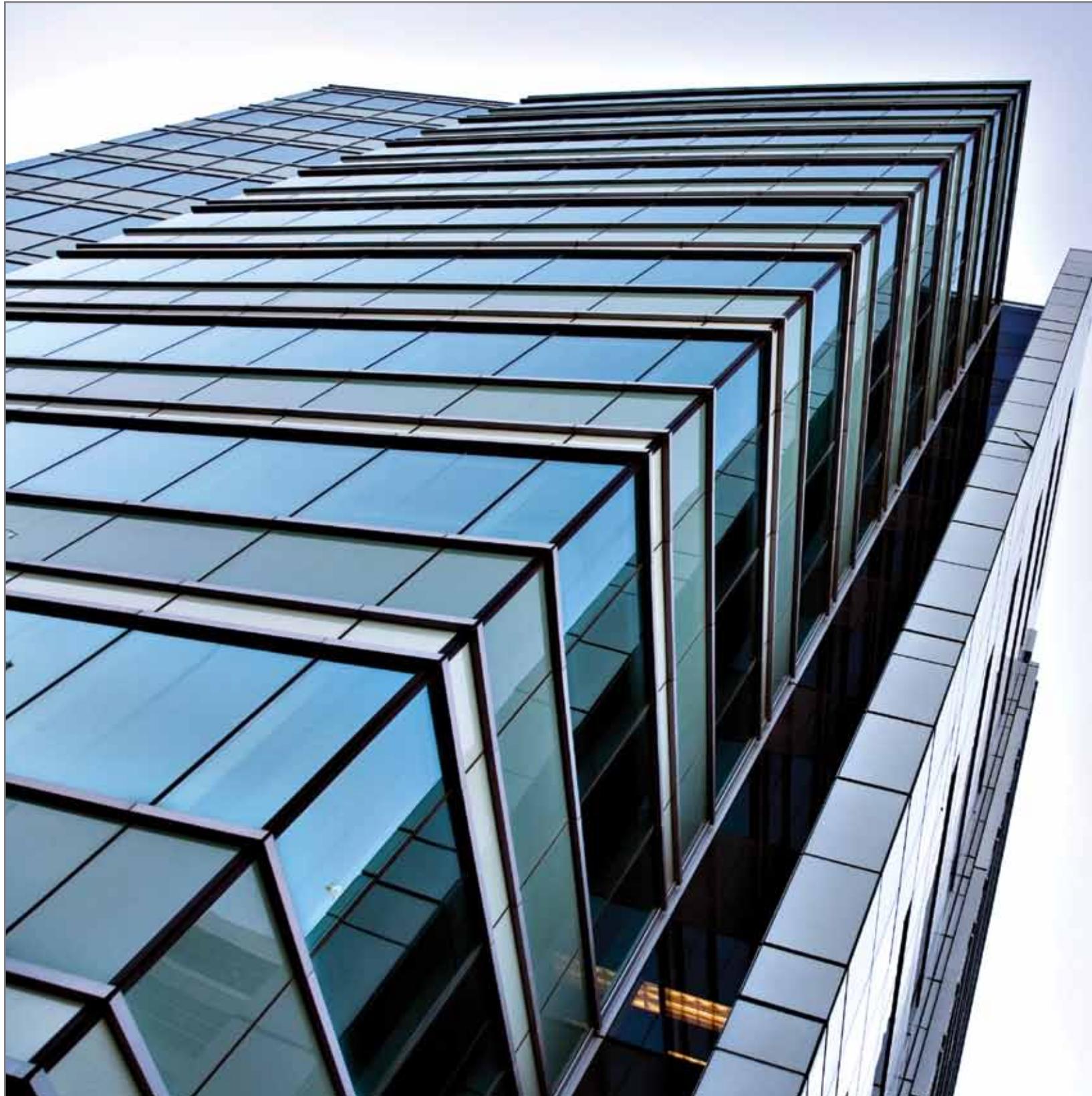


REPORT TO THE COMMUNITY
2009 - A YEAR IN REVIEW



HOTCHKISS
BRAIN INSTITUTE



The mission of the Hotchkiss Brain Institute (HBI) is to be a centre of excellence in neuroscience and mental health research and education, translating discoveries into innovative health care solutions. The Institute supports and conducts research on the healthy and diseased brain, spinal cord and peripheral nerves to assess, understand and disseminate knowledge.



HOTCHKISS BRAIN INSTITUTE

HRIC 1A10
3330 Hospital Dr. NW
Calgary, AB T2N 4N1

Director: Dr. Samuel Weiss
Associate Director: Dan Doll

Strategic Advisory Board (SAB)

Chair: Dr. Chen Fong
Professor, Department of Radiology, University of Calgary
Dr. Gregory Cairncross
Professor and Head, Department of Clinical Neurosciences, University of Calgary
Mr. Richard Haskayne, OC, FCA
RF Haskayne and Partners
Dr. Richard Hawkes
Senior Associate Dean, Research, Faculty of Medicine, University of Calgary
Mr. Harley Hotchkiss, CC, AOE
President and CEO, Spartan Holdings Ltd
Mrs. Brenda Mackie
Chair, Community and Partners Advisory Committee
Dr. Glenda MacQueen
Professor and Head, Department of Psychiatry, University of Calgary
Mr. Ronald Mathison
President, Matco Investments Ltd
Mr. Michael Rose
President and CEO, Tourmaline Oil Corp.
Dr. Robert Sevick
Professor and Head, Department of Radiology, University of Calgary

Stay Connected:

In addition to our Report to The Community, which is published annually, we have other ways in which you can keep up to date on HBI Research and community events.

Here are a few ways to stay connected:

- Visit www.hbi.ucalgary.ca
- Email hbi@ucalgary.ca to request to receive newsletters or event notifications.
- Become a member of our Facebook Community

Managing Editor: Lisa Fleece

Contributors: Jonathan Davies, Dan Doll, Yvonne Durnin, Natalie St-Denis

Photos: Charles Hope, Trudi Lee, Bruce Perrault, Rebecca Rowley, Natalie St-Denis

Design: Radius Creative

Cover: Oligodendrocytes (red cells) and astrocytes (green cells) with blue nuclei in culture.

Photo Credit: Dr. A. Chojnacki, HBI Associate Member

REPORT TO THE COMMUNITY

Message From The Hotchkiss Family

Page 6

Message From The President

Page 8

Message From The Dean

Page 9

Message From The Director

Page 10

Six Years As A Graduate Student In The HBI

Page 12

Community Support Key To Unique Education Activities At HBI

Page 13

RUN - Off To A Good Start

Page 14

Insulin Nasal Spray Could Help Diabetics Suffering From A Debilitating Nerve Disease

Page 16

New Stroke Researchers

Page 18

Understanding How Exercise Can Improve Brain Function In Older Adults

Page 20

New Mental Health Centre Set To Open In 2010

Page 23

2009



MESSAGE FROM THE HOTCHKISS FAMILY

My family is proud to be associated with the Hotchkiss Brain Institute and we are impressed with all that has been accomplished over the past five years. Although my professional background is in the energy industry, I have become familiar with the excellent medical research taking place in our city and province and the positive impact this research has on our health care system. My involvement with the Foothills Hospital Board, the Alberta Heritage Foundation for Medical Research, and the Partners in Health and Reach! fundraising campaigns has allowed me to meet many of the outstanding physicians and scientists we have right here, working towards the next breakthrough. I believe that the excellent people we have working in medical research and health care deserve the support of our community.

Knowing that we have some of the best people and facilities in the world in Calgary has made it easy for me and my family to get behind the Hotchkiss Brain Institute and support the outstanding neurological and mental health research and education taking place in our city. Through my family's involvement in various Institute committees and events, we have gained an in depth appreciation of the extremely talented group of people that work together within the Hotchkiss Brain Institute and their dedication to our Institute and to their own work in the labs and clinics.

I would like to make special mention of the leadership and the tireless efforts of our Institute Director, Dr. Samuel Weiss, who I have worked with closely from day one of the Institute. I greatly admire Sam's passion for the Hotchkiss Brain Institute, his ability to move things forward, and his integrity as an individual. It doesn't hurt that he's also an avid hockey fan and cheers for our home team.

My family, together with the outstanding support of other friends from the community, is helping to make sure that the Hotchkiss Brain Institute continues to be successful and is able to achieve even greater things in the years to come. We recently established a Hotchkiss Brain Institute endowment at the University of Calgary, to provide a foundation for the future of our Institute. I believe that the solid start we have achieved as an Institute, the excellent people and facilities that we have put together, and the long term support provided by the Hotchkiss Brain Institute Endowment will make our city and province one of the best places in the world to teach, study, and provide patient care in brain and nerve health.



MESSAGE FROM THE PRESIDENT

The Hotchkiss Brain Institute is one of the finest examples of how universities can work together with our community to improve quality of life and benefit all of society.

Because of the vision of Calgary philanthropist Harley Hotchkiss, and through the extraordinary support of our community, the HBI has established itself as Alberta's first neuroscience institute and a recognized centre of excellence in neurological research and education.

In the past five years, the institute has fostered innovative collaborations between researchers and physicians in one of the fastest-growing areas of medicine with the greatest impact on health. The HBI is translating research discoveries into clinical applications and commercial viability in all areas of brain health.

Congratulations to the Hotchkiss Brain Institute on its 5th year anniversary.

Harvey P. Weingarten
President and Vice-Chancellor
University of Calgary



MESSAGE FROM THE DEAN

The Hotchkiss Brain Institute has achieved remarkable success in only five years of existence. This is due to an outstanding group of researchers and clinicians, tremendous community support and inspired leadership.

The HBI is a key part of the Faculty of Medicine and we are committed to neuroscience and mental health research as a priority. This commitment, combined with the strength of the Institute and its people, offer unlimited potential for translating research to the clinic and will no doubt improve outcomes for patients and families who are affected by neurological or mental health disorders.

I am proud to congratulate the HBI on these first five years of success and wish them continued success in the future.

Thomas Feasby, MD FRCPC
Dean, Faculty of Medicine
University of Calgary





MESSAGE FROM THE DIRECTOR

Welcome to our annual Report to the Community.

This year, we are recognizing a number of significant milestones for the HBI that include our fifth anniversary as an Institute, the creation of an Institute endowment, and the launch of a new strategic framework that will guide us to even greater success over the next five years.

It seems hard to believe that it has been five years since our community supporters and founding partner organizations gathered together to launch the Hotchkiss Brain Institute. I marvel at how far we have come in these first five years, with the HBI already establishing itself as one of the top Canadian centres for neurological and mental health research, education, and innovation. The strength of the HBI is derived from the efforts of its outstanding faculty members, staff and trainees, whose united efforts and successes are propelling us to new heights. We were able to start from a position of strength, building on a foundation of neuroscience excellence in Calgary, and we have received unprecedented support from our community over the past five years.

The Hotchkiss family serves as one of the pillars of our Institute. Over five years ago, they committed their philanthropic support to the HBI, which allowed us to get off to a running start. What has proven to be equally important to our Institute's success is the expertise and experience that the Hotchkiss family has offered us. Right from the beginning, they have been ready to pitch in and have contributed countless hours as board and committee members, as community fundraising leaders, and by helping with numerous institute events and activities. I can't say enough about the critical role that Harley Hotchkiss and his family have played in guiding and supporting us, and I want to offer them my deepest thanks for all that they have done.

Over the past year, we have been working hard to map out our future and to position the HBI for enduring success. We have made significant progress on two fronts.

First, working with our members and partners, we have completed a strategic review and renewal process for the Institute. Through this process, we have identified our

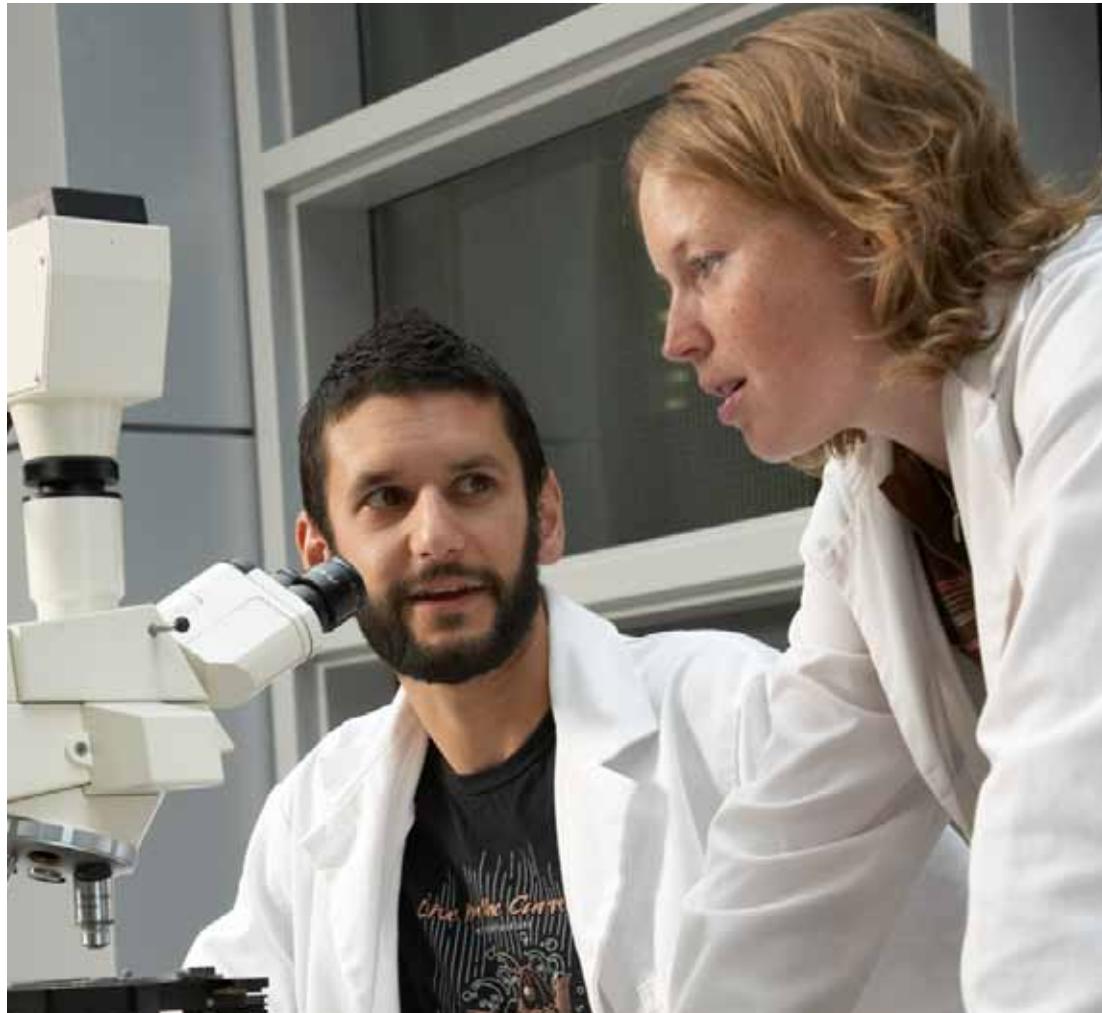
areas of greatest strength and emerging potential in research, education, and the translation of discoveries into improved health. Over the next five years we will focus on three discovery-based foundational research themes and four application-based translational research programs. These research priority areas are: axon biology and regeneration, applied to spinal cord and nerve injury and MS; cerebral blood flow, applied to stroke and vascular dementia; and nerve cell signal transmission, applied to depression and psychosis. The strategic renewal process has been invigorating for the Institute and we are confident that our heightened focus on priority areas will be the catalyst for impressive advances in the years ahead.

Second, we are extremely pleased to be announcing the establishment of an HBI Endowment at the University of Calgary. Founded with a gift from the Hotchkiss family, and positioned to grow with future donations, the Endowment will ensure the long term sustainability of the HBI, in its pursuit of excellence.

In closing, I would like to take this opportunity to offer my sincere thanks to everyone who has contributed towards the success of the HBI. The tireless efforts and incredible support of so many people have allowed us to quickly build the HBI into one of the premier locations for new neurological and mental health discoveries and their application towards improved health. Over the next five years, and beyond, we will continue to bring together expert researchers and educators along with our key partners and a supportive community to achieve even more remarkable things.



SIX YEARS AS A GRADUATE STUDENT IN THE HBI



Karl Iremonger (left) collaborating with fellow scientist.

In 2003, Karl Iremonger left his home country of New Zealand to start a graduate degree in the neurosciences at the University of Calgary. Six years later he has completed his PhD and shares some of his observations.

The past six years have gone by in a flash. In that time I finished an MSc and soon I will have completed a PhD in Neuroscience. Would I do it again? Yes. While progress in science is often frustratingly slow, somehow sharing this frustration with fellow graduate students makes it bearable, and sometimes even fun. And then there are those small breakthroughs, eureka moments, where all the data and analysis finally make sense. These moments keep me in science.

My time here in Calgary is almost over. Doing my doctoral degree here has given me the opportunity to rub shoulders with some of the world's top scientists and use some of the most cutting edge technology. My thesis is almost done! After several months of writing, I'm going a little crazy here in my overheated and cramped office. I'm heading back "down under" to spend time on the beach, cook some shrimp on the barby and unwind. Then I will go back to staring down a microscope in some small, dark room, at some university - oh, the glorious life of a scientist!

COMMUNITY SUPPORT KEY TO UNIQUE EDUCATION ACTIVITIES AT HBI



Mr. David Lake (centre) with his family and first fellowship recipient, Dr. Gloria Roldan (right).

Since the inception of the HBI, training the next generation of neuroscientists has been a focal point.

Over the last five years, the support of individuals and organizations in the community has played a key role in enhancing our educational efforts. New initiatives that have been developed with donor support have allowed the HBI to attract aspiring neuroscientists from around the world to work with our members as students and post-graduate fellows.

The HBI has played a key role in establishing a number of unique neuroscience educational initiatives in Calgary, which allow young scientists to immerse themselves in brain research from high school right through to post-graduate studies. A key link was established this past year, when the first class was enrolled in the UofC's new undergraduate neuroscience program. The support of the Kahanoff Foundation was critical to establishing this new bachelor's degree program, which provides enhanced teaching and research activities for a select group of highly achieving students. Now, students entering the Bachelors in Neuroscience program can start learning about the brain in their first year of university, with specialized courses, field study experiences, and research lab projects - all thanks in large measure to the Kahanoff Foundation's support.

Talented students who have finished their undergraduate work are being attracted to Calgary to pursue doctoral degrees with our HBI members

thanks to a scholarship program established with the support of Dr. T. Chen Fong. His donation provides substantial scholarships to the very best new PhD students in the HBI.

Also, thanks to Mr. David Lake, we are able to attract highly qualified clinical research fellows to undertake a year of training in the HBI. The Denyse Lajoie Lake Fellowship, named in memory of Mr. Lake's late wife, supports young physicians who come to Calgary to carry out a medical research project with an HBI member.

The Kahanoff Foundation is also supporting neuroscience training at the other end of the spectrum, for fellows who have completed their doctoral degree and wish to undertake additional specialized training with an HBI member expert. The Kahanoff Foundation post-doctoral fellowships are allowing us to bring in top talent from a number of countries, which is substantially enhancing the research taking place in the HBI.

With the support of its donors, the HBI is attracting the best and brightest from around the world. With unique educational and training opportunities, we are helping to establish the next generation of neuroscience experts right here in Calgary.

RUN – OFF TO A GOOD START



Dr. Douglas Zochodne is a neurologist and neuroscientist in the HBI.

Dr. Douglas Zochodne, co-leader of the spinal cord and nerve regeneration translational research program at the HBI is spearheading the Regeneration Unit in Neurobiology (RUN).

Dr. Zochodne sees a number of patients with nerve damage in a typical day. “Damage from trauma or disease to the axons (wiring) of the spinal cord and peripheral nerves devastate the lives of people. Depending on the severity of the injury there may be limitations to daily activities and decreased quality of life: impaired walking or exercising, impaired use of the hands and arms and intractable pain. Regrettably there are currently no treatments available to specifically encourage the re-growth of axons,” says Zochodne.

That is why, when he isn’t seeing patients, Zochodne is researching the regeneration of axons - a part of the nerve cell that provides the wiring cable links between our brain and the body it controls. If these axons could re-grow and reconnect there is the incredible potential to find solutions to neuropathy and associated paralysis. Zochodne is concerned that discoveries in spinal cord and peripheral nerve regeneration research have not progressed as quickly as many would like. So together with his colleagues, he came up with project RUN.

RUN, or the Regeneration Unit in Neurobiology, will address one of modern medicine’s most perplexing, untreatable problems; the failure of injured peripheral and central (spinal cord, brain) axons to regenerate or reconnect.

The proposed project will be built within the HBI, adjacent to the key researchers’ current laboratories. This proximity to the HBI’s core group of nerve repair and regeneration specialists will bring together the combined expertise of neurologists, neurosurgeons, neuroscientists and bio-medical engineers who specialize in nerve surgery, nerve functioning, spinal cord pattern generation, molecular neurobiology and cellular neuroscience.

In addition to support from the HBI, RUN has secured a Canada Foundation for Innovation (CFI) infrastructure grant worth \$1.3 million. Matching funding

from the provincial government’s Alberta Science and Research Investment Program has brought the total external funding for RUN up to \$2.6 million. These dollars will be utilized to develop a cutting edge facility that, according to Zochodne, will accelerate regeneration research.

“If we’re successful, the regeneration of spinal cord axons may begin to allow quadriplegic patients to walk and the regeneration of peripheral nerve axons may allow an ALS patient to reverse progressive paralysis, or allow a diabetic patient with nerve damage feel their feet again before they are infected or have to be amputated,” says Zochodne.

Zochodne, along with other HBI researchers in this area, hope to have RUN ‘up and running’ as early as spring 2010.

NERVE REGENERATION RESEARCH

Injuries to the peripheral nerves, such as the nerves in your arms and legs, are relatively common and often result in pain, paralysis and loss of sensation. Although these nerves have the capacity to regenerate and reconnect, recovery is often limited to short distances and the outcomes remain uncertain. Although invasive surgical procedures are possible and available, the functional recovery is usually partial. When a nerve is severely damaged, the Schwann cells in the injured nerve lose their ability to support regeneration. This is important as Schwann Cells may be key for nerve regeneration.

Dr. Rajiv Midha, a neurosurgeon in the Department of Clinical Neurosciences and a Scientist in the Spinal Cord and Nerve Regeneration translational research program of the HBI, is searching for new methods to encourage nerve regeneration. His work is frequently published in scientific journals and most recently was highlighted for increasing growth-supportive Schwann cells in the areas of nerve damage.

This work is just one example of how HBI researchers are investigating numerous approaches to solving issues of nerve injury and paralysis. RUN will provide Dr. Midha and his colleagues with some of the most advanced technologies, such as nerve imaging and behavioural analysis, that will further accelerate research discoveries.

INSULIN NASAL SPRAY COULD HELP DIABETICS SUFFERING FROM A DEBILITATING NERVE DISEASE

Clinical scientists at the HBI are starting a pilot study for local patients with type 1 diabetes, looking at the delivery of insulin through the nose as a potential new treatment for diabetic neuropathy, a diabetic nerve disease.

About 50 percent of people with diabetes will develop debilitating and painful nerve disease. Currently, the treatments for diabetic neuropathy are limited to pain management. The lack of effective treatment options is prompting excitement about the potential of this new approach.

Dr. Cory Toth, a neurologist and Assistant Professor in the Department of Clinical Neurosciences, is co-leading the new study. His laboratory work, which demonstrated that intranasal (delivered through the nasal passageway) insulin helps protect nerves in the brain and central nervous systems of mice, was published in the journal *Diabetes*.

Now Toth will measure the impact on people. “The patients that I see in my practice develop problems where they can’t feel their feet, stub their toes, develop wounds, and also deal with severe pain.”

Toth says his research shows that nerves are deficient in insulin and that delivering drugs through the nose targets the nervous system while insulin delivered under the skin provides enough insulin to regulate sugars in the body but leaves insufficient amounts for nerves. Toth likens it to the nerves starving for insulin.

It is estimated that only 2 percent of an insulin shot migrates to the brain and nerves, while approximately 98 percent of insulin administered into the nose migrates directly to the brain. Toth says that the insulin then travels along the nerves of the spinal cord to peripheral nerves providing the protection they need from degeneration.



promises help for the many people who suffer with unrelenting symptoms and pain due to diabetes related nerve disease,” says scientist Dr. Vera Bril, an expert on diabetic neuropathy, Professor of Medicine at the University of Toronto and Krembil Family Chair in Neurology, University Health Network.

Dr. Lawrence Korngut, Toth’s colleague in the Department of Clinical Neurosciences and co-lead researcher on the pilot study, says, “As a physician, it’s extremely frustrating not having

laboratory to the clinic. Forty Calgarians with Type 1 diabetes will take part in the study.

“This research was born and bred right here in Calgary,” says HBI Director Samuel Weiss, PhD.

“Cory Toth and his colleagues have advanced this research from theory to proven scientific results. Now, they’re moving the research from their laboratory to the clinic - exemplifying the translational research that the HBI strives for.”

Dr. Lawrence Korngut (left) and Dr. Cory Toth (right).

Targeting drugs to the brain using the nose is not a new concept. However, this is the first time that researchers have tried using this approach to target the nervous system and treat diabetic neuropathy.

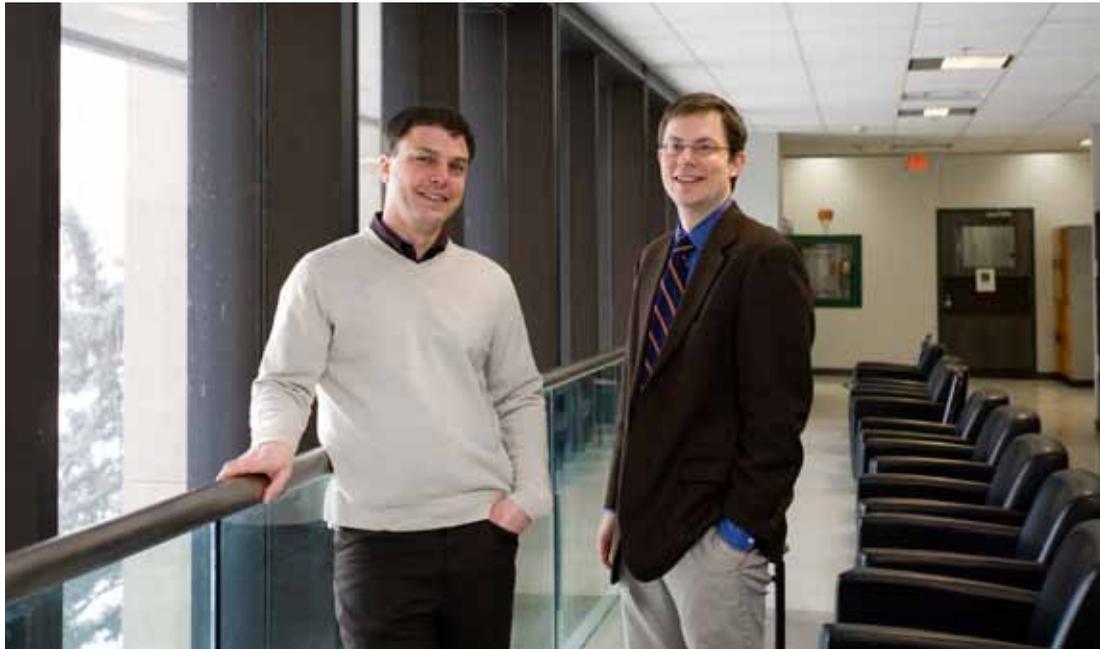
“The concept is very exciting for the field of diabetic neuropathy. This innovative treatment

a treatment. To think we may have a locally developed solution, or at least partial solution to the problem, is very exciting.”

The pilot study is an important first step before moving on to a larger clinical trial. The HBI’s Clinical Research Unit is facilitating the transition of Toth’s research from the

The pilot study is supported by the HBI. Dr. Cory Toth is an Alberta Heritage Foundation for Medical Research (AHFMR) Clinical Investigator. Dr. Lawrence Korngut is an AHFMR clinical fellow.

ATTRACTING BRIGHT NEW MINDS TO HBI'S STROKE & VASCULAR DEMENTIA PROGRAM



Dr. Sean Dukelow (left) and Dr. Eric Smith (right) are rising stars in the field of stroke research and patient care.

Young clinical scientists Drs. Eric Smith and Sean Dukelow are bringing their innovative approaches to help improve the outcome for stroke patients in Calgary.

Identifying Risk Factors for Vascular Dementia

Dr. Eric Smith joined the HBI last year after more than five years as a clinical researcher at Harvard Medical School. A native of Saskatoon, Smith was looking to return to Canada but says the outstanding stroke program in Calgary played a leading role in his decision to move.

"I wanted to come to an internationally recognized clinical research facility for stroke," says Smith, "and the innovative way the HBI brings together researchers and clinicians across multiple disciplines was a big part of that decision."

Smith is interested in understanding 'silent cerebral infarctions' - or silent strokes caused by blood clots that block the small blood vessels feeding the brain. Many of us suffer numerous silent strokes as we age without even knowing it; something neuroscientists believe contributes to signs of aging, such as, impaired memory and mobility.

By adapting clinical imaging tools, including functional magnetic resonance imaging (fMRI) and transcranial Doppler ultrasound, Smith wants to develop a diagnostic technique to measure silent strokes and help identify those most at risk of clinical stroke or cognitive decline due to Alzheimer's and vascular dementia - before it's too late.

"Once we can identify who is most at risk [of silent strokes], we can try to intervene to improve blood vessel health and stroke outcomes," he says.

Smith will be building on the success of fellow HBI imaging experts; Richard Frayne and Brad Goodyear and fellow stroke researchers; Marc Poulin and Andrew Demchuk, as he continues his search for new ways of determining the health of our blood vessels. Ultimately, Smith and his colleagues aim to ease the burden of stroke and cognitive decline in our community.



Dr. Sean Dukelow can accurately assess motor control with the robotic chair.

Targeting Stroke Rehabilitation With Technology

When it comes to improving patient outcomes following a stroke, effectively assessing the function that has been lost can be half the battle. That's why physical rehabilitation specialist Dr. Sean Dukelow joined the HBI, where he'll continue the development of an assessment-based tool to guide stroke rehabilitation, a project that has people talking.

According to the Heart and Stroke Foundation of Canada, more than 50,000 Canadians suffer from stroke each year. Nearly, 15 percent of these stroke patients die and 10 percent recover completely, but Dukelow is interested in the 75 percent that make up the spectrum of partial recovery.

"Stroke is fascinating in that a lesion (damage) can be very hard to correlate the anatomy to the functional outcome," says Dukelow.

According to Dukelow, this makes it very hard to tailor rehabilitation therapy to the individual stroke patient. Another problem is that physicians and therapists are still using a simplistic 7-point scale to assess the deficits in patient functioning caused by a stroke. Dukelow argues the scale is too narrow and too subjective to effectively gauge and tailor rehabilitation.

So Dukelow helped develop a fully customizable robotic stroke assessment tool.

Following a stroke, the patient sits in the robot; a chair with 'limbs' that support the

arms. These limbs have elbow and shoulder joints that allow free movement of the arms in a horizontal plane. Sensors in the joints calculate the position of the shoulders, elbows, and fingertips. Sensory data from the robot feeds into a computer which compares how the person did compared to the test movement.

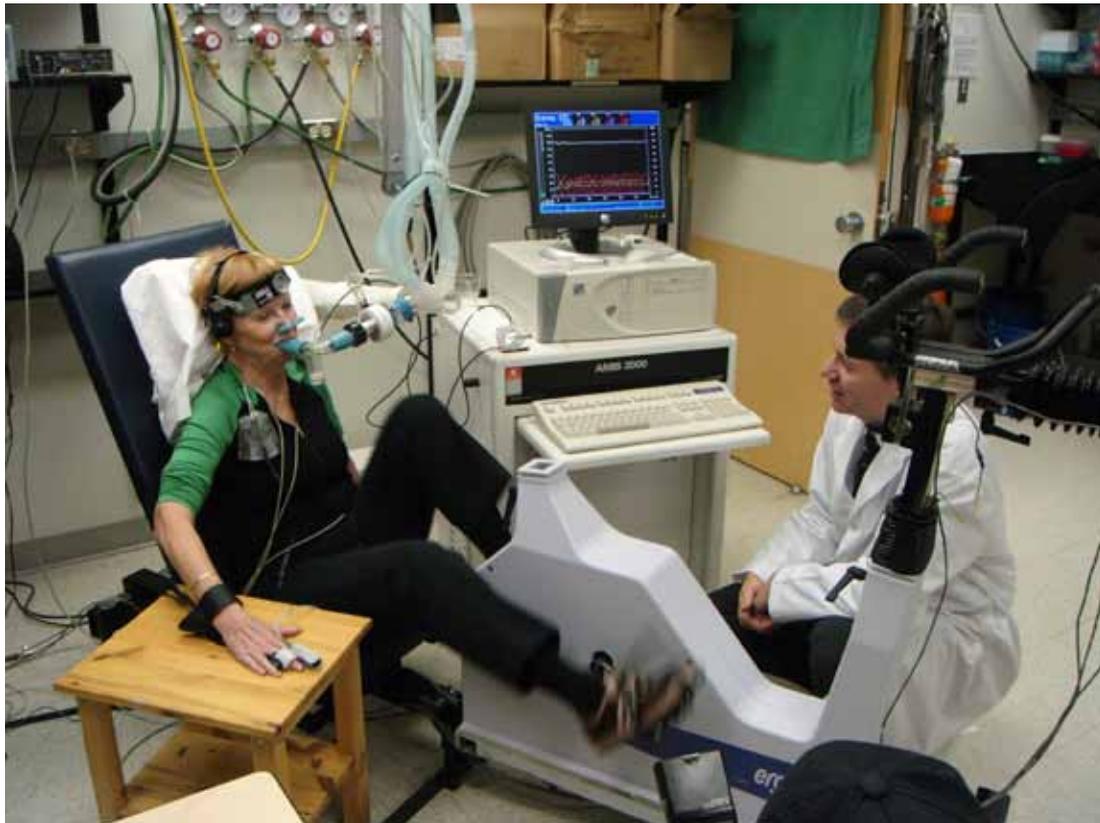
Using this setup, Dukelow can accurately assess deficits in a patient's motor control over a range of complex movements that involve the use of multiple muscle groups. This gives him a more comprehensive picture of the functional deficits caused by a stroke and, importantly, the identical test can be repeated to assess recovery over time. The robotic system gives a clearer, unbiased picture of stroke deficits and recovery, Dukelow says.

He's now working toward correlating the patient assessment data that is recorded by the robot with real-time human brain imaging, or functional fMRI, to get a better understanding of how the location of the stroke damage influences function.

As for his own research, Dukelow eventually wants to adapt his stroke robot as a sophisticated tool for rehabilitation. He says that after assessing the precise functional deficits left by a stroke, the robot could tailor specific resistance training programs to help train patients to recover their lost function.

"Now that we have the outcome measurement tool" says Dukelow, "we can develop physical therapies to modify that outcome in a positive way."

UNDERSTANDING HOW EXERCISE CAN IMPROVE BRAIN FUNCTION IN OLDER ADULTS



Dr. Poulin supervises an aerobic exercise program that measures physiological, biological and cognitive measurements from volunteers in the study.

The Canadian population is aging, and overall, people are living longer. In 2011, the first wave of baby boomers turns 65 years old.

This group will contribute to a doubling of the Canadian population over 65 years of age by 2025 and to a tripling in the number of centenarians by 2031.

As we age, our bodies face increased levels of oxidative stress, which is an imbalance in the body between pro-oxidant (damaging free-radicals) and antioxidant (protective) chemicals, with the balance tipped towards the free-radicals. Oxidative stress is involved in many diseases such as hypertension (high blood pressure) - a leading cause of cardiovascular and cerebrovascular diseases, such as stroke.

Dr. Marc Poulin, a member of the HBI's Cerebral Blood Flow Regulation foundational research theme, recently had his work published in *Hypertension*, the top-ranked journal in the field of hypertension, for his work uncovering the beneficial effects of aerobic exercise in decreasing oxidative stress in postmenopausal women.

"The results of the study suggest that after menopause, fitness levels and regular physical activity mediate against oxidative stress, while also reducing blood pressure and improving the brain's vascular responses," explains Dr. Vincent Pialoux, a former AHFMR

postdoctoral fellow in Poulin's lab. "This may help reduce the risks of stroke," says Poulin. "But we need to conduct an intervention study to understand the direct relationships among exercise, oxidative stress and blood pressure, before we can generalize these results to the greater population".

The unanswered questions from this earlier work led to Poulin setting up a long-term study to look at the effects of regular exercise on brain blood flow and its role in preventing cognitive decline in Canada's aging population. "We know that working out is good for our brains, but we don't know what key mechanisms are at play in this process."

Poulin successfully secured funding from the Canadian Institutes of Health Research (CIHR) to initiate this critical study. Poulin's research team is in the process of enrolling 250 participants (125 women and 125 men) between the ages of 55 and 75 in an 18-month study. The participants are undergoing a series of tests, from blood work to cognitive testing, to obtain their biological, physiological and cerebrovascular responses, as well as cognitive measurements, before and after a six-month supervised aerobic exercise training program.

"What we are examining in this study is how the changes in brain blood flow impact cognitive function in response to aerobic exercise training," says Poulin. "Then, we'll determine to what extent these changes persist after the completion of the training program. My expectations are that the improved blood flow and cognitive abilities should be maintained for some time after the training program has been completed."

Dr. Poulin feels that this study is very timely given the aging demographic of Canada's population. "The expectations aren't just about living longer - but about living well," he says. "Our goal is to establish a strong scientific basis to explain how exercise improves cognition and brain function in older adults. The implications are huge given age-related diseases, such as vascular dementia, Alzheimer's and stroke."

MS RESEARCH UPDATE

While inflammation often causes damage to the nerves of multiple sclerosis (MS) patients, a group of HBI researchers has been studying how neuroinflammation can instead be harnessed to repair the damage caused by this disease.

Dr. V.W. Yong's laboratory set out to test whether a drug that is used to treat MS symptoms, Copaxone or glatiramer acetate (GA), could also play a role in repairing the covering of nerves that have been damaged by MS. "We know the drug is safely used around the world but we wanted to know if GA offered any reparative benefits," said Claudia Silva, laboratory manager for the Yong lab.

In MS, axons (the wiring between cells) lose their protective covering, otherwise known as myelin. The myelin helps nerve cells transmit signals and without it axons cannot carry information as quickly or efficiently, which can lead to the short or jerky movements demonstrated by some MS patients.

Yong's team attempted to enhance the body's ability to repair axons by stimulating a specific immune cell to produce beneficial growth factors. The researchers isolated the TH2 helper cell and found that GA caused these cells to secrete several growth factors.

In various models of MS, the team saw that the application of GA produced positive indicators that damaged nerves were being remyelinated. These results could lead to an understanding that GA can not only treat the symptoms of MS but that it may also provide protection or repair for the nerve damage caused by this devastating disorder.



Dr. Glenda MacQueen brings an impressive research and leadership background to her role as director for the centre.

NEW MENTAL HEALTH CENTRE SET TO OPEN IN 2010

One in five Canadians will suffer from mental illness in their lifetime.

Given its impact on society, developing a better understanding of mental illness is a key focus for the HBI. The Mental Health Centre, a joint initiative of the HBI and its partner organizations the University of Calgary (UofC) and Alberta Health Services, will soon be opening its doors, helping to address this pressing issue.

Dr. Glenda MacQueen, Professor and Head of the Department of Psychiatry at the UofC, is the director of the new centre. She brings an impressive background in mental health research, education, and leadership, which will all be called upon as she develops the mandate for the centre and fosters strong interdisciplinary mental health research links across the city.

They key focus of the centre will be to combine knowledge from both biological and environmental research in order to predict, prevent, and change the trajectory of mental illness through early intervention.

“It’s not a question of nature versus nurture,” says MacQueen “because ultimately genetic and environmental factors will manifest themselves physiologically as a mental illness.”

MacQueen says understanding how these factors trigger changes in the brain’s functioning and learning how to better intervene when there is a risk for developing mental illness will form an integral part of the Mental Health Centre’s mandate. This goal might be closer than we realize because researchers are discovering something extraordinary, that different mental illnesses share a number of common features.

“The brain has only so many ways it can declare its sick” says MacQueen, “so you can see very discrete illnesses with overlapping biological markers.”

The Mental Health Centre will employ the latest research technologies to investigate these biological markers and other physical elements that are shared with mental illnesses.

In particular, our researchers will be looking for markers associated with mood disorders and psychosis.

One of these key technologies is brain imaging. Schizophrenia researcher and magnetic resonance imaging (MRI) expert, Dr. Thomas Raedler, was recently recruited to the new centre. He will work with other HBI brain imaging experts to help us better understand the anatomy of mental illness.

To understand mental illness at the cellular level, Dr. Jaideep Bains will lend his expertise in this area to the centre. As co-leader of the HBI’s Synaptic Transmission and Neural Systems research theme, Bains investigates how individual brain cells (neurons) or networks of neurons communicate with each other. This communication takes place at the part of the neuron called the synapse. Bains has found that external factors, such as stress, affect the transmission of communications and that this may contribute to the onset of mental illnesses.

The centre has also recruited Dr. Jean Addington, the UofC’s recently appointed Alberta Centennial Mental Health Research Chair. Dr. Addington believes that early intervention is the key to slowing or halting the progression of schizophrenia. Her work in the early detection and prevention of schizophrenia uses both brain imaging and the study of brain electrical activity (electrophysiology) to help decipher how brain function changes with the onset of psychosis.

With an all-star cast of dedicated researchers and support being provided by other HBI experts, new research in the physiology and early detection of mental health disorders endeavours to enable physicians to provide treatments earlier.

With a projected opening in 2010, the Mental Health Centre is poised to quickly become a centre of excellence in mood disorders and psychosis research on the world stage.



The Hotchkiss Brain Institute brings together a diverse group of experts and trainees in the pursuit of a common goal; the discovery and development of improved ways to prevent, detect and treat neurological and mental health conditions.

Hotchkiss Brain Institute

University of Calgary, Faculty of Medicine
HRIC 1A10, 3330 Hospital Drive NW
Calgary, AB T2N 4N1
www.hbi.ucalgary.ca