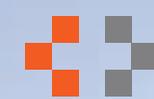




REPORT TO THE COMMUNITY
2010 - 2011: A YEAR IN REVIEW



HOTCHKISS
BRAIN INSTITUTE



**HOTCHKISS
BRAIN INSTITUTE**

The mission of the Hotchkiss Brain Institute (HBI) is to be a centre of excellence in neurological 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

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Stay Connected

In addition to our annual Report to the Community, 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
 - Follow us on Twitter @HotchkissBrain

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Cover: Neuroendocrine cells in the hypothalamus and their fibers arching to the pituitary where they release hormone into circulation.

Photo Credit: Cheryl Sank, Research Technologist, Bains lab

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MESSAGE FROM THE HOTCHKISS FAMILY

As we look back on another year at the Hotchkiss Brain Institute, I am struck with a sense of pride and appreciation. Our family and friends have been closely involved with the HBI from the beginning and we've been able to see great progress and impact, thanks to the support received from the community. This past year we've seen that momentum continue and I am pleased that several new initiatives have developed as a result of commitments made by both continuing and new supporters of our Institute.

I was particularly pleased to see the gift made by our daughter Brenda Mackie and her husband Jamie directed towards improving neuroscience education, with the newly established Mackie Family History of Neuroscience Book Collection. As avid book lovers and believers in education, Brenda and Jamie felt that this gift would be a meaningful way to provide a lasting legacy for students and researchers in Calgary and ultimately around the world. Our family takes great pride in being involved with the HBI and I am thankful to them for their help establishing this valuable educational resource.

People in Calgary and beyond have really come together to provide tremendous support to the Hotchkiss Brain Institute over the past six years. This continued recently when a long-time friend and

business associate, John Lamacraft, took it upon himself to bring together a group of people, including all of our children, and get behind the creation of the Rebecca Hotchkiss International Scholar Exchange Program. This new initiative will allow the Institute to bring international neuroscience leaders to Calgary, and will also allow our faculty, fellows and students to go out and exchange ideas with leading neuroscientists around the world. The commitment from John and the response from our friends has been truly overwhelming, and on behalf of Rebecca and myself, I would like to thank everyone involved for their support.

Finally, I would like to take a moment to thank our Institute's Director, Dr. Samuel Weiss for his tireless efforts and outstanding commitment. Sam's passion and drive continue to move the Institute forward on many fronts. I believe that together we are making the Hotchkiss Brain Institute a world leader in brain and mental health research, which leads to outstanding patient care for Albertans.





Dr. Samuel Weiss

MESSAGE FROM **THE DIRECTOR**

I am pleased to be able to look back on another exceptional year at the HBI. In this year's Report to the Community, you will see some examples of how our themes and programs continue to advance their collaborative research and education efforts in the lab and clinic. We have also continued to enjoy incredible support from our community and stakeholders – enabling us to elevate the success of the institute as a whole and work towards our goal of enhancing neurological and mental health research and education.

Late in 2010, we welcomed back the members of our Expert Advisory Committee (EAC) for their third site visit in Calgary. This group of distinguished scientists represents the top tier of scientific leadership in neurological and mental health. Once again, the EAC has provided us with a very positive 'report card' on our achievements and future plans.

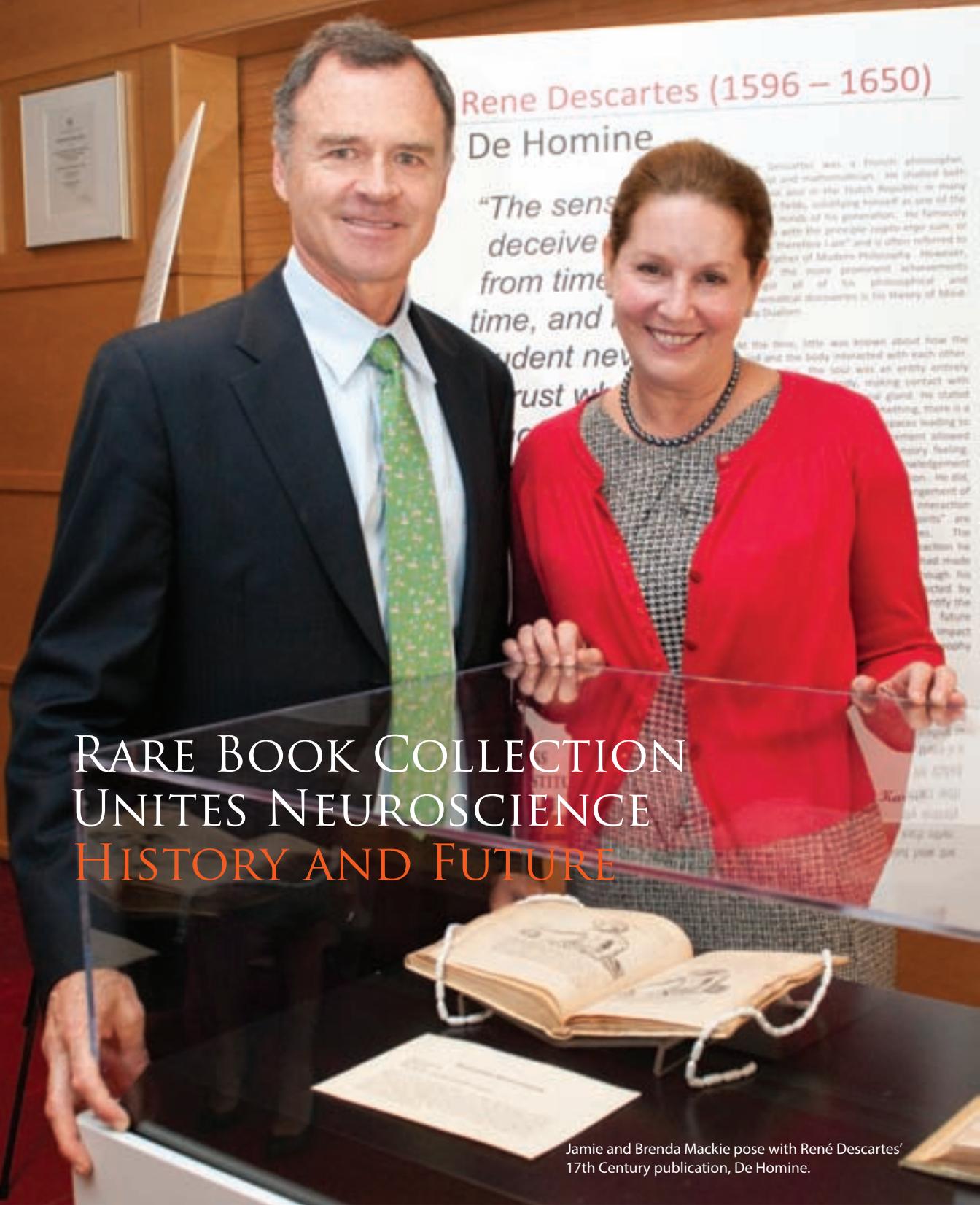
Another measure of our ongoing success is the amount of externally reviewed, competitive research and education funding secured from granting agencies – such as the highly competitive 'gold standard' Canadian Institutes of Health Research (CIHR). When we look at the growth in overall competitive funding received by HBI members, it has climbed from \$18 million per year when the Institute first started to \$32 million last year! We are fortunate to have a highly regarded and talented group of scientists in the HBI and we are constantly working to attract the best new recruits to join us. Community donations allow us to significantly enhance our collective success as an institute and expand the scope of our research and education efforts.

We have made the translation of research discoveries into improved health care a priority from day one of

the HBI. This has led us to support groundbreaking initiatives, such as the HBI Clinical Research Unit (CRU). The CRU allows our members to launch new clinical trials, to evaluate the effectiveness of new ways of diagnosing and treating neurological and mental health conditions. The CRU began by supporting three clinical trials designed and run by HBI Investigators in 2007 and by 2010, that number had grown to 20 trials. The CRU is another incredible success story, only made possible with the support of our community.

Late last year, a whirlwind of activity led by HBI supporter John Lamacraft led to an outpouring of support from the community for a new international exchange initiative at the HBI. This program will allow the HBI to extend its reach to the international neuroscience community and allow for unprecedented collaborations. Having the resources to bring the world's best and brightest minds to Calgary, and to send our top scholars to the top neuroscience centres, will enhance the global reputation of the HBI and magnify the impact of our work.

I would like to offer my sincere thanks to everyone who has contributed to the Institute's achievements over the past six years. The commitment to our shared success by our community of supporters and the Hotchkiss family continues to both impress and amaze me. Our exceptional cadre of researchers and trainees will continue to advance neurological and mental health research and education. I'm looking forward to another year of groundbreaking discovery and innovative education activities at the HBI. Thank you for your ongoing interest and support.



RARE BOOK COLLECTION UNITES NEUROSCIENCE HISTORY AND FUTURE

Jamie and Brenda Mackie pose with René Descartes' 17th Century publication, De Homine.

The brain is one of the most complex, yet least understood parts of the human body and philosophers and scientists around the world have been working for hundreds of years to unravel its many mysteries. This rich history of insights and discoveries provides the foundation for HBI research and education today.

Recently, the HBI acquired a comprehensive collection chronicling centuries of neuroscience history. Thanks to a gift from Calgary community leaders Brenda and Jamie Mackie, the University of Calgary has obtained a rare set of more than 2,400 historical neuroscience texts, some of which date back to the 17th century.

The collection has officially been named the Mackie Family History of Neuroscience Collection.

"It is remarkable to hold in your hands something that is 500 years old, and is so well preserved," says Brenda Mackie. "The fact that the knowledge contained within these pages is relevant today is truly inspiring. It means a lot to us that this collection will be used, and valued by so many."

The complete collection was purchased from a retired Houston neurologist and book collector, who amassed these rare volumes through 30 years of determined effort. The collection includes some of the seminal works of science, such as an original copy of the 1953 Nature paper where Nobel laureates James D. Watson and Francis Crick first described their discovery of the double helix structure of DNA.

"This collection will drive comparison, innovation, reflection, inspiration and consequently performance, and we are honoured to be a part of that."

While the rarest and most fragile texts will be stored and handled carefully, many of the books are readily available to students and faculty who are conducting research or are simply interested in reading about neuroscience history. Each of the books will also be digitized – a process that will make them available to the global neuroscience community via the Internet.

This incredible donation by the Mackie family has quickly proven itself as a valuable resource to HBI students and faculty and some of the texts have already been used by HBI members for their scholarly publications. Vikram Karnik, a third-year undergraduate student, spoke at the event and could hardly contain his excitement about the collection. "For students like me with a passion for neuroscience, having these books on campus is like having a local version of the Louvre or the Met. They truly are that fascinating," he says.

"We now have the ability to hold the seeds of neurological science in our hands and with the click of a mouse, send it immediately somewhere else in the world," remarks Jamie. "This collection will drive comparison, innovation, reflection, inspiration and consequently performance, and we are honoured to be a part of that."

EDUCATING THE NEXT GENERATION OF NEUROSCIENCE LEADERS

In 2008, the University of Calgary launched the Bachelor of Science in Neuroscience program (BSc Neuro), which is set to celebrate its first graduating class in 2012. This interdisciplinary undergraduate program offers a number of unique features and student opportunities, made possible by a generous donation from the Calgary-based Kahanoff Foundation.

In addition to boasting small class sizes and an intensive field course, BSc Neuro students also have the opportunity to gain real research project experience in HBI labs and receive mentorship from HBI members, fellows and graduate students.

Laura Ansell, now a third year student, is a member of the inaugural class and talks about the many ways that the BSc Neuro program stands out from other undergraduate programs. "Having experts from the HBI teach is invaluable to our education," says Laura. "And the fact that we have access to HBI scientists and trainees and are exposed early to research further elevates the program."

This unique undergraduate program emphasizes the HBI's commitment to educating the next generation of neuroscience leaders.



Laura Ansell presents posters summarizing two historical texts at the Mackie Family History of Neuroscience Book Launch.



Nabeela Nathoo

UNITING RESEARCHERS IN THE FIGHT TO END MS

Multiple sclerosis (MS) is a devastating and complex neurological disease that is most commonly diagnosed in young adults. Canadians have one of the highest rates of multiple sclerosis in the world. In Alberta, MS affects almost one in every 350 people – nearly twice the rate of MS in central Canada.

At the HBI, we have assembled a world-class team of scientists, neurologists, imaging experts and population health researchers to treat and

investigate MS. Led by Drs. V. Wee Yong and Luanne Metz, the HBI's MS Translational Research Program is integrating research in the lab and clinic with comprehensive education and training activities to advance the fight against this debilitating disease.

In MS, the nerve cells of the central nervous system (CNS) sustain damage to their protective covering, known as myelin. Without this protective sheath, nerve cells are not able to relay electrical signals

properly and this results in varying degrees of disability affecting vision, hearing, memory, balance and mobility.

One major avenue for MS research is investigating the role that the body's immune system plays in the progression of the disease. As Dr. Shalina Ousman explains, "Normally our body's immune response is a good thing, but in MS, the immune system has turned against the body's own nerves".

"Normally our body's immune response is a good thing, but in MS, the immune system has turned against the body's own nerves."

Since arriving at the HBI in 2008, Ousman has been looking at the body's own defensive mechanisms and why they aren't able to stop the disease. Her current research focuses on a molecule called alphaB-crystallin, that is found in high levels in the brains of MS patients. Dr. Ousman and colleagues discovered that this molecule has anti-inflammatory and neuroprotective properties but these protective functions appear to be disrupted in MS patients. Her work focuses on examining ways to enhance the function of alphaB-crystallin as a potential therapy for MS.

Fellow HBI researcher and co-leader of the HBI MS Program Dr. V. Wee Yong also looks to the body's immune response as a possible key to unlocking the mystery of MS. In early 2010, Yong identified a molecular switch that could block immune cells from entering the central nervous system and causing damage to the nerve cells in MS patients.

"Our data suggests that if we target [this switch] in patients with MS, we may reduce the injury to the brain and spinal cord that is caused by immune cells," explains Yong.

The research being conducted in foundational science laboratories such as those run by Yong and Ousman is being directly translated into the clinical setting. Dr. Luanne Metz, a neurologist and co-leader of the HBI MS Program, is currently leading clinical trials and collaborating on pilot studies based on research that has come directly from the labs of Dr. Yong and Dr. Ousman.

"We are at the frontier of promoting neural repair in MS patients and the translational nature of work being done at the HBI is allowing us to progress rapidly," says Dr. Yong. "Furthermore, we are increasing collaborations among researchers and trainees and expanding MS research into other areas that is also generating significant potential."

One such example can be found in the work of first-year graduate student Nabeela Nathoo. Nabeela is hoping to improve diagnostic imaging of MS by using an iron-sensitive magnetic resonance imaging (MRI) technique. Previous research has shown that this type of imaging reveals lesions in MS patients that are not visible using more conventional methods. Together with her supervisor, Dr. Jeff F. Dunn, Nabeela is working with an animal model to explore the possible role of iron in MS.

"This work is significant because by using an animal model, imaging scientists can learn a lot about the MS brain that wouldn't be possible by looking at a human patient," says Dr. Yong. "This work can teach us what the images represent and we can then take that knowledge and apply it in the clinic."

Nabeela was able to join the HBI team through a funding award that was provided by the endMS Network. Formed to accelerate discovery in the field of MS research, this network is an initiative of the MS Society of Canada and it has five regional centres across the country. Here in Calgary, the HBI is home to the Alberta endMS Regional Research and Training Centre.

"One of the greatest things about the endMS Network is that it provides so many opportunities for MS researchers to connect with one another," says Nabeela. "We are all working towards the same goal, so having the chance to learn from each other is really advancing the science at a rapid pace."

By fostering an environment that encourages collaboration, the HBI is developing a clearer picture of how the pieces fit together in MS.

As Dr. Yong explains, "it's about increasing capacity and enhancing the quality of research and training. The HBI is doing this by nurturing the spirit of collaboration not only within the Institute, but across Alberta and across the country".



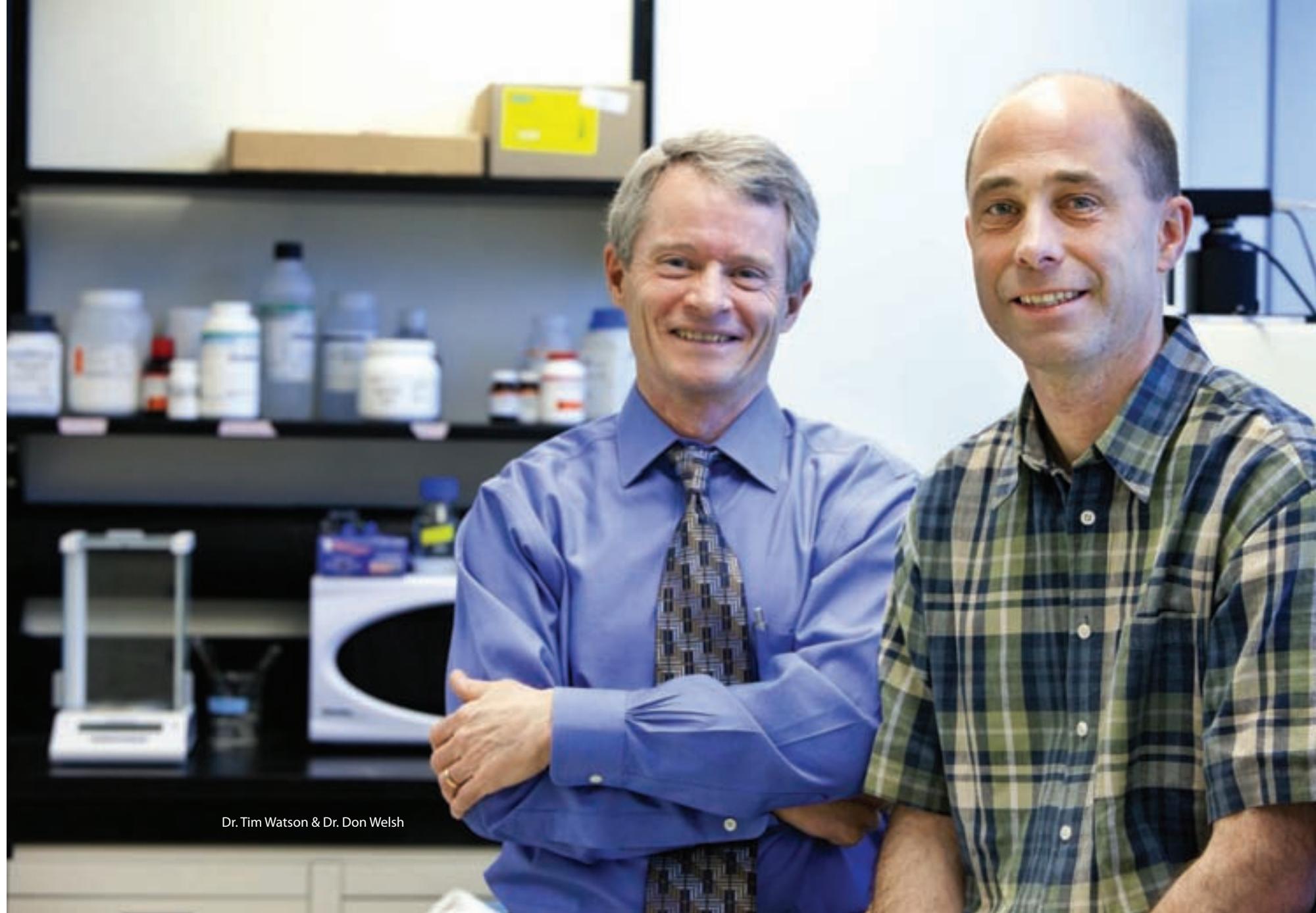
ENHANCING STROKE RESEARCH THROUGH COLLABORATION

Each year nearly 50,000 Canadians will have a stroke and of these, approximately 12,000 will die. One in six Canadians will have a stroke over their lifetime and its magnitude as a health care concern has made it a high priority at the HBI.

The HBI's Cerebral Circulation Research Theme was initiated with the principal goal of bringing together researchers studying various aspects of brain blood flow. With the intent of bringing together key individuals to share perspectives gained from laboratory, clinical, and brain imaging research the Cerebral Circulation theme and corresponding Stroke and Vascular Dementia Translational Research Program is providing a foundation for new collaborations and the potential for more effective ways of preventing, detecting, and treating stroke.

HBI member Dr. Tim Watson is a stroke neurologist with the Calgary Stroke Program at the Foothills Medical Center. Most of the patients he deals with have ischemic stroke, which is caused when a blood clot blocks an artery to the brain. For appropriate patients with ischemic stroke, treatment involves administering a clot-busting drug called tPA. Although this drug is effective, it can only be administered to 5-10% of stroke patients. Dr. Watson explains "most of my patients are either too late getting to the hospital to receive tPA or their clots are resistant to it. At this time we have no other effective treatment options". This ongoing challenge has prompted Watson and his colleagues to pursue alternate solutions to enhance blood flow and reduce the extent of brain damage.

Smooth muscle researcher Dr. Don Welsh is a basic scientist and member of both the HBI and the Libin Cardiovascular Institute of Alberta (LCIA). Welsh runs a lab that studies how the electrical activity of smooth muscle cells causes the dilatation or contraction of arteries.



Dr. Tim Watson & Dr. Don Welsh

Both Welsh and Watson believe that increasing blood flow through collateral arteries in the brain will produce better clinical outcomes following stroke. "In some patients, this therapy would increase the time window available to break up the clot and re-establish flow to the brain tissue at risk," Watson explains enthusiastically. "This could significantly reduce brain damage during an acute stroke."

Welsh explains the importance of successfully demonstrating new approaches in the lab first. "We know that blood flow is necessary to survival of brain tissue, but we need solid evidence to prove the efficacy of increased blood flow in conjunction with tPA before moving it to the clinical setting.

This is why conducting the foundational research in the laboratory is so important." In keeping with the HBI's mission to translate advances in basic science to clinical care, Watson explains "this collaboration between a clinical and basic scientist is bringing the problem rich environment of clinical medicine to the solution rich environment of the research lab."

Working with his clinical collaborators, Welsh will first proceed in model systems, including human tissue (arteries) that has been obtained through surgical procedures. Welsh hopes that positive results in his lab will allow Watson and his fellow stroke neurologists to then test new techniques in clinical trials.

The partnership established between Drs. Welsh and Watson is testament to the value of inter-institute collaboration such as this one between the HBI and the LCIA. It also serves as one example of the productive scientific connections developing under the HBI's Cerebral Circulation theme and its closely connected HBI Stroke and Vascular Dementia Translational Program.

"We believe we can develop an important treatment for stroke that will improve patient outcomes and reduce the impact of this terrible disease," says Watson "and for the stroke patient, that's all that really matters."



Dr. David Zygun

FIGHTING FOR BETTER BRAIN INJURY OUTCOMES

If you've ever had a car accident or severe fall, there's a chance you've suffered some degree of brain trauma. Traumatic brain injury (TBI) occurs when the head receives an impact forceful enough to injure the brain. It's the leading cause of injury and death in otherwise healthy young Canadians, striking without warning and leaving damage that can last a lifetime.

Dr. David Zygun knows better than most just how destructive brain trauma can be. He's a neurocritical care doctor and a researcher at the HBI. Eleven years ago, during his clinical residency, the challenge of dealing with head injuries sparked Zygun's interest in neurocritical care. He recalls vividly that patients were coming in and not always doing well.

"That summer, we worked really hard but still had very poor outcomes" he says.

The frustration of seeing some lives destroyed while others with the same injury recovered fully, proved pivotal in Zygun's decision to specialize in neurocritical care and devote his career to research that would improve outcomes in neural trauma.

Calgary's Foothills Medical Centre has the second largest trauma unit in Canada, seeing around 120 severe TBI patients a year, and that's just the tip of the iceberg says Zygun. That figure excludes the individuals who succumb to their injuries before they reach the intensive care unit (ICU), as well as two to three thousand less severe injuries a year in

Calgary alone and untold others who never seek medical attention.

Despite great advances in our understanding of the brain, relatively little is still known about neural trauma. Every TBI presents with a distinct combination of axon and blood vessel tearing and bruising that can leave irreversible cognitive and functional deficits – or worse. The individual nature of the initial injury makes TBI harder for doctors to treat and for researchers to study.

The picture is complicated by secondary injuries: processes that are initiated by the damaged brain that cause further damage. Minimizing secondary injuries, such as cerebral ischemia (insufficient blood

flow to the brain), stroke, haemorrhage, swelling, programmed cell death and seizures, is a large part of what Dr. Zygun and his colleagues strive to prevent every day. While they can do little to prevent brain injuries from occurring in the first place, Zygun believes that with continued research, we'll be able to achieve much better secondary injury outcomes over the next decade.

"We're not going to cure traumatic brain injuries, but we can make the outcomes a little better," he says.

Zygun and his colleagues routinely use a number of tools to monitor neural trauma. Along with visualizing the TBI with magnetic resonance imaging (MRI), they complete the picture with sophisticated monitoring, using probes and sensors inserted as close to the site of injury as possible. This data can be used in the ICU to make better informed decisions as well as for research studies after the patient has left the ward.

"We're not going to cure traumatic brain injuries, but we can make the outcomes a little better"

"With imaging and additional biological monitoring, we're able to see how the brain is responding to different stages of injury and whether or not our therapies are having an effect," says Zygun, "so once we know we're heading in the right direction, we can then direct therapies that are clinically relevant."

Of course neurocritical care research is a team effort. Highly dedicated clinicians and nurses rely on collaborations with HBI laboratory scientists such as Dr. V. Wee Yong to validate new treatment approaches in the lab. In this way says Zygun, the institute is helping advance outcomes in neurocritical care.

"The ability to work alongside basic and clinical scientists, and test ideas and analyse clinical samples in the lab is one of the strengths of the HBI," he says. "Currently, we are looking for new and better ways of minimizing the injury that occurs following trauma to the brain, and the HBI is providing us with a great opportunity to do that."





Dr. Jaideep Bains

INVESTIGATING THE EFFECTS OF STRESS ON BRAIN CIRCUITRY

We are all familiar with the unpleasant physical symptoms of stress – things like headache, irritability, and fatigue – which all stem from activity in our brain. The ability to respond to stress is an essential survival tool. However, when the stress system responds inappropriately, it can lead to mental health conditions such as depression and anxiety disorders.

How the brain reacts to stress, through changes to cells and circuits within the brain, remains for the most part, a mystery. HBI researcher Dr. Jaideep Bains is working to understand how stressful situations can lead to long-term changes in brain circuitry and the functioning of individual brain cells, or neurons.

One of the leaders in the HBI's Neural Systems and Behaviour Research Theme, Dr. Bains has had his groundbreaking studies on brain circuits and

signaling published in the world's most prestigious journals. The Bains lab uses cutting edge tools to visualize and record minute changes in the activity of single cells in their quest to better understand the biology of mental health.

Bains focuses on circuits in the hypothalamus, which is the brain's command-centre for stress responses. He and his team discovered how neurons in that area of the brain control the levels of stress hormones in the body. They also found that the brain's response to stress depends on how that stress is encountered.

"For example," explains Bains, "we already know that repeated exposure to the same stressor changes your reaction to it over time. What we've discovered for the first time are some of the key cellular mechanisms that may be responsible for these changes." These

adaptations are critical to allowing the brain to filter out stressors that are not threatening.

"We already know that repeated exposure to the same stressor changes your reaction to it over time. What we've discovered for the first time are some of the key cellular mechanisms that may be responsible for these changes."

Most recently, Bains also discovered a means through which the brain can respond rapidly to unique stressors. So, while it may adapt over time to a constant source of stress, the brain continues to remain vigilant for new perceived threats that may appear. Bains has uncovered a mechanism that may explain how a new source of stress can prime the brain to react even more robustly to subsequent stressful events.

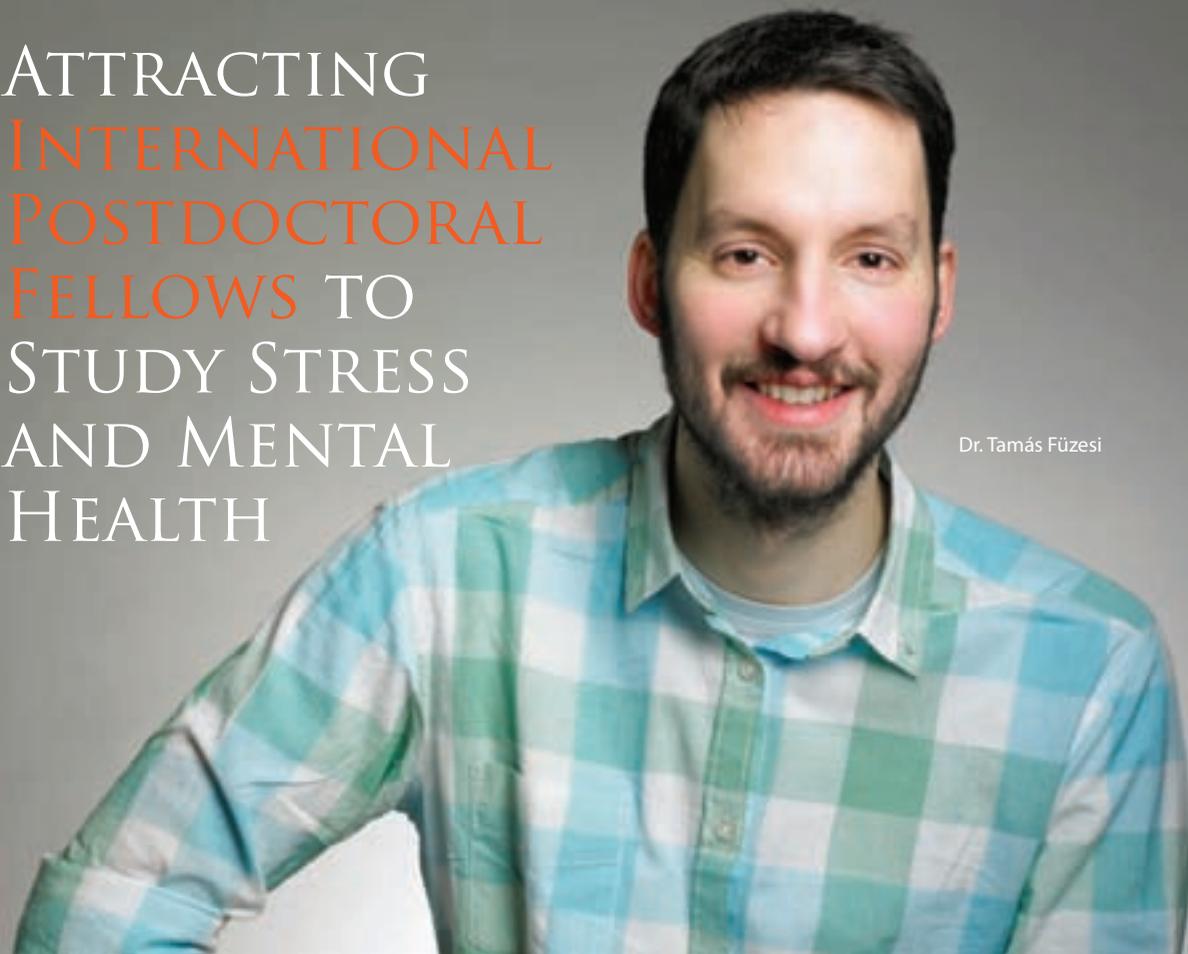
"We have discovered that stress signals arriving in the brain leave a molecular imprint on brain cells that lasts for several days," explains Bains. "We then observed that these imprinted cells reacted more strongly to subsequent stressors."

By understanding how stress leads to long-term changes in brain circuitry, Bains hopes that we can learn how to "switch off" the brain's inappropriate responses to unpredictable stress. Understanding how the brain's stress command-centre can discriminate between a repeated stressor that is harmless versus one that requires an immediate response is a vital step towards the development of new ways of treating or preventing the disorders caused by stress.

"At the end of the day what we are striving for is understanding the factors that create the balance between stress resilience and vulnerability. We want to have the ability to experience stress, respond appropriately, and then move on with our lives."



ATTRACTING INTERNATIONAL POSTDOCTORAL FELLOWS TO STUDY STRESS AND MENTAL HEALTH



Dr. Tamás Füzesi

Attracting outstanding postdoctoral fellows (postdocs) to work alongside researchers is one way that the HBI is elevating our research activities to new heights. These recent PhD or MD graduates who are working to further their knowledge in a specific field, bring exciting new perspectives and valuable contributions to the HBI. In light of this, we are excited to be celebrating a very important milestone.

The results of the March 2010 Alberta Innovates-Health Solutions (formerly AHFMR) Fellowship Award competition have given the HBI a reason to be proud. This highly competitive funding competition, open to postdocs in health research across Alberta, has an average success rate of less than one third for all applicants. In an unprecedented result in this competition, nearly half of the fellowships awarded province-wide (9 out of 21) went to new postdocs undertaking training fellowships at the HBI.

It's a moment that speaks volumes about how far the HBI has come and how far it will go in the future.

A CULTURE OF SUCCESS

When the HBI was established in October 2004, a conscious decision was made to develop a culture of collectivism, the principle being that the success of your nearest neighbour and the institute as a whole, invariably impacts your success as well.

"We didn't want to just create a space where people could reside, but an environment where people could thrive," says HBI Director Samuel Weiss.

The move has paid off. Within six years, the HBI has distinguished itself at the national level, growing to over 120 members and an even larger number of trainees, and contributing significantly to neuroscience research and education in Canada.

"The peer review system is really speaking to the quality of the science and people involved," says Weiss, "and I believe this is the first sign that we are beginning to attract a cadre of highly qualified postdoctoral scientists from around the world that want to continue their training at the HBI."

FRESH PERSPECTIVES FOR STRESS AND MENTAL HEALTH RESEARCH

Among that new cadre are two accomplished postdocs who recognized that continuing their training at the HBI would give them a competitive edge.

Dr. Tamás Füzesi wants to be at the forefront of hypothalamic research, at the level of the nerve cell, and he knew that working with HBI member Dr. Jaideep Bains would get him there. Bains is a world leader in investigating the long-term changes in the hypothalamus. This brain structure acts as a critical link between the brain and our hormonal systems and control's the body's stress response – a key area of research in the Bains lab.

"Hypothalamus electrophysiology is a very specialized field, and only a few laboratories apply these methods in the world," says Füzesi, "so working at the HBI with Jaideep is an amazing opportunity."

But Füzesi will also bring fresh perspectives to the Bains lab. Joining the HBI from the Hungarian Academy of Sciences, Füzesi already has an outstanding publication record and an equally impressive list of peer-reviewed awards he has received. The HBI's growing international reputation is drawing highly skilled and experienced researchers like Dr. Füzesi from around the world, for further training with HBI scientists, like Dr. Bains, who are recognized as leaders in their field.



Dr. Stefanie Hassel

Dr. Stefanie Hassel has also travelled a long way to join the HBI. For her second postdoctoral fellowship she's building on her previous experience applying neuroimaging tools towards understanding the ways that brain function is affected in mental illness.

Hassel is teaming up with Professor and Head of the Department of Psychiatry, Dr. Glenda MacQueen, who studies the clinical, functional and biological changes associated with mood disorders.

"My research interests overlap tightly with Dr. MacQueen's," says Hassel, "and the HBI is a great environment for us to do that research - it has a lot to offer."

German-born Hassel did her PhD training in the UK before moving to Pittsburgh for her first postdoctoral position, where she developed expertise in magnetoencephalography (MEG). Using the HBI's state-of-the-art neuroimaging facilities, she'll be working to increase the accuracy of diagnostic tests for bipolar disorder by integrating multiple techniques including functional magnetic resonance imaging (fMRI) and diffusion MRI. The HBI's rapidly expanding expertise in mental health research combined with its brain imaging research strengths is attracting the next generation of talented scientists, like Dr. Hassel, to launch their research careers at our Institute.

THE ROAD AHEAD

According to Weiss, the improved cadre of postdocs will immediately elevate the quality of HBI research, with more outstanding research fellows applying their expertise to our most significant research questions.

"They'll bring an ongoing, novel perspective that replenishes ideas and approaches so [we're] always coming up with new ways to attack old problems," says Weiss.

He's also confident that we will see the HBI become a 'force to be reckoned with' internationally, with even more accomplished postdocs seeking to train here. Between the seamless integration of laboratory and clinical research in neurological and mental health and the dedication to education and training, Weiss believes the HBI offers a quality training environment that's hard to beat anywhere.

"If you want a long term career trajectory, it's about the number of tools you have in your toolbox and I believe the HBI is a great place to acquire those tools," he says.

Our new postdocs are bright, enthusiastic, and bringing fresh ideas to the existing strengths of the HBI. The quality speaks for itself and Weiss believes, that's just the beginning.



Understanding the biological basis of mental illness is a key focus for the HBI. That's why we're proud to announce that Dr. Frank MacMaster has joined us to help work on this important research initiative. Dr. MacMaster will conduct his research jointly within the HBI and the Alberta Children's Hospital Research Institute for Child and Maternal Health (ACHRI) and is the inaugural Cuthbertson and Fischer Chair in Paediatric Mental Health.

"If you're interested in making a dent in mental illness you've got to look in adolescence because many of the major disorders start during this period," says MacMaster.

MacMaster wants to understand how mental illnesses develop in children. At the HBI, he'll be leading a multidisciplinary team of researchers including psychiatrists, psychologists, postdoctoral fellows and students of all levels to investigate the early stages of these conditions: a critical first step in developing screening and diagnostic tools, and therapies in the future.

NEW APPROACHES

According to the Canadian Mental Health Association, one in five Canadian kids is affected by mental illness. Yet despite this prevalence, MacMaster argues that not enough advances are being made in mental health using traditional psychiatric approaches.

"Usually in psychiatry, discovery goes from pharmacology to pathophysiology, starting with medication and developing a hypothesis about it," he says. "But to truly advance, we need to go the other way, starting with a biological understanding of the disorder and then targeting treatment based on that."

"If you're interested in making a dent in mental illness you've got to look in adolescence because many of the major disorders start during this period!"

Before moving to Calgary, MacMaster and his colleagues took this approach, becoming the first group to look at the biological underpinnings of paediatric Obsessive Compulsive Disorder (OCD), and opening up previously unexplored avenues of OCD research in the process. That work led to a National



Dr. Frank MacMaster

INVESTIGATING THE ORIGIN OF MENTAL ILLNESS

Institutes of Mental Health (NIMH) sponsored clinical trial, to test a drug that modifies the chemical imbalance seen in the brains of paediatric OCD patients.

At the HBI, MacMaster will be applying a similar multimodal approach and cutting-edge technologies to understand paediatric mood disorders, including bipolar disorder and major depression. In addition to using magnetic resonance imaging (MRI) to look at structural changes in key brain areas associated with mood disorders, he'll apply diffusion tensor imaging (DTI) to see how those brain regions are connecting and changing over time and MR spectroscopy to look at chemical changes in those regions.

A GREAT PARTNERSHIP

While his combination of psychology and brain imaging expertise and an innovative approach to mental health research made him the clear choice for the Cuthbertson and Fischer Chair, MacMaster says the Chair provided him with an amazing research opportunity.

"Calgary has a real can-do attitude when it comes to research, they're not afraid to try new ideas and approaches," he says.

MacMaster believes that working with well-organized institutes such as the HBI and ACHRI, which are supported by strong partnerships between donors,

government and the University of Calgary, will give him the best opportunity to continue to produce high quality research results. But the biggest draw, he says, is the patient community in southern Alberta.

"The degree of research savvy that the public has, and their willingness to participate is amazing here," he says. "A lot of families are excited and willing to participate in research, and that's huge."

With over 3000 mental health patients coming through the Alberta Children's Hospital each year, this partnership means MacMaster and his colleagues will get the answers they need, faster. In turn, this will have a major impact on mental health in our community.



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.



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