solutions to health problems. This community-based research may be the best way to improve the health of Aboriginal Canadians.
research

Working in the community
“Almost everywhere you look there is an inequity in the health indicators of Aboriginal people by comparison with the general population,” says Dr. Malcolm King, scientific director of the Canadian Institutes of Health Research (CIHR) Institute of Aboriginal Peoples’ Health and a professor in the Faculty of Medicine and Dentistry at the University of Alberta. “I’ve heard people wonder why health outcomes are so different for Aboriginal people since the diseases we all get are essentially the same. You have to look at the context—the factors that contribute to how someone ends up developing a disease. These are known as the determinants of health. They include education, income, sanitation, nutrition, housing, environmental quality, and access to healthcare.”

Dr. King notes that research methods are changing, where Aboriginal health is concerned. The emphasis is now on community-based research, in which community members and researchers work together in planning studies. This approach to research is widely viewed as the best way to find solutions that are culturally appropriate and truly effective.

A case in point is the research of AHFMR Population Health Investigator Dr. Noreen Willows at the University of Alberta. She studies childhood obesity in Cree communities in Quebec and Alberta. “We already know that Aboriginal people have a shorter life expectancy,” says Dr. Willows. “If, as the research suggests, Aboriginal children are becoming obese at a very young age, the prognosis is not good. So the key is prevention. But you can’t prevent something unless you understand it.” For example, in her Quebec study, elders voiced their concern that children have few opportunities to experience traditional Cree life and eat traditional Cree food. “I don’t come in as an expert and say, ‘Here are the issues.’ Our approach is to ask the community members what they believe the issues are. In this way, we can ensure that the results will be meaningful because they make sense to the community.”
Dr. Willows notes that obesity prevention will require a better understanding of the circumstances of people’s lives, and of the things that prevent individuals and communities from adopting healthy lifestyles. “There is low educational achievement, lack of opportunity for employment, and poverty in many Aboriginal communities; all these factors impact childhood obesity. I take an approach, where I look at individual-level factors, community-level factors, and the environments where people live. It’s not enough to just put your efforts at the level of the individual. If you educate individuals only, you give them the tools to make changes—but their ability to make those changes depends on whether they are empowered in the environment where they live. As a community-based researcher, you have to look at the bigger picture."

The cornerstone of community-based research is community engagement, which entails a lot of groundwork. Community leaders must be consulted; local steering committees must be formed and become operational before research can even begin. “It’s about building relationships of trust. If you don’t build the relationships, you won’t be welcomed back,” says Dr. Willows.

The approach is extremely time-consuming. Given the limited time frames of many research grants, this can be a problem. However, granting agencies are becoming more flexible, and support organizations for researchers have sprung up in the past few years. For example, the University of Alberta’s Community–University Partnership for the Study of Children, Youth, and Families provides consulting, brokering of partnerships, and leadership in community-based research.

“I think we’re moving toward a time when community-based research will be better appreciated, better supported, and even more community-driven,” says Dr. Willows.

**Quick Facts**

**Health challenges faced by Canada’s Aboriginal people**

- **High rates of chronic diseases**, such as diabetes. Type 2 diabetes affects First Nations and Métis people three to five times more than the general Canadian population. Although type 2 diabetes is currently less prevalent among the Inuit, they are beginning to acquire the disease in greater numbers.

- **High rates of infectious diseases**, such as tuberculosis. First Nations and Inuit tuberculosis rates are 10 times higher than for other Canadians.

- **Low life expectancy** of Aboriginal men and women. On average, First Nations men live seven years less than other Canadian men; and First Nations women, five years less than other Canadian women. Life expectancy for Inuit is also believed to be lower, although statistics are not available for all northern regions.

- **High rates of suicide**, especially among Aboriginal youth. The suicide rate for First Nations youth is five to six times higher than the national average; for Inuit youth, 11 times higher. Suicide is the most prevalent cause of injury-related death among Aboriginal people.

*Source: Health Canada*
Teaming up with northern communities

Helicobacter pylori, a bacterium that lives in the stomach, is a major cause of gastric cancer and peptic ulcer disease. AHFMR Health Senior Scholar Dr. Karen Goodman thought she had seen most aspects of population-based research on this bacterium when she joined the faculty of the University of Alberta in 2005. As an epidemiologist, she had already studied H. pylori infection in the United States, in Mexico, and in South America. But almost immediately upon arrival, Dr. Goodman was in for a new experience—a request for research on the topic that came directly from a community. “This has not been part of the history of H. pylori infection research. I was intrigued.”

The community was Aklavik, a hamlet of about 600 people in the Northwest Territories whose residents are mainly Inuvialuit (Inuit) and Gwich’in First Nation people. They were concerned about a perceived increase in the number of diagnoses of stomach cancer among community members. They believed that H. pylori was to blame.

Their fears were well founded. Northern Aboriginal communities around the world have much higher rates of H. pylori infection (50% to 95%) than the general population (20% to 30%). In the Northwest Territories, the rate of stomach cancer is twice that in the rest of Canada.

Aklavik’s concerns resulted in a groundbreaking research initiative to investigate the health risks from H. pylori infection. Led by Dr. Goodman, a collaborative team planned and initiated fieldwork to collect relevant data. The team consisted of researchers from the University of Alberta, health officials from the Northwest Territories and Alberta, and local community leaders. Central to the process was a local planning committee, whose members included Aklavik residents and Dr. Goodman. “The committee is absolutely vital to the process. Its input is critical to ensuring the research is community-driven,” she says. “The entire project has had tremendous co-operation from everyone—community members, medical professionals, government officials. People volunteered time and resources to make this happen.”

Of the 343 participants in the Aklavik project, 208 tested positive for H. pylori. Those with infections were offered treatment.
with antibiotics; 111 of these individuals enrolled in a treatment trial. Team members are now going back to Aklavik to find out whether the infections cleared. Antibiotic treatment is not always successful, especially in populations with a high prevalence of *H. pylori* infection.

Word about the project has spread among northern communities; and the team is now starting a similar project in Old Crow, Yukon, at the invitation of community leaders. “We see Aklavik as the initial project of a broader collaborative effort to investigate community-health problems related to *H. pylori* infection in northern Canada,” says Dr. Goodman.

“*H. pylori* infection exists around the world. There are no magic bullets; the infection is not easy to treat, and we’re not sure how to stop transmission. That’s why our research focuses on community priorities. We’re addressing community concerns and providing information to health authorities and policy analysts, so they can improve the management of this infection.”

### Quick Facts

#### 12 Key determinants of health

At every stage of life, health is determined by complex interactions between social and economic factors, the physical environment, and individual behaviour. These factors are called *determinants of health*. They include the following:

- Income and social status
- Social-support networks
- Education and literacy
- Employment and working conditions
- Social environments
- Physical environments
- Personal health practices and coping skills
- Early childhood development
- Biology and genetic endowment
- Health services
- Gender
- Culture

*Source: Public Health Agency of Canada*

---

**About the researcher**

**AHFMR Health Senior Scholar Dr. Karen Goodman** is an associate professor in the Division of Gastroenterology in the Faculty of Medicine and Dentistry at the University of Alberta.

**Selected publication**

Investigating addictive behaviours

“‘There’s something going on here.’ That’s what Cheryl Currie first noticed while working as a Research Associate after her master’s degree at the University of Manitoba. Her study centred on gambling in First Nations communities in Ontario, and she spent time living in those communities. “It was clear that some communities were stronger [than others]—had more pride, more sense of community—and these communities were somehow protected from the problems with gambling. That observation stuck with me.”

In her Ph.D. research at the University of Alberta, supported by an AHFMR/AMHB (Alberta Mental Health Board) Studentship, Currie is now exploring the idea that certain factors may protect people from addictive behaviour. She studies Aboriginal people living in urban centres, one of the fastest-growing segments of the Canadian population. Research suggests that urban Aboriginal people exhibit more addictive behaviour than the rest of the population with respect to alcohol, drugs, nicotine, and problem gambling.

“Rather than look only at the risk factors for addictive behaviour—such as poverty, marginalization, and lack of education—I wanted to investigate whether there are factors that protect people from addictions,” says Currie. “Research done in Canada and the United States has identified spirituality, Aboriginal identity, and participation in cultural activities as protective factors. I want to follow this up.”

The research proposal struck a chord with her study advisory committee, made up of 12 members of the Aboriginal community in Edmonton. They welcomed this novel approach, as well as her focus on urban Aboriginal people. Urban residents account for 56% of the Canadian Aboriginal population (61% in Alberta); yet very little research has been conducted on these groups.

Currie tested her approach in a pilot study of 60 Aboriginal students at the University of Alberta. She looked for specific indicators that might show the strength of a person’s connection to their Aboriginal culture, and how these markers relate to harmful drug and alcohol use and problem gambling. The results highlighted the fact that many Aboriginal people living in an urban setting are bicultural: they are connected to both mainstream and Aboriginal culture. “Identifying with both cultures appears to be protective. The individuals who viewed the two cultures as compatible and could integrate them were doing the best. The people who wanted nothing to do with Aboriginal or mainstream culture were struggling.”
For her Ph.D. research, Cheryl Currie will undertake an in-depth survey of about 400 Aboriginal and Métis people in Edmonton to ask more targeted questions.

“I’m excited by this work,” she says. “So much of the news about Aboriginal health is negative, and I do appreciate that there are very serious risk factors. But if we could find protective factors, this would be something positive for people to work with and it would further empower Aboriginal communities.”

**About the researcher**

**Cheryl Currie** is a Ph.D. student in the Department of Public Health Sciences at the University of Alberta School of Public Health. She is supported by an AHFMR/AMHB Studentship.

**Selected publication**

Dr. Malcolm King would agree emphatically. As an Aboriginal person himself, he notes that the resilience of Aboriginal people is not always evident, because of the grim health statistics. “And the good news also gets lost when so much attention is paid to Aboriginal people who don’t seem to be in control of their lives. But there are groups and individuals who are showing leadership within their communities. Aboriginal people are learning how to deal better with their own health issues, including health research.”

The research picture is changing, says Dr. King. Prior to 2000 there was almost no research in Aboriginal health in Canada. The establishment of the CIHR’s Institute of Aboriginal Peoples’ Health sparked an immediate surge in activity. This included training of graduate students and post-doctoral researchers, many of whom are just beginning their academic careers.

Now, Dr. King says, we are set for the “third wave”—where Aboriginal people take an active role, perhaps even a leading role, in Aboriginal health research. “We have to fully engage Aboriginal communities—not just as willing partners but as active partners. This is perhaps the most difficult step because there is a training gap. Aboriginal people require the resources and skills so that they can be active participants in research. I’m optimistic, because there are many Aboriginal people willing to take this on. We need to support them.”

Tackling kidney disease

As a nurse working in outpost stations in northern Saskatchewan and the Northwest Territories, AHFMR Population Health Investigator Dr. Brenda Hemmelgarn saw the challenges of Aboriginal health at first hand. The experience sparked her interest in research. She went on to do Ph.D. and M.D. degrees and now works as a nephrologist (a doctor who treats people with kidney problems) and a researcher at the University of Calgary.

Her research focuses on kidney disease among Aboriginal people. While the prevalence of chronic kidney disease is essentially the same in both Aboriginal and non-Aboriginal populations, the Aboriginal population has a rate of kidney failure that is two to four times higher. This is very closely related to the high incidence of diabetes in the Aboriginal community. But even among Aboriginal people without diabetes, the rates of kidney failure are higher. “As a

About the researcher

Dr. Malcolm King is scientific director of CIHR’s Institute of Aboriginal Peoples’ Health. He is a professor in the Faculty of Medicine and Dentistry at the University of Alberta where he is a researcher in respiratory diseases. He also heads the Aboriginal Health Care Careers program and chairs the University Aboriginal Advisory Council. He is the principal investigator of the Alberta ACADRE (Aboriginal Capacity and Developmental Research Environments) Network for Aboriginal health research training.

Selected publication

doctor, I want to know why. As a researcher, I’m particularly interested in what kinds of healthcare processes could be related to these inequities. What is it in the way we deliver care that may be contributing to the higher rates of kidney failure?"

Dr. Hemmelgarn’s team has found that Aboriginal people in Alberta are 43% less likely than other people to visit a nephrologist even if they have severe kidney disease. Another notable difference is in the management of kidney disease for people with conditions that if treated adequately in an outpatient setting should not result in hospitalization. The team found that Aboriginal people were twice as likely to be hospitalized for these conditions. This finding suggests that these cases of kidney disease are not being managed properly. “But we don’t know what aspect of care is not managed properly,” says Dr. Hemmelgarn.

Since publishing the data on the prevalence of chronic kidney disease, Dr. Hemmelgarn’s team has started looking at other aspects of care; how well diabetes is controlled, for example. “We’d also like to do some primary data collection to get at the patient-related factors such as access to care, patients’ perceptions, and any barriers they may be experiencing. There’s more we need to know.”

One of the findings of her research is already being followed up clinically—namely, the finding that Aboriginal people in rural locations are less likely to come to a city to see a nephrologist. A specialized clinic for individuals at high risk for kidney disease has been set up at the Siksika First Nation, 100 kilometres east of Calgary. People with diabetes and those who have blood pressure that is difficult to control see a nurse-practitioner once a week.

“This is a short-term measure. We’ll be looking to see whether the service is successful in improving blood-pressure control and diabetes control. In the long term, I hope that what we find leads to program changes or new services that better meet the needs of First Nations communities in helping them reduce the risk of kidney disease.”

About the researcher

**AHFMR Population Health Investigator Dr. Brenda Hemmelgarn**

is an associate professor in the departments of Medicine and Community Health Sciences at the University of Calgary. She is the director of the Alberta Kidney Disease Network and is one of the leaders of a new **AHFMR Interdisciplinary Team** studying chronic disease.

**Selected publication**

An innovative rating tool for surgery referral could improve the quality of life for people suffering from partial epilepsy.

**A TOOL TO IMPROVE LIVES**

**STORY BY LAURA LY / PHOTOS BY TRUDIE LEE AND VEER**

When asked about her research and clinical work with epilepsy, Dr. Nathalie Jetté often recalls a particular patient. She tells the story of a man who suffered from seizures for several years before he was referred to her clinic. His seizures had initially been misdiagnosed as anxiety attacks. Within 12 hours of receiving treatment for epilepsy, the seizures had stopped. “I saw him about a week later, and he was radiant and energetic,” she remembers. “Since 70% of people respond to treatment, you can make such an impact in this area. It’s really fulfilling.”

Dr. Nathalie Jetté (r) with one of her patients
Now Dr. Jetté’s research could help the other 30% of epilepsy patients: those who do not respond to medication. Many of these are people who suffer from partial or focal epilepsy, which is characterized by seizures originating from a particular part of the brain, most commonly from the temporal lobe. Surgery is a treatment option for those with this type of epilepsy who do not respond to medication. Yet some people suffer from incapacitating seizures for many years before being referred for surgery. Dr. Jetté is developing a rating tool to identify potential surgical candidates so that patients with partial epilepsy can be treated earlier and more effectively.

Since partial seizures originate from one specific part of the brain, removing that part has the potential to cure partial epilepsy. Although success rates can be as high as 60% to 90% for temporal lobe epilepsy and 40% to 60% for other partial epilepsies, surgery seems to be underused. Continued medication is the favoured treatment approach. Misconceptions about risks could explain the reluctance of patients and doctors to consider surgery. “People mistakenly see epilepsy surgery as a last-resort measure,” says Dr. Jetté.

In developing the rating tool, Dr. Jetté considered the benefits and risks of surgery, the frequency of partial epilepsy, and the long-term risks for patients who are treated with medication but continue to have seizures. She hopes the tool will better inform neurologists and other physicians about the risks and benefits of surgery so that patients can be referred earlier for treatment. “We don’t expect family physicians or general neurologists to decide whether patients should have surgery. The tool is to give them a little guidance, to show them that patients who fit certain profiles may be surgical candidates,” she says.

As an indication of whether or not patients should have surgery, the tool produces a rating calculated from a number of items of information: age, duration of epilepsy, seizure type, frequency of seizures, and the extent to which the seizures are disabling. Seizures are considered disabling if they cause injuries or other significant medical problems, or if they have serious psychosocial consequences. In children, seizures are also considered disabling if they interfere with development. The information also includes the number of drugs a patient has tried or is currently taking. For example, a patient may be seizure-free but suffering side effects from three different anti-epileptic drugs. The rating tool takes into consideration more than 3,000 possible patient scenarios.

The tool also considers the region of the brain where seizures occur. EEG and MRI scans of the brain help doctors determine where the seizures originate. Surgery is performed only if the relevant part of the brain is not essential for a critical task such as memory, language, or motor function.

The tool will soon be tested in clinics in Calgary and Saskatoon and will then be made available online for wider use. Dr. Jetté intends to summarize
Some people suffer from incapacitating seizures for years before being referred for surgery and simplify the rating tool information onto a single card for family doctors and other non-epilepsy specialists to use. The card could be available as early as 2010.

“By identifying those who may be candidates for surgery, not only can we reduce their seizure frequency, we can improve their quality of life and sense of independence,” says Dr. Jetté. “Studies show the sooner they have surgery, the better the success rate.”

As a clinician-scientist, Dr. Jetté applies her research in her practice to improve her treatment of patients. “I’ve completed some work with colleagues looking at the psychiatric conditions that can coexist with epilepsy. When I see patients in my clinic, I ask them about their mood and make sure they aren’t depressed or having anxiety attacks, because ultimately that is going to impact how I treat them. I can translate the knowledge from my research much faster and more efficiently in my clinic.”

Recommended websites
- Epilepsy Canada
  http://www.epilepsy.ca/
- Hotchkiss Brain Institute – Epilepsy and Brain Circuits Program
  http://www.hbi.ucalgary.ca/sections.php?sid=5&cid=34&saved=1
- American Epilepsy Society
  http://www.aesnet.org/

About the researcher
AHFMR Population Health Investigator Dr. Nathalie Jetté is an assistant professor in the departments of Clinical Neurosciences and Community Health Sciences at the University of Calgary. She is also cross-appointed to the Hotchkiss Brain Institute and Alberta Health Services.

Selected publications

Seizures and the developing brain

McLeod Scholarship winner Michael Galic studies the effect of inflammation on the developing brain.

STORY BY JANET HARVEY / PHOTOS BY TRUDIE LEE, DUSTIN DELFS, AND MARTIN DEE

The first few years of a child’s life are an important time—a time of tremendous opportunity for growth as well as tremendous vulnerability to harm. Exposure to inflammation during this time can affect various aspects of physiology and behavior. Now Dr. Michael Galic, one of three winners of this year’s Dr. Lionel E. McLeod Health Research Scholarship, has demonstrated that inflammation may also influence the brain’s excitability later in life.

The excitability of the brain affects its ability to perceive its environment, perceive information, and control bodily functions. Brain excitability varies; generally speaking the brain will adopt the best level of functioning for everyday cognitive performance. “If we were to explain brain excitability as existing along a spectrum, a coma would occupy the low end and a seizure would be at the high end,” explains Galic.

To learn more about the high end of this spectrum, Galic administers mild inflammatory compounds (comparable to minor cold or flu symptoms) to rats during their second week of life—roughly equivalent to humans aged between one and two years. When the rats have grown to adulthood, Galic gives them seizure-inducing drugs to measure the excitability of their brains. He has shown that brief periods of inflamma-
Inflammation may also influence the brain’s excitability later in life.

During critical periods of development—when the brain is susceptible—can make the animals more prone to seizures when they are given these seizure-inducing drugs as adults.

Important chemical messengers called cytokines are at work here. The release of cytokines during inflammation seems to reorganize or reprogram the brain, making it more excitable. In some cases this release is also associated with changes in how neurons communicate with each other and may lead to impaired learning and memory.

But don’t panic. That cold or flu bug your child is fighting doesn’t necessarily mean they will go on to have the recurrent, unprovoked seizures that define epilepsy. The seizures Galic is inducing occur only in the presence of seizure-evoking drugs. The key point is that the presence of inflammation and fever in the newborn may alter the way in which the adult brain subsequently responds to different situations. “All babies have infections from time to time,” he confirms. “That doesn’t mean they will all grow up to suffer from epilepsy.”

In fact, the causes of epilepsy in adults remain quite elusive. Some causes, such as congenital abnormalities, head injuries, stroke, and encephalitis (brain inflammation) are known. The piece Galic’s work adds to the puzzle is the discovery that peripheral inflammation (inflammation equivalent in the human body to an upper-respiratory or gastrointestinal infection) appears to change the brain in a way similar to inflammation in the brain itself (such as encephalitis). Both types of inflammation cause the release of cytokines. “So the conclusion is that if we block the cytokines we can prevent this inflammatory process and possibly reduce the predisposition to seizures later in adulthood,” he explains.

Compounds that can do this already exist to treat other conditions. The result? “What we’ve learned could help prevent the development of epilepsy,” concludes Galic.

**About the researcher**

Michael Galic has just completed his Ph.D. under the supervision of AHFMR Scientist Dr. Quentin Pittman in the Department of Neuroscience at the University of Calgary. He is supported by an AHFMR Studentship and is one of three winners of this year’s Lionel E. McLeod Health Research Scholarship. Dr. Galic’s next career step is to head to medical school, after which he hopes to resume research as a clinician scientist.

**Selected publication**

AHFMR funding partners

The Alberta Heritage Foundation for Medical Research (AHFMR) has committed more than $1 billion to Alberta’s health-research community. The Foundation also relies on the contributions of many partners in building and sustaining health research in this province. In addition to AHFMR support, researchers featured in this issue of Research News also receive funding from:

- Alberta ACADRE Network
- Alberta Centre for Child, Family and Community Research
- Alberta Gaming Research Institute
- Alberta Health Services
- American Epilepsy Society
- Bayer Canada
- Canadian Institutes of Health Research
- Canadian Cancer Society
- Canadian Circumpolar Institute
- Canadian Gastroenterology Association
- Canadian Stroke Network
- Heart and Stroke Foundation of Alberta & the NWT
- Hotchkiss Brain Institute
- Indian and Northern Affairs Canada
- Inuvialuit Regional Corporation
- Kidney Foundation of Canada
- Milken Family Foundation
- National Institutes of Health (NIH)
- Natural Sciences and Engineering Research Council of Canada (NSERC)
- Northwest Territories Health and Social Services
- Olympus Canada
- Public Health Agency of Canada
- Saskatchewan Workers’ Compensation Board
- Social Sciences and Humanities Research Council (SSHRC)
- University of Alberta
- University of Calgary
- Workers’ Compensation Board of Manitoba
- WorkSafe BC

For more information on the Dr. Lionel E. McLeod Health Research Scholarship go to http://www.ahfmr.ab.ca/grants/mcleod.php
“Back pain: don’t take it lying down.” Since 2005, the Alberta Workers’ Compensation Board and its partners have promoted this message as a public-service announcement to Albertans.

The old counsel was “Stay in bed and rest if you have back pain”. In fact, the evidence shows the opposite. “Stay as active as you can and you’ll get better quicker,” says Dr. Douglas Gross, a professor of physical therapy at the University of Alberta. With support from the Health Research Fund, Dr. Gross has been evaluating the Alberta Workers’ Compensation Board (WCB) campaign, to measure its success as a public-health initiative.

The strategy was inspired by an Australian campaign in the late 1990s. Back pain was on the rise in Australia. The workers’ compensation authority in the state of Victoria ran a series of 36 television commercials with the same slogan: “Back pain: don’t take it lying down.” That campaign had a really dramatic impact on the beliefs of the population. And, most importantly, they saw a reduction in disability and healthcare costs,” explains Dr. Gross.

Because of the high cost of television advertising, the campaign in Alberta has been conducted by means of province-wide bus ads, workplace posters, and radio commercials. Olympic speed skater Catriona Le May Doan was the spokesperson in 2006.

To evaluate the impact of these efforts, Dr. Gross conducted annual telephone surveys from 2005 until early 2008. Over the three-year period, the data showed a 7% increase in the number of people who agreed with the statement “If you have back pain, you should stay active.” Although 7% sounds like a modest gain, it represents a large number of Albertans whose beliefs have changed, according to Dr. Gross.

In contrast to the effects of the much larger Australian campaign, changes in beliefs failed to result in corresponding changes in behaviour where Albertans were concerned. People with back pain visited their healthcare providers the same number of times. And the number of days people took off work due to back pain remained the same.

Since it may take somewhat more than three years to see such behavioural changes, the WCB is continuing the campaign for at least one more year. Dr. Gross hopes the message will be expanded to include specific advice on how to stay active with back pain. “I think there’s potential to really change the way back pain is handled here in Alberta.”

About the researcher

Dr. Douglas Gross is an assistant professor of physical therapy in the Faculty of Rehabilitation Medicine at the University of Alberta. He received support for this study through the Health Research Fund, which is administered by AHFMR on behalf of Alberta Health and Wellness.

Recommended website

Backactive.ca
http://www.backactive.ca

Physicians: please place in your patient waiting rooms.