



**HOTCHKISS  
BRAIN INSTITUTE**

Strategic Plan 2015

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INTRODUCTION

## INTRODUCTION

### EXECUTIVE SUMMARY

The Hotchkiss Brain Institute (HBI)'s 2015 strategic plan launches the next decade for the Institute, with a revitalized vision of *“healthy brains for better lives”* and a renewed mission, *“to inspire discovery and apply knowledge towards innovative solutions for neurological and mental health disorders.”* This strategic plan also recognizes a new role for the HBI, as leaders of the University of Calgary's Brain and Mental Health Strategic Research Theme. The HBI's organizational governance model has been updated to reflect the Institute's expanded mandate.

The primary strategic research goal of the HBI is to achieve internationally recognized key discoveries and transformative clinical research in the neurosciences and mental health. This goal will be reached with the introduction of a *“NeuroDiscovery Framework”*, which aligns research within three themes of Brain & Behaviour, Neural Injury & Repair and Healthy Brain Aging. Each theme is composed of a number of *“NeuroTeams”* organized in a translational continuum, which includes basic, clinical, population and public health researchers. The teams build on a springboard environment of NeuroTechnologies, Core Facilities and support programs that will allow them to pursue their research goals. The HBI education program aims to position the HBI as the premiere place to train in the neurosciences and mental health in Canada, by becoming a training centre of choice at all post-secondary training levels and offering enhanced opportunities that equip trainees to become successful leaders in their chosen career paths. The HBI is committed to engaging with the community and partners, as a locally relevant and internationally recognized centre of excellence for brain and mental health. The community engagement goals of this plan will be achieved by becoming a hub for brain and mental health knowledge within Calgary, involving the community in the HBI's stewardship and building impactful partnerships that advance and enrich brain and mental health research and education at the University of Calgary.

### ABOUT THE HOTCHKISS BRAIN INSTITUTE

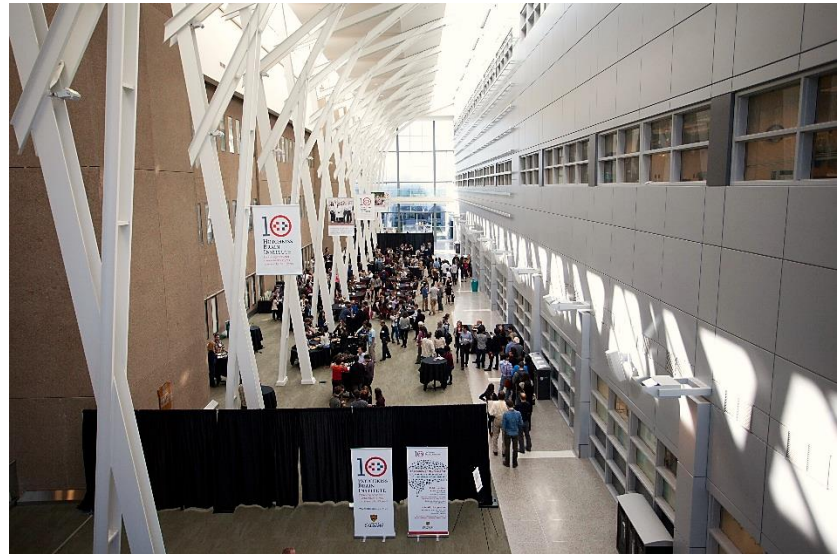
One in three Canadians will be affected by a brain or nervous system illness, disorder or injury within their lives. Brain and mental health conditions span the life cycle, with 75 per cent of major mental illnesses beginning during adolescence and dementia-related health care taking over as the largest financial burden on the Canadian health care system due to our aging population. Remarkable progress has been made in understanding the processes of the central and peripheral nervous systems and applying new discoveries toward the treatment of neurological diseases and mental health disorders. Yet the brain remains the least understood organ in the human body; there is a great deal to learn. Rising to the grand challenges of understanding the brain, basic and clinical researchers of the Hotchkiss Brain Institute are dedicated to making new discoveries and contributing to health care solutions, for this generation and the next. This is the role of the Hotchkiss Brain Institute.



The Hotchkiss Brain Institute is an internationally recognized centre of excellence in brain and mental health research and education, fully engaged within the enterprising city of Calgary, Alberta, Canada. The HBI began within the University of Calgary's Faculty of Medicine – recently renamed as the Cumming School of Medicine. In the early 2000s, neuroscience faculty members began a discussion with community leaders and the Calgary Health Region about creating a dedicated institute for brain and mental health within our city. By bringing together and supporting research and education within a collaborative network of basic, clinical and population health scientists, we could become more than the sum of our parts. The goal was to become a centre of excellence in brain and mental health research and education, translating discoveries into innovative health care solutions. In 2004, the foundational gift and vision of Calgary businessman and philanthropist Harley N. Hotchkiss officially launched the HBI under the leadership of its director, Dr. Samuel Weiss.

A decade later, the HBI continues to achieve success as an integrated institute within the University of Calgary, operating within the Cumming School of Medicine. Our

membership has grown significantly and 43 researchers have been directly recruited to the HBI in collaboration with the Departments of Cell Biology and Anatomy, Clinical Neurosciences, Physiology and Pharmacology, Psychiatry and Radiology at the Cumming School of Medicine and the Department of Psychology in the Faculty of Arts, since 2007. Additionally, multidisciplinary researchers from faculties across the University of Calgary have joined the HBI because they recognized the benefits of working within the HBI's collaborative framework. There are a total of 127 full members of the HBI as of the beginning of 2015. The HBI's organizational governance is available in Appendix A. Together with members, trainees, research and professional staff, the HBI includes approximately 750 people working together towards a shared vision.



*A cross-section of HBI members, trainees and international guest lecturers interact at the HBI-10 Symposium, held at the Cumming School of Medicine in October 2014, in celebration of the HBI's tenth anniversary.*

## BRAIN AND MENTAL HEALTH AT THE UNIVERSITY OF CALGARY

The University of Calgary's *Eyes High* strategic direction is to become a top five Canadian research university. To achieve this ambitious goal, the 2012 Strategic Research Plan identified areas of research strength at the University of Calgary and aligned those strengths with the needs and grand challenges facing today's society. Brain and Mental Health emerged as a key strategic priority at the University of Calgary. Academics from nine different faculties are engaged in brain and mental health research,

including the Faculties of Arts, Kinesiology, Nursing, Science, Social Work and Veterinary Medicine, the Cumming School of Medicine, the Schulich School of Engineering and the Werklund School of Education. Building on their respective expertise, these researchers are collaborating to identify new ways to accelerate research and translate this knowledge into meaningful outcomes in the areas of brain and mental health.

A Research Scholars Committee representing all of the involved faculties and chaired by HBI Director Dr. Samuel Weiss was convened in 2013. The majority of researchers at the University of Calgary who are engaged in brain and mental health research are members of the HBI. Given this existing network and the HBI's infrastructure to propel brain and mental health research, the Research Scholars Committee recommended that the HBI lead the Brain and Mental Health Strategic Research Theme. This recommendation was supported by the University of Calgary's Executive Leadership Team.

The HBI is committed to a collaborative approach and recognizes the essential roles and contributions of all partners in achieving this university-wide vision. Additional partners in the Brain and Mental Health Strategic Research Theme include:

- Cumming School of Medicine
  - Hotchkiss Brain Institute
  - Alberta Children's Hospital Research Institute
  - Libin Cardiovascular Institute of Alberta
  - O'Brien Institute for Public Health
- Alberta Children's Hospital
- Alberta Health Services
- Faculty of Arts
- Faculty of Kinesiology
- Faculty of Nursing
- Faculty of Science
- Faculty of Social Work
- Faculty of Veterinary Medicine
- Schulich School of Engineering
- Werklund School of Education

The HBI strategic plan aims to best support brain and mental health scientific research through targeted goals and strategies that maximize impact for our scientists and society. As leaders of the Brain and Mental Health Strategic Research Theme, the HBI membership will:

- Focus and coordinate brain and mental health activities university-wide.
- Promote interdisciplinary research excellence.
- Enhance research funding competitiveness.
- Increase and accelerate the impact of research through knowledge generation and translation.



- Increase collaboration and awareness internally between faculties, departments and groups in brain and mental health to achieve meaningful outcomes.
- Present a unified voice in communication and fund development for brain and mental health research activities directed to the community.

## VISION, MISSION AND VALUES

### The HBI's vision is “healthy brains for better lives.”

**Mission:** The Hotchkiss Brain Institute inspires discovery and applies knowledge towards innovative solutions for neurological and mental health disorders.

This mission is guided by six core values:

- **Excellence** – HBI members set a high bar for the quality and impact of their research and educational programs. As an institute, the HBI is constantly pursuing innovative ways to push this bar higher, with supportive programs, frameworks and partnerships for its membership.
- **Collaboration** – This value is at the core of the HBI's approach; within the Institute, collaboration guides the foundational structure of our research programs and externally, the HBI places great value on partnerships and working hand in hand with the community.
- **Integrity** – All members, trainees and staff of the HBI understand and deeply respect the responsibility to uphold the highest standards of ethical conduct of clinical and basic research, to be ambassadors of the University of Calgary in all our conduct and to give back value from the generous investments of the community.
- **Impact** – The HBI's mission is driven by high-impact research that makes a significant difference in our understanding of the brain, as well as our ability to treat neurological and mental health disorders.
- **Creativity** – The challenges of the brain and mental health often require an outside-the-box approach, whether this be through innovative high-risk approaches to research and education, remarkable collaborations, or imaginative community dialogue. Creativity is embraced in all areas of the HBI.
- **Relevance** – The HBI is part of an international community working together on the vast challenges of the brain and mental health, which are only growing in their importance. Within this global network, the HBI is focused on serving the needs of our local Calgary community, by working together to advance engagement in the study of brain and mental health, thus increasing our understanding and ultimately achieving healthier brains and better lives.

The HBI seeks to achieve its mission by focusing on three overarching goals:

#### 1. RESEARCH:

To achieve internationally recognized key discoveries and transformative clinical research in the neurosciences and mental health.



**2. EDUCATION:**

To become the premiere place to train in the neurosciences and mental health in Canada.

**3. COMMUNITY & PARTNERSHIPS:**

To engage with the community and partners as a locally relevant and internationally recognized centre of excellence for brain and mental health.

## THE STRATEGIC PLANNING PROCESS

The HBI's 2015 strategic plan is built upon over a year of meaningful discussions with internal and external stakeholder groups. This process began with a blue-sky brainstorming retreat in October 2013 and ideas were vetted through a comprehensive consultation process, culminating in this plan for focused goals and strategies to advance brain and mental health. Consultation activities included:

- Discussions with senior leaders in brain and mental health across the Cumming School of Medicine and the University of Calgary to align strategic directions.
- Committee presentations and discussions with HBI partners and thought leaders.
- Town hall meetings that engaged brain and mental health academics from across both the Foothills and main University of Calgary campuses.
- Targeted surveys which sought feedback from HBI members, staff and students.
- The #HBInext10 social media campaign and public survey that provided an open call for input from the community.

This consultation process is just the beginning – the HBI is committed to continuing to work closely with all stakeholders and partners, aligning actions with the new strategic direction while being responsive to changes in the brain and mental health landscape.

Together, the HBI is leading a new era of brain and mental health research and education in our community. Creating healthy brains for better lives.







# HBI RESEARCH

## HBI RESEARCH

### CONTEXT – THE RESEARCH LANDSCAPE

The Hotchkiss Brain Institute leads the University of Calgary’s Strategic Research Theme of Brain and Mental Health. Academics from nine of the University’s faculties participate in brain and mental health research, including the Faculties of Arts, Kinesiology, Nursing, Science, Social Work and Veterinary Medicine, the Cumming School of Medicine, the Schulich School of Engineering and the Werklund School of Education. All nine of these faculties are represented in the Hotchkiss Brain Institute’s membership.

The Cumming School of Medicine supports the HBI’s research efforts. HBI researchers collaborate regularly with one or more of the school’s six other research institutes. Brain and mental health is one of two areas receiving support from the school’s Cumming Medical Research Fund, established in 2014 thanks to the transformational gift from University of Calgary alumnus Mr. Geoffrey Cumming and matching provincial support. The school has also increased its recruitment of new faculty after a temporary hiring freeze in 2013. The HBI works closely with the Departments of Cell Biology and Anatomy, Clinical Neurosciences, Physiology and Pharmacology, Psychiatry, Psychology and Radiology to strategically hire top

investigators in brain and mental health research. Faculty-run facilities, such as the Clinical Research Unit, provide infrastructure to support the work of HBI members.

The University of Calgary has a strong record of commercialization of its research products and processes. Innovate Calgary acts as the University of Calgary’s centre to incubate and commercialize new technology. This group helps researchers to move discoveries into relevant applications for society. The HBI has been successful in commercializing the discoveries of its members, which range from surgical robotic technologies, to spin-off companies such as Calgary Scientific Inc.




*HBI member Dr. Jean Addington (third from left) accepts new funding for her research into youth mental health from Brain Canada executive committee chair Mr. Rupert Duchesne (right). HBI director Dr. Sam Weiss (left) and HBI Strategic Advisory Board member Mr. Ronald P. Mathison (second from left) also participated in the October 2014 announcement.*

The HBI aligns with the Government of Alberta's Health Research and Innovation Strategy, released in 2010. Mental health, wellness at every age, cross-disciplinary translational research, participation in national and international networks and enhancing clinical trials and technology are all key elements of this framework which the HBI fosters. The Government of Alberta provides funding support for brain and mental health research through Alberta Innovates – Health Solutions (AI-HS). Most grants available from AI-HS utilize a team model, requiring networks of basic and clinical scientists collaborating on research projects to be eligible for funding. While the continuation of this program may be dependent on the governing political party, it is currently a supportive partner. The September 2014 ministerial letters for both the Ministry of Health and the Ministry of Seniors identified brain and mental health as a focus area. Campus Alberta Neuroscience – a network of neuroscience researchers across the Universities of Calgary, Lethbridge and Alberta – also supports brain and mental health research on a provincial scale.

Nationally, the HBI competes for funding and top recruits against other leading neuroscience centres, including the Montreal Neurological Institute (MNI) at McGill University and the Brain Research Centre (BRC) at the University of British Columbia. The MNI was founded in 1934 and has approximately 150 members – slightly more than the HBI's 127 members. The BRC currently has over 200 members and was founded in 2004. Similar to HBI, both the MNI and BRC employ multidisciplinary teams of basic and clinical scientists to conduct research and patient care across the full spectrum of contemporary neurosciences, as well as to train students and fellows. A comparison of H-indexes (calculated using Thompson Reuter's Web of Knowledge) using publications from 2005-2013 provides values for the HBI, BRC and MNI of 50, 63 and 70 respectively. This positions the HBI as competitive in the Canadian neuroscience research landscape, especially when considering the HBI was founded just 10 years ago in 2004.

Canada's primary funding program for health research, the Canadian Institutes of Health Research (CIHR), has become increasingly competitive. CIHR is transitioning to



## SNAPSHOT OF SUCCESS – BRAIN & BEHAVIOUR

In October 2014, the HBI announced \$3 million in competitive national funding from Brain Canada. These Multi-Investigator Research Initiative grants will fund two major projects at the HBI in Brain & Behaviour – spanning both the basic and clinical realms to effectively translate collaborative, discovery-based research.

Dr. Jean Addington is the lead researcher behind a clinical project that aims to identify youth at risk before they develop a serious mental illness. Her research will look at understanding the triggers of these mental illnesses through clinical investigation, in addition to using brain scans and blood analysis to identify contributing biological factors.

Dr. Jaideep Bains is leading a team of scientists that will investigate how stressful situations can lead to long-term changes in how individual brain cells and brain circuitry function. His project uses advanced technologies such as optogenetics – genetically engineered, light-based proteins used to visualize, activate or inactivate the brain circuits that control behaviour in animal models. Bains' research is establishing links between early life stress and changes to neural circuits that are related to the emergence of behavioural changes later in life such as anxiety and depression.

a new 'Foundation' and 'Project' funding scheme in 2015 and significantly changing the adjudication process for grant applications. There continues to be federal support for health science funding in the neurosciences; Brain Canada currently provides matching funds to neuroscience research proposals. There is also a global spotlight on the neurosciences and mental health, created by President Obama's BRAIN Initiative in the US, and the European Commission's Human Brain Project in the EU.

Since its inception one decade ago, the Hotchkiss Brain Institute has established itself as a major contributor to the neurosciences and mental health research and clinical practice in Canada. See Appendix C to read about the HBI's significant accomplishments in brain and mental health research.



## SWOT ANALYSIS for HBI RESEARCH

<b>STRENGTHS</b>	<ul style="list-style-type: none"> <li>• Focused research areas that have guided recruitment and investment</li> <li>• Research framework engages a large proportion of the HBI membership</li> <li>• Strong interactions between basic and clinical scientists</li> <li>• Capitalize on funding opportunities with partnership components</li> <li>• Sustain a high level of tri-council funding success</li> <li>• Successful engagement of external stakeholders, donors, government and university leadership</li> <li>• Strong integration of education and research</li> <li>• A culture of excellence in research and education</li> <li>• Leadership development opportunities for members</li> <li>• A welcoming, supportive environment</li> </ul>	<ul style="list-style-type: none"> <li>• Aging infrastructure</li> <li>• Members spread across multiple buildings and two campuses</li> <li>• Limited expertise in certain areas of growing importance in the neurosciences, including computational biology and population health</li> <li>• Low proportion of high-achieving trainees pursuing a research-focused career path</li> </ul>	<b>WEAKNESSES</b>
<b>OPPORTUNITIES</b>	<ul style="list-style-type: none"> <li>• New funding available from the Cumming Medical Research Fund</li> <li>• Provincial and national funding opportunities in the neurosciences</li> <li>• Support and partnership opportunities facilitated by Campus Alberta Neuroscience</li> <li>• Continuing strong community support for the HBI's mission</li> <li>• HBI's leadership of the University of Calgary's Brain and Mental Health Strategic Research Theme</li> <li>• Recruitment of top University of Calgary trainees with degrees in chemistry, physics and engineering</li> </ul>	<ul style="list-style-type: none"> <li>• Limited space for growth</li> <li>• Lack of co-location of clinicians and basic scientists</li> <li>• Loss of talented leadership to roles external to the HBI</li> <li>• Overextension of investigators who hold multiple leadership and teaching roles in the HBI</li> <li>• Volatile CIHR funding environment</li> <li>• Research landscape changing to emphasize team approach, however investigators continue to be judged on individual merit</li> <li>• Canadian research landscape in the neurosciences is becoming increasingly competitive for top recruits</li> </ul>	<b>THREATS</b>

## RESEARCH GOALS

**The overarching research goal of the HBI is to achieve internationally recognized key discoveries and transformative clinical research in the neurosciences and mental health.**

The Hotchkiss Brain Institute will lead the University of Calgary into an era of accelerated discovery and translation of new knowledge towards enhancing brain and mental health. Research impact will be maximized by achieving three goals.

### **Goal 1.1: NEURO-DISCOVERY FRAMEWORK**

**Align brain and mental health research at the University of Calgary within a “NeuroDiscovery Framework” at the intersection of the university’s strengths and the community’s needs.**

The HBI’s research will continue to build on the established and emerging strengths of its members, in areas where there are opportunities to become national and international leaders. The needs of the community are an important consideration to ensure our research priorities continue to be locally relevant. Research questions and directions are driven by the researchers.

**Strategy 1.1a** – Focus HBI research under three discovery-based themes: Brain & Behaviour, Neural Injury & Repair and Healthy Brain Aging. These themes address brain and mental health research across the life course of the developed brain, which we define as from adolescence to senescence. Across all three themes, prediction, prevention and early intervention for neurological and mental illness and injury are cross-cutting goals of the Institute.

#### Brain & Behaviour:

Understanding how the brain controls behaviour remains one the biggest fundamental challenges of neuroscience. How behaviours are controlled or modified, how thoughts are turned into actions and how memories are gained or

## SNAPSHOT OF SUCCESS – NEURAL INJURY & REPAIR

Research in the Neural Injury & Repair priority has recently attracted provincial and national funding for projects in the areas of multiple sclerosis (MS) and mild traumatic brain injury (concussion).

Announced in May 2014, Drs. Luanne Metz and V. Wee Yong received a highly competitive \$5 million grant from Alberta Innovates – Health Solutions. Their five-year project combines basic laboratory science with translational clinical research to develop new medicines to treat progressive MS.

Drs. Carolyn Emery and Willem Meeuwisse, were awarded \$1.5 million from the Canadian Institutes of Health Research (CIHR) in November 2013 for their “Safe to Play” project. Their interdisciplinary team is following youth hockey players for five years – establishing the first longitudinal community cohort of 11-17 year old athletes to discover the best ways to identify, prevent and treat concussion.



lost will be understood by studying the synaptic circuitry of the brain. Neurological and mental health conditions that range from epilepsy to the mental health disorders of depression and anxiety also have their basis in structural and/or functional alterations in the circuitry of the brain. A key trigger for many brain disorders is stress. The functional circuitry of stress remains to be fully understood. Frequently affecting adolescents and young adults, understanding the basis of neurological and mental health conditions is the focus of Brain & Behaviour. One out of every three Canadians will be affected by a brain or mental health disorder in their life and early detection and treatment is often critical to a swift recovery.

### Neural Injury & Repair:

Injuries to the brain or peripheral nervous system have lifelong consequences for otherwise healthy people. Injuries can be initiated by immune mechanisms inside the body, as is the case for multiple sclerosis, changes in blood flow to the brain, as occurs after a stroke, or through trauma or accidents, as is the case for concussion and spinal cord injuries. A fundamental understanding of the mechanisms of neural injury, developing approaches to speed recovery and rehabilitate those who have neural injuries is the focus of Neural Injury & Repair.



*HBI members Dr. Carolyn Emery (left) and Dr. Willem Meeuwisse (right) in the University of Calgary's Olympic Oval. Their research into concussion in youth hockey players has attracted national attention.*

### Healthy Brain Aging:

In an aging population, dementia has already become the most expensive medical condition in the Canadian health care system. Other brain conditions such as stroke and Parkinson's disease, to name only two, are also a concern for our communities. This research theme of Healthy Brain Aging is focused on understanding the fundamental causes and developing new and improved treatments, for neurological and mental health conditions affecting the aging brain.

**Strategy 1.1b** – Foster cross-campus, collaborative research programs that capitalize on multidisciplinary approaches to brain and mental health research. Four strategic areas at the University of Calgary were identified as developing strengths in the Brain and Mental Health research priority: Optimizing Child & Youth Development & Behaviour; Preventing & Treating Concussion & Brain Injury; Stimulating Spinal Cord & Nerve Recovery Regeneration; and Enhancing Healthy Brain Aging. These cross-campus initiatives overlap with the new research themes of the HBI and extend their impact by engaging other Cumming School of Medicine research institutes and departments, and University of Calgary faculties.

**Strategy 1.1c** – Increase the profile of our research accomplishments in the local and global communities. This strategy involves increased print and social media presence to promote brain and mental health research at the University of Calgary. Additionally, we will engage all HBI researchers, trainees, staff and community partners to act as ambassadors of the HBI. This strategy is supported by the Education and Community Engagement goals.

**Goal 1.2: TRANSLATIONAL CONTINUUM**

**Invest in the best people and organize them along a fully integrated continuum of basic to clinical to population health research excellence.**

**Strategy 1.2a** – Organize researchers within the new framework around discovery-based, collaborative and multidisciplinary “NeuroTeams”. HBI members will be encouraged to join one or more teams, thus increasing collaboration and opportunities for creative approaches for cutting edge research. Teams will be the vehicles for discoveries, aligned with the team-based funding models of external funding bodies. In addition to setting up researchers for team funding success, the NeuroTeams structure will aid researchers in doing top-quality science, by aligning individuals with shared interests into small, interdisciplinary groups, which will also appeal to prospective postdoctoral fellows. Additionally, NeuroTeam leadership positions will provide credentials to HBI members needed in CIHR Foundation grant applications.

NeuroTeams Criteria:

To be considered a NeuroTeam, research groups should satisfy the following three conditions:

1. Discovery-Based: Teams should be grounded in discovery-based research.
2. Collaborative: Teams should involve at least six full HBI members, including both clinical and basic scientists and at least two of the CIHR pillars must be represented on a team. Note that teams should strive to include members representing all four of the CIHR pillars; however, teams with two or more pillars represented will be considered.
3. Multidisciplinary: Teams should work in partnership with at least one other institute at the Cumming School of Medicine, or one other faculty at the University of Calgary.

Brain & Behaviour – 2015 NeuroTeams:

1. Stress
  - Stress is an important trigger for mental health disorders and strongly correlated with the development of many physical conditions. Understanding the neural basis of stress is the focus of the team.





2. Epilepsy

- This team will have strong links to ACHRI, building on their strengths in epilepsy and seizure disorders to develop a translational continuum from childhood through to adulthood; from bench to bedside to population health studies.

3. Mental Health Disorders

- This team will be centred in The Mathison Centre for Mental Health Research & Education. Mental health research includes a multidisciplinary approach to the early identification, treatment and prevention of mental disorders including depression, psychosis, schizophrenia and other conditions.

Neural Injury & Repair – 2015 NeuroTeams:

4. Multiple Sclerosis

- MS research is a long-standing focus area at the HBI, where basic and clinical researchers support a cyclical process of discovery and translation, contributing to new treatments for patients. The high prevalence of MS in Alberta reinforces the continued importance of this team.

5. Spinal Cord/Nerve Injury & Pain

- The focus of this team will be the mechanisms of injury and rehabilitation of the spinal cord and peripheral nervous system. The triggers and neural pathways of pain are also a growing area within this team.

6. Traumatic Brain Injury

- This team will work closely with ACHRI, the Faculty of Kinesiology and the Department of Psychology to address sports-related concussion and other forms of mild traumatic brain injury as the leaders of an integrated, university-wide program.

Healthy Brain Aging – 2015 NeuroTeams:

1. Stroke

- The Calgary Stroke Program provides a strong clinical foundation for this integrated team, which also works closely with the Libin Cardiovascular Institute of Alberta. The stroke team is developing an international expertise in acute stroke treatment.

2. Dementia & Cognitive Disorders

- This team will conduct research into the varied causes of dementia and other cognitive impairments, including vascular dementia and Alzheimer's disease. Early identification and intervention are a focus of this team's work. The Dementia & Cognitive Disorders team is also a key collaborator in the Canadian Consortium on Neurodegeneration in Aging.



### 3. Movement Disorders

- This team will take a multidisciplinary approach to studying the mechanisms and origins of the cognitive deficits observed in Parkinson’s disease and other movement-related disorders of the aging population.

#### Emerging NeuroTeams Pipeline:

Research strengths will change over time, as HBI members develop their programs and new recruits join University of Calgary. Similarly, the community’s needs in brain and mental health research, education and treatment will evolve. To anticipate these changes, we have created a pipeline program called “Emerging NeuroTeams.” This program encourages research in areas that may not meet all criteria for NeuroTeams and provides an opportunity for risk-taking and the exploration of promising new areas. Over time, Emerging NeuroTeams may be added to, or replace, the list of 2015 NeuroTeams.

**Strategy 1.2b** – Recruit excellent principal investigators and trainees. A recruitment plan being developed in partnership with the Departments of Clinical Neurosciences, Psychiatry, Radiology, Cell Biology and Anatomy, Physiology and Pharmacology and Psychology will ensure HBI recruitment continues to align with the NeuroDiscovery research framework. A schedule of planned recruitments in 2015 and 2016 is available in Appendix F. Recruitment of excellent PIs not only strengthens research programs, but it also attracts more top-quality trainees, thus simultaneously benefitting the Education goals. HBI stipend support for trainees and the Education goals, also contribute to this strategy.

**Strategy 1.2c** – Fully develop the leadership and academic potential of researchers via HBI support programs, including:

- HBI mentorship program for junior faculty, for personalized development during the first 10 years of their careers.
- HBI leadership positions for senior faculty, including internal committee seats and NeuroTeam Leader positions.
- The Rebecca Hotchkiss International Scholars Exchange (RHISE) program, to learn from international neuroscience and mental health experts.
- The HBI Internal Peer Review Program, which helps investigators to strengthen their research grant applications based on peer feedback prior to submission.
- The HBI Team Grant Advisory Panel, which supports teams of investigators in building the strongest possible research grant applications for major competitions prior to advancing to external rounds of evaluation.
- Annual retreats of the newly formed NeuroTeams to provide space and time for researchers to discuss novel approaches to their work.

For a complete description of current HBI programs that support our members, please see Appendix B. This strategy is also reinforced by the Education goals.



**Goal 1.3: SPRINGBOARD ENVIRONMENT**

**Create an environment that acts as a springboard for creativity and excellence in research.**

**Strategy 1.3a** – Build an infrastructure that maximizes research potential with state-of-the-art NeuroTechnologies, Core Facilities and collaborative social spaces.

NeuroTechnologies:

Cross-cutting NeuroTechnologies will provide researchers across all areas of brain and mental health with the most advanced equipment available, enabling HBI researchers to be competitive with the top neuroscience facilities in the world. The NeuroTechnologies program incorporates a long-term plan for maintenance and operation; technical experts and trainee education will ensure the HBI capitalizes on these new resources. Three NeuroTechnology Platforms are under development:



*HBI stroke researchers Drs. Andrew Demchuck and Michael Hill speak with a patient at the Calgary Stroke Program. Their research uses imaging technology to work towards the development of new treatments for acute stroke.*

1. Neuro-Imaging – imaging and recording technology which has rapidly evolved to improve our ability to observe and record fundamental brain structure, physiology and function at the micro- and macroscopic scale.
2. Neuro-Stimulation – revolutionary tools that can establish causal links between neural circuits and behaviour and may lead to new, non-invasive treatments for neurological and mental health diseases.
3. Neuro-Informatics – the next generation of neuroscience research will take advantage of ‘big data’ analysis to integrate multiple data sets and visualize trends, with large resulting programming and storage needs.

Core Facilities:

HBI operates several specialized research facilities, with dedicated staff scientists, for the exclusive use of its members. Core Facilities must serve researchers across all three thematic areas of the NeuroDiscovery Framework. They include:

- The Regeneration Unit in Neurobiology (RUN) which houses advanced microscopy and behavioural testing facilities.
- The HBI Molecular Core Facility provides molecular and genetic expertise, equipment and advising on experimental design.
- The NeuroImaging Research Unit (NIRU) is centred at the Seaman Family MR Research Centre and enables human brain imaging research.
- The HBI Advanced Light and Optogenetics (HALO) facility provides cutting-edge tools to control neural circuits using light.

The Clinical Research Unit (CRU) began as an HBI facility and has now been expanded to a faculty-wide facility for the Cumming School of Medicine due to its enormous success. The CRU aids clinical health researchers, including many HBI members, with every stage of clinical trials.

**Strategy 1.3b** – Develop a NeuroResearch Clinic initiative in collaboration with the Department of Clinical Neurosciences and the Clinical Research Unit, to enable the involvement of an increasing percentage of patients as participants in research trials and epidemiological studies, through the use of registry platforms. The NeuroResearch Clinics will be a major avenue of knowledge translation, moving HBI research into applications for the Calgary community.

A harmonized NeuroResearch Clinic program will improve neurological care by standardizing and supporting the collection and use of patient data across multiple specialized University of Calgary clinics. Patient engagement will benefit from increased education about the importance of local research and patients will be provided with expanded volunteer opportunities to contribute to large-scale research studies and clinical trials in neurological and mental health disorders. Researchers will benefit from dedicated support staff and processes to facilitate patient recruitment and consent, data analysis, sound data management, shared best practices and linkages into provincial and national health databases. The long-term benefits of this program include enhanced

## SNAPSHOT OF SUCCESS – HEALTHY BRAIN AGING

The HBI is leading provincial and national research initiatives in Healthy Brain Aging – including two major projects that were recently funded in the area of stroke and vascular dementia.

In March 2013, Dr. Eric Smith received \$1.2 million from CIHR, to lead a national research initiative into covert stroke. “Silent strokes” are relatively common and largely undetected, but over time contribute to the risk of dementia – a public health epidemic affecting up to 25 per cent of Canadians during their lifetime.

Together with colleagues across the country, Smith is conducting this population-based study to identify the proportion of people who have had covert stroke and at what age, how it affects their memory and what the risk factors are. The team will gather data to develop new ideas for preventing covert stroke beginning in middle age, ideally decreasing the incidence of dementia later in life.

Announced in May 2014, Drs. Michael Hill and Andrew Demchuk received \$5 million from Alberta Innovates – Health Solutions to improve care and measurement of acute stroke. Together with colleagues across the province, the researchers aim to improve treatment of stroke patients through accelerating clinical and neurovascular imaging and speed of treatment delivery.



research productivity, patient engagement and competitiveness for external funding. This initiative also provides a mechanism for HBI research to help inform health care. An implementation timeline will see the NeuroResearch Clinic initiative develop at University of Calgary clinics during its first two years within the City of Calgary, with the potential for subsequent province-wide expansion.

**Strategy 1.3c** – Support HBI-led research with programs that leverage external funding sources.

The Pilot Funding program provides support for early-phase studies in promising new brain and mental health research directions. This program operates in partnership with the Department of Clinical Neurosciences to fund clinical pilots and in partnership with The Mathison Centre for Mental Health Research & Education to fund mental health pilot studies.

The Infrastructure and Small Equipment Repair and Replacement Initiative provides funding for the maintenance of existing research equipment in the labs of HBI members and represents the HBI's needs to the faculty's Centre for Advanced Technologies.

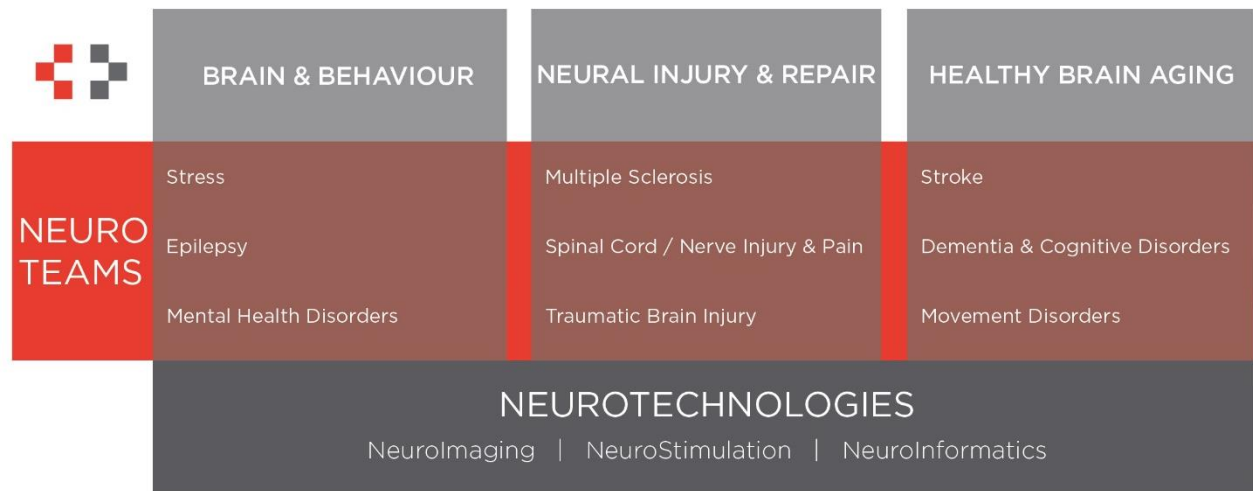
The new 2015 HBI Bridge Funding program will operate collaboratively with the faculty-level bridge program, to support high-ranking CIHR grant applications that narrowly miss funding cut-offs. The purpose of this program is to enable continued data collection and refinement of applications, thus increasing applicants' chances of success in subsequent competitions.

A new HBI Equipment Fund will provide a mechanism for researchers to purchase new equipment for their labs. As these equipment purchases are often not eligible to be funded with research grants, this HBI program will provide much-needed support to its members.

As CIHR transitions to its new 'Foundation' and 'Project' funding schemes in 2015, additional tactical-level programs will support HBI members through this challenging transition of funding models. The HBI is committed to ensuring the continued ability of its members to conduct top-quality research through this transition, when traditional funding sources may be unpredictable.

For a complete description of HBI infrastructure and support programs, please see Appendix B.

Together, these goals and strategies are visualized as a united vision for brain and mental health research at the Hotchkiss Brain Institute – the NeuroDiscovery Framework:



## METRICS OF SUCCESS

The following performance measures will be reviewed and compared annually to chart trends and progress as an institute towards achieving the overarching research goal of internationally recognized key discoveries and transformative clinical research in the neurosciences and mental health.

### Publications:

- Annual number of publications authored or co-authored by HBI members appearing in high-impact neuroscience and medical journals.
- Annual number of citations of HBI-authored papers.

### Applications:

- Annual number of new or ongoing clinical trials involving HBI members.
  - Investigator-initiated clinical trials
  - Industry-led clinical trials
- Patents by HBI members.
- Alterations in clinical practice guidelines or health policy at the provincial or national scale initiated by HBI-led research.
- Participation in knowledge translation activities.

### Funding:

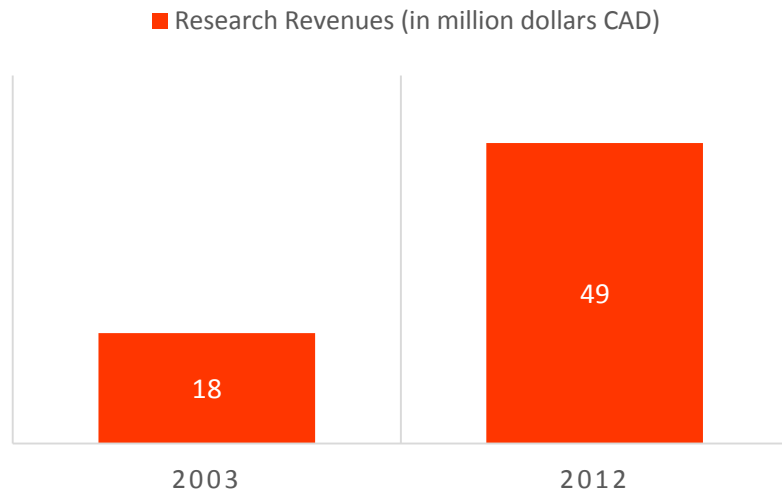
- Total value of research grants awarded to HBI members and relative funding to HBI members compared to other research institutes.



- Total value of team grants lead by HBI members.

**Awards:**

- Major awards received by HBI members.
- Speaking invitations for HBI members.
- Recognitions received by the HBI or its research teams and/or clinical programs.



New key HBI research programs launching in 2015 will also undergo formative evaluation after the first year of operation, to ensure these programs can be adjusted as they develop to best achieve research goals.

*HBI research revenues increased from \$18 million in 2003 to \$49 million in 2012. In 2015, the HBI continues to be the number one research institute at the Cumming School of Medicine, with respect to total research funding.*

- **NeuroTeams:** Percentages of HBI members who have joined each NeuroTeam within the new NeuroDiscovery framework, as compared to the percentages of HBI members who belonged to the themes and programs of HBI’s former framework. Qualitative feedback on the effectiveness of the new NeuroTeams will also be analyzed.
- **NeuroTechnologies:** Percentage of HBI members who use one or more of the Core Facilities or new equipment purchased under the NeuroTechnology Platforms as an integral part of their research. Qualitative feedback on the perceived value of the NeuroTechnologies infrastructure will also be analyzed.
- **NeuroResearch Clinics:** At the one-year mark, this initiative will have completed the Planning Phase (six months) and begun the Pilot Phase (12 months), where the first three clinics will be supported. Quantitative analysis of research outputs (clinical protocols developed, patient recruitment, clinical research projects supported) at the supported clinics versus the unsupported clinics will be conducted. Qualitative feedback on community awareness and support for research via the NeuroResearch Clinics will also be analyzed.



# HBI EDUCATION



## HBI EDUCATION

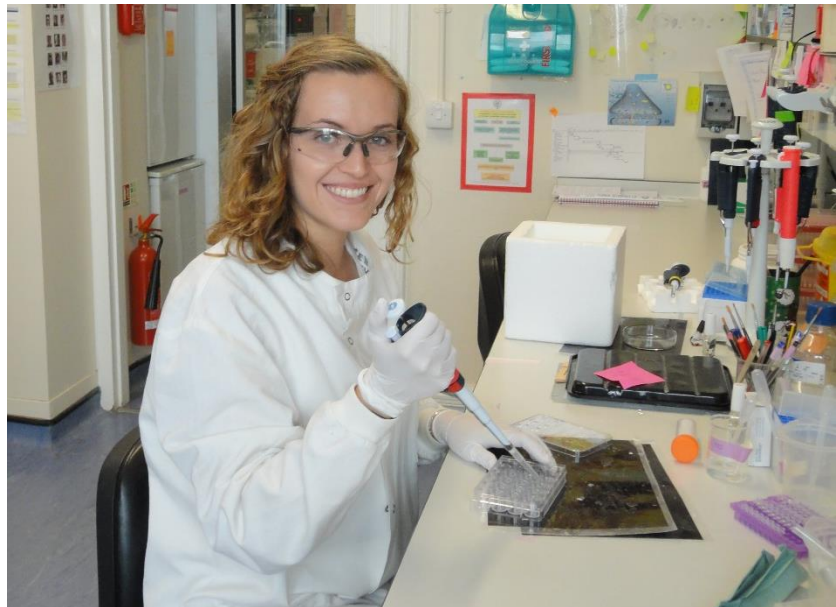
### CONTEXT – THE EDUCATION LANDSCAPE

The University of Calgary is a supportive environment for undergraduate and graduate students, postdoctoral and clinical fellows – collectively known as trainees – in the neurosciences. There are over 300 trainees of HBI members and our numbers have been steadily increasing. The HBI recognizes its obligation to provide a broad education to all trainees, who advance brain and mental health research, which will propel them to success in the next stages of their lives.

HBI graduate students and postdoctoral and clinical fellows come from the Graduate Departments of Neuroscience, Psychology, Engineering, Kinesiology and others. Approximately 100 of our graduate students belong to the Department of Neuroscience – a field-specific department in the Faculty of Graduate Studies. This department works in collaboration with the HBI to provide a well-rounded, foundational education in the neurosciences that also exposes trainees to clinical work. Many of the student leaders in the HBI's Trainee Organization, the HBITO, belong to this department. Postdoctoral scholars at the HBI benefit from the University of Calgary's postdoctoral recruitment program – a strategic funding initiative to increase the numbers and level of support for postdoctoral scholars at the University of Calgary as part of the *Eyes High* strategic direction. As the primary drivers of scientific research, the university values the contributions trainees make to research in brain and mental health.

Over 100 undergraduate students in the interdisciplinary Bachelor of Science in Neuroscience program are also highly integrated into the HBI's education program. This honours degree program is operated out of the Faculty of Science as a tri-faculty initiative in partnership with the Faculty of Arts and the Cumming School of Medicine.

The progressive undergraduate program launched in 2008 and was established by a group of HBI members interested in advancing neuroscience education, including current HBI Education Director, Dr. G. Campbell Teskey. Today, the BSc in Neuroscience program is the University of Calgary's premiere undergraduate program, with the highest entrance average. The program attracts top-calibre students – a prestigious Rhodes scholarship was awarded to one of the students in this program in 2014. A new instructor position created fall 2014 in the



*Jacqueline Boon conducts experiments at Oxford University, while taking part in an HBI exchange program as an undergraduate student in the BSc in Neuroscience program.*

Department of Psychology is dedicated to teaching courses for the BSc Neuroscience program, which demonstrates valuable support from the Faculty of Arts. Students in this program are eligible for HBI-funded summer studentship positions within HBI research labs, providing early research experience in the neurosciences.

On a provincial scale and in the last year, HBI trainees were awarded approximately 24 per cent of available health sciences graduate scholarships and 24 per cent of the postdoctoral fellowships from Alberta Innovates – Health Solutions. 41 per cent of the AI-HS summer student awards in Calgary went to HBI laboratories. Campus Alberta Neuroscience – a province-wide network of neuroscience researchers across the Universities of Calgary, Lethbridge and Alberta – offers trainee-specific programs for Albertan neuroscience students. Workshops taught by internationally-recognized experts in specific fields of neuroscience are made available to students from all three campuses via both distance learning and travel funding. A Trainee Mobility Program also funds short-term exchanges between the three campuses.

Nationally and internationally, the academic landscape for students in the health sciences is less supportive. Fewer open scholarships are available to graduate students and postdoctoral fellows from Canada’s tri-council funding bodies: CIHR, NSERC and SSHRC. Additionally, the value of these scholarships has not increased to reflect rising costs over the past decade. Worldwide, medical research, which often translates into trainee funding, has not seen increased investment. However, while investment in the health sciences as a whole may be decreasing, neuroscience and mental health research have received more prominence thanks to a recent media spotlight on mental health disorders.

Education at the HBI is an integral part of our mission. From student scholarships to professional development, the HBI offers a number of programs that have raised the bar of the educational experience for HBI trainees. For a complete description of the progress and accomplishments in HBI education during the Institute’s first 10 years, see Appendix D.

## SNAPSHOT OF SUCCESS – BSC NEURO PROGRAM

The HBI’s unique learning environment is enhanced by travelling fellowship opportunities, encouraging students and trainees to exchange ideas and learn from world-renowned neuroscience institutions.

In 2013 Jacqueline Boon, a University of Calgary BSc Neuroscience student, participated in the Rebecca Hotchkiss International Scholar Exchange (RHISE) Program’s first HBI-Oxford Summer Exchange. At the University of Oxford, Boon had the formative experience of working in a developmental neurobiology laboratory. Boon was inspired by the traditions, culture and history that accompany academia in Oxford.

During the undergraduate neuroscience program, Boon also capitalized on various opportunities to work in different laboratories at the HBI, to discover what she was most passionate about – research in the development and plasticity of the cerebral cortex. Boon will soon be starting a Master’s degree in Psychology (Brain and Cognitive Sciences), under the supervision of HBI member Dr. Richard Dyck.

“I’m really excited,” says Boon about beginning the next stage of her education with the HBI. “The amazing support and opportunities I had during my undergraduate degree were a huge influence in my decision to pursue a career in the neurosciences.”



## SWOT ANALYSIS for HBI EDUCATION

<b>Strengths</b>	<ul style="list-style-type: none"> <li>• Department of Neuroscience is one of the leading graduate programs in the University</li> <li>• Outstanding graduate trainees, who consistently earn above-average percentages of health science scholarships and Governor General awards</li> <li>• Excellent relationship between the Department of Neuroscience and HBI is cited as a model for graduate programs in the Cumming School of Medicine</li> <li>• Students and fellows are very competitive for external funding awards and Faculty of Graduate Studies thesis awards</li> <li>• BSc (Neuro) program attracts outstanding students</li> <li>• Excellent leadership and energy by HBITO</li> <li>• Trainees are prepared for non-academic careers/interdisciplinary research team environments via REALISE program</li> </ul>	<ul style="list-style-type: none"> <li>• Uncertain grant funding situation limits numbers of trainees who can be offered positions in supervisors' labs</li> <li>• Reliance on grant-based funding model dictates that PI research, rather than training, is focus</li> <li>• Number of available scholarships is not keeping up with increasing trainee numbers</li> <li>• Limited funding to support PDFs results in less application pressure</li> <li>• Lack of faculty teaching requirements in the Cumming School of Medicine results in a reliance on individual motivation to fill teaching positions</li> <li>• Few teaching opportunities for trainees</li> <li>• HBI advertising does not include online or print materials targeted at prospective students and fellows</li> <li>• No coordinator dedicated to supporting the education director portfolio</li> </ul>	<b>Weaknesses</b>
<b>Opportunities</b>	<ul style="list-style-type: none"> <li>• Increase financial support for the RHISE program to further enhance trainee experience with international exposure and potentially draw international trainees</li> <li>• Significant opportunities to grow the clinician-scientist program</li> <li>• Grow REALISE program especially the areas of community mentorship, internships, REALISE alumni engagement and community outreach</li> <li>• Cumming dollars could support trainee recruitment in specific areas</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of clarity in the Cumming School of Medicine w.r.t. teaching load of faculty</li> <li>• Funding trends away from basic biomedical research (our hallmark), towards interdisciplinary, solution-based research, which threatens the model of independent investigator-based research and training</li> <li>• Recent funding shortfalls mean we can no longer guarantee every BSc Neuroscience student summer employment</li> <li>• Overextension of HBI members who play key roles in leadership and education</li> </ul>	<b>Threats</b>



## EDUCATION GOALS

**The overarching education goal of the HBI is to become the premiere place to train in the neurosciences and mental health in Canada.**

To conduct the best research, HBI needs to attract the best trainees and maximize their potential. The following two goals set out strategies to achieve this vision and provide a superior educational experience at all levels of training.

### **Goal 2.1: DESTINATION OF CHOICE**

**Become the destination of choice for training in the neurosciences and mental health in Canada, to attract the highest calibre students and fellows at all post-secondary levels.**

Trainees are essential drivers of scientific research at the University of Calgary. HBI trainees make critical contributions to brain and mental health research. Attracting excellent students and fellows will significantly accelerate the HBI's progress towards realizing meaningful research discoveries in brain and mental health. The BSc Neuroscience program is a critical first step in exposing the best and brightest students to the field of neuroscience at the University of Calgary. By attracting top-achieving students to the field and then providing an excellent academic program that enriches students' understanding of neuroscience and mental health research, the HBI can proactively recruit excellent students into its graduate trainee programs and transform these student leaders into ambassadors for the HBI. This goal will be led by the HBI Education Director, with the support of a dedicated Education Coordinator.

At the postdoctoral level, attracting excellent fellows in both clinical and research streams is critical to the HBI's ongoing research success. For foreign fellows looking for international experience in their neuroscience and mental health careers, we want to become the first-choice destination in Canada. Combined with our international strategy, the HBI has a great opportunity to attract top foreign postdoctoral and clinical fellows as a key aspect of this goal.

**Strategy 2.1a** – Offer recruitment scholarships and studentships at each trainee level, as increased incentives to attract the best students and fellows in Canada and abroad. Scholarships must be offered to students and fellows in a timely fashion to be competitive with offers from other universities.

As the number of active HBI faculty members continues to grow, more graduate and postdoctoral recruitment scholarships and new scholarships for the BSc Neuroscience students, are needed to keep pace and fill their labs with excellent students.

HBI currently offers the Dr. T. Chen Fong Doctoral Scholarship to outstanding PhD candidates and the Donald Burns and Louise Berlin Graduate Awards in Dementia Research for both MSc and PhD candidates. The Harley N. Hotchkiss Postdoctoral Fellowship and the Donald Burns and Louise Berlin Postdoctoral Fellowship in Dementia Research, currently support recruitment at the postdoctoral fellow level. Additional scholarships offered at both the graduate and fellowship level will aid the HBI in becoming the destination of choice for neuroscience and mental health training. As well, increased

funding of the HBI Summer Studentship program, to make positions in HBI research labs available to every interested BSc Neuroscience student each summer, will extend this strategy to the undergraduate level, thus attracting the best students from the outset.

**Strategy 2.1b** – Create a funded ‘Open First Year’ program for graduate students in targeted areas within the neurosciences and mental health, which enables students to rotate through multiple research labs in their first year before selecting a specific supervisor and focus area. This program will be introduced as a compliment to the traditional pathways of entry into graduate programs, by applying with a specific Principal Investigator.

**Strategy 2.1c** – Create a ‘Co-Supervisor Translational Research’ program that provides graduate students and postdoctoral fellows with cross-cutting research experience shared between basic science labs and clinical settings to foster innovative, translational research.

This program will benefit students and fellows in both clinically-focused and research-focused program streams by exposing them to both realms. Clinical fellows pursuing health care delivery focused careers will have the opportunity to explore the integration of research into their work, which may spark an interest in a career in clinical research.

**Strategy 2.1d** – Effectively advertise HBI trainee programs to a wider audience of top prospective students and fellows via targeted online marketing and partnerships.

Advertising is a critical component to attraction of excellent students. Effective advertising begins with the HBI website, where a ‘Prospective Students’ section can be tailored to this audience and further enhanced via online marketing and social media. Partnerships can also be capitalized on to spread word of the HBI’s top educational programs nationally and internationally.



## SNAPSHOT OF SUCCESS – GRADUATE EDUCATION

Enhanced training and skill development opportunities at the HBI ensure graduates acquire the tools necessary to become the next generation of community, business and academic leaders. The HBI’s Research, Education and Leadership in Neuroscience (REALISE) program positions students and trainees for future success in their chosen careers, both within and beyond academia.

Rami Halabi, a graduate student pursuing his PhD in the laboratory of HBI member Dr. Sarah McFarlane, is taking full advantage of the REALISE program to broaden his career prospects. Halabi participates in modules ranging from financial planning to career development and professionalism. He now has the unique opportunity to put his business etiquette and networking skills into practice outside of the research environment – Halabi has been paired with a business leader through REALISE’s new Community Mentorship program. Halabi is already paying it forward – he created a REALISE HBITO Mentorship program to support interactions between the HBI’s graduate students with undergraduate neuroscience and high school students.

“REALISE has given me a fresh perspective on how to succeed in my career and the prospect to explore different avenues following graduate school,” shares Halabi.

**Goal 2.2: ENHANCED OPPORTUNITIES**

**Provide enhanced opportunities that equip trainees at all levels to become successful leaders in their chosen career paths.**

Many trainees will go on to pursue research-focused careers in the neurosciences, or careers in health care as physicians, psychologists and other brain and mental health experts. Some trainees, as highly intelligent and educated leaders, will follow alternate career paths. Whatever their chosen career, the HBI strives to provide an education that positions all trainees for success – during and after their training with the HBI.

**Strategy 2.2a** – Expand the REALISE program.

REALISE, or ‘Research, Education and Leadership in Neuroscience’, is a professional development program that offers advanced training, leadership and skill development opportunities to prepare HBI trainees to be successful in any career. Currently, REALISE offers three types of programming:



*PhD candidate Rami Halabi is one of over 130 HBI trainees who actively participate in the REALISE program. REALISE provides enhanced educational training opportunities that will position trainees like Halabi for success in and outside of the laboratory.*

- **Training Modules:** courses and workshops encompassing a range of competencies, from professional soft skills to research-specific techniques. These modules are led by HBI scientists, professional facilitators and senior level trainees with content expertise.
- **Internship Opportunities:** work experience placements in the private sector, government and non-governmental organizations. This program launched in summer 2014, with a pilot program focusing on industry placements.
- **Community Mentorship:** meaningful one-on-one mentoring relationships for HBI trainees with successful community leaders. The REALISE Community Mentorship program launched in fall 2014.

Awards are also available through the REALISE program for trainees to register in approved workshops and courses external to the HBI, thus expanding the availability of learning opportunities.

Continued growth of the REALISE program will make these high-quality career development opportunities available to all interested HBI trainees and become an integrated part of HBI education for

trainees at all levels. As a part of this growth, involvement of trainees in community outreach programs will develop trainees' communication and leadership skills while engaging the next generation – also supporting the Community Engagement goals.

As part of REALISE, an HBI Alumni program will be developed to provide meaningful interactions and knowledge sharing between generations of HBI trainees. This strategy will also increase the HBI's connection with former trainees, to act as ambassadors for our Institute in the broader community.

**Strategy 2.2b** – Provide international exchange opportunities to an increasing proportion of trainees at all levels via the RHISE (Rebecca Hotchkiss International Scholar Exchange) program to broaden students' educational experience.

The RHISE program began undergraduate exchanges with Oxford University for students in the BSc Neuroscience program in 2013. A second international exchange program for undergraduate students is launching in 2015 with the Karolinska Institute in Stockholm, Sweden. An exchange program for graduate students and postdoctoral fellows, as a partnership program between the University of Melbourne and The Florey Institute of Neuroscience and Mental Health in Melbourne, Australia, will be launching in 2015. Additional countries and exchange opportunities for postdoctoral and clinical fellows, are also being explored as part of this strategy.

The HBI also offers travel awards to graduate students which provide additional international experience. PhD students are eligible for an HBI Travelling Fellowship award to take a course as part of their program requirements that is offered at another institution abroad. The Arun Anbazhagan HBI Travel Award provides funding for a graduate student to present at the annual Society for Neuroscience conference in the United States.

## SNAPSHOT OF SUCCESS – POSTDOCTORAL FELLOW

Collaborative training opportunities offered to postdoctoral fellows, like Dr. Megan Gray, are attracting the brightest young minds in neuroscience to the HBI.

Gray is part of a multidisciplinary research team at the HBI working to advance understanding of stress-related illnesses. Her basic science expertise has been broadened into more clinically-focused human models thanks to integrated partnerships between the laboratory and clinic. Her research is leading to novel anti-anxiety drug discoveries in the lab – Gray has also collaborated on a study investigating the impact of moderate exercise during old-age on stress markers in clinical patients.

In the past year, Gray's recent successes included publishing her first book chapter; co-authoring a 'Stress Research Essentials' review paper; presenting at a prestigious stress conference; and travelling to promote her research. She also elevated her teaching credentials by co-instructing a graduate neuroanatomy course alongside a former Harvard instructor. Gray is one of nine University of Calgary postdoctoral fellows to be nominated for an esteemed 2015 Banting Postdoctoral Fellowship.

World-class research opportunities and exceptional training support at the HBI ensure Gray's trajectory for success is set to continue.

**Strategy 2.2c** – Fully involve HBI trainees across all levels and Departments in HBI educational activities and programs.

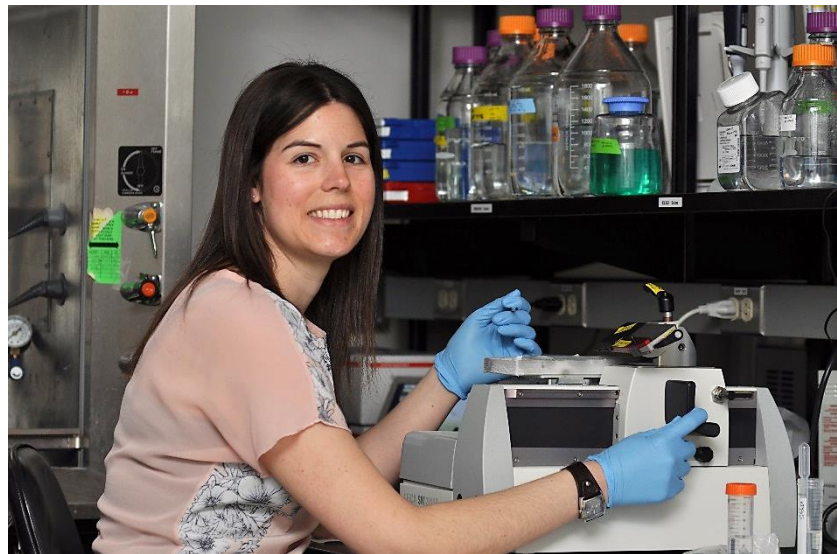
While graduate students in the Department of Neuroscience have high participation in programs like REALISE, RHISE and the HBITO – all of which enhance their professional development and student experience – students from the other graduate departments have slightly lower participation. The same is true of undergraduate trainees and postdoctoral and clinical fellows. The HBI will work to overcome trainee barriers to achieve full participation in these programs, so that the HBI trainee experience is equally exceptional for all students and fellows.

## METRICS OF SUCCESS

The HBI's progress towards the outlined goals will be tracked at all levels of education.

Entrance metrics for incoming trainees will include:

- Mean and range of GPAs for incoming students in the Department of Neuroscience and the BSc Neuroscience program – tracked annually and compared for increasing trends.
- Scholarships awarded to incoming students in the Department of Neuroscience and the BSc Neuroscience program – percentage of students receiving scholarships, mean and range of values, tracked annually.
- Application pressure at each training level.



*Dr. Megan Gray is a postdoctoral fellow in the final stages of her neuroscience training at the HBI. Her collaborative education and research draws on both clinical and basic science domains.*

During their time as students at the HBI, trainee success will be evaluated by:

- Scholarships – percentage of students receiving scholarships, mean and range of scholarship values, tracked annually.
- Publications – for graduate and postdoctoral students, the numbers and impact of scholarly publications, measured by the percentage of students with annual publications and impact ratings of papers.

Metrics used to evaluate success once trainees depart the HBI will include:

- An exit survey administered annually, to track and compare the percentage of new graduates with positions lined up, types of positions and quantitative evaluation of feelings of preparedness for a successful career upon completion of an HBI trainee program.



A photograph of two women sitting outdoors. The woman on the left is older, with short grey hair, wearing glasses and a green short-sleeved shirt. She is smiling and holding a white tray with green grapes. The woman on the right is younger, with blonde hair in a ponytail, wearing glasses and a plaid shirt. She is looking towards the older woman. The background is a soft-focus outdoor setting. The text 'HBI COMMUNITY & PARTNERSHIPS' is overlaid in white, sans-serif font across the center of the image.

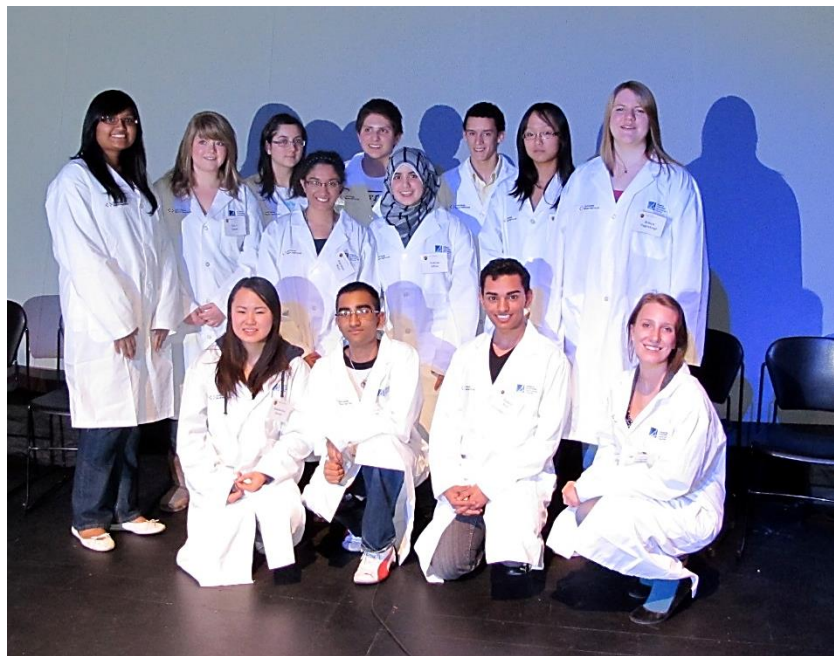
HBI COMMUNITY  
& PARTNERSHIPS

## HBI COMMUNITY & PARTNERSHIPS

### CONTEXT – THE COMMUNITY LANDSCAPE

Full integration with the community is one of the University of Calgary's three main pillars in the *Eyes High* strategic direction and a strategy embraced by the Hotchkiss Brain Institute (HBI). The HBI understands that its successes could not have been achieved so swiftly without the support of the community and a collaborative, partnership approach to its research and education programs. The HBI has a responsibility to be relevant to our community, as leaders in brain and mental health. At the HBI, community engagement encompasses both the HBI's external relations and our involvement with the local community of Calgary.

The University of Calgary Brain and Mental Health Strategic Research Theme is built on the strengths of the university community in this area. As a collaborative initiative to propel the University of Calgary to become a top research academy in brain and mental health, researchers from nine faculties and multiple institutes (listed in Strategy 3.3a) work together on integrated, multidisciplinary research programs. The HBI, which includes members from all nine of these faculties, is honoured to have been asked to lead the Brain and Mental Health research strategy. The HBI is committed to working closely with all of the involved institutes and faculties to ensure the essential roles and contributions of all partners to achieving this university-wide vision are properly recognized.



*High school students pose at the beginning of the Calgary Brain Bee – an annual competition organized by the HBI which raises community awareness for the neurosciences.*

The Government of Alberta knows the importance of community involvement in health research and education. The HBI follows the Alberta Health Research and Innovation Strategy which specifically identifies health literacy and engaging the public as focuses in their strategy. The Calgary community has been involved with the HBI from its outset, with the Institute's vision and values being strongly influenced by foundational donor Harley N. Hotchkiss. From patient participation in HBI-led clinical trials, to the annual Report to the Community publication, to numerous outreach programs, the HBI's community engagement continues to be at the core of our institution. For a complete list of current community engagement activities, see Appendix E.

Most HBI faculty members have built highly productive partnerships that broaden the scope of their research. These range from working with the pharmaceutical industry in large, international drug trials, to partnering with other Canadian neuroscience institutes on national team grants. At an institute level, the HBI takes a proactive role in fostering partnerships on the provincial, national and international stages. We have also taken on a leadership role in many partnerships which involve multiple groups, such as Campus Alberta Neuroscience. These partnerships, which are detailed in Goal 3.3, strengthen the HBI's research and education programs along the path to becoming a top internationally recognized brain and mental health institute.

## SWOT ANALYSIS for HBI COMMUNITY ENGAGEMENT

<b>STRENGTHS</b>	<ul style="list-style-type: none"> <li>• Strong philanthropic support from the local community</li> <li>• Many influential advocates for brain and mental health in the local community act as HBI ambassadors</li> <li>• The HBI has assumed a leadership role in most local and provincial brain and mental health initiatives</li> <li>• High quality events, print materials and other communications</li> <li>• RHISE program has sparked several international partnerships</li> </ul>	<ul style="list-style-type: none"> <li>• Reliance on external parties (e.g. faculty communications, fund development) who have multiple competing interests and limited resources</li> <li>• Difficulty receiving timely information from members (e.g. pre-publication notices)</li> </ul>	<b>WEAKNESSES</b>
<b>OPPORTUNITIES</b>	<ul style="list-style-type: none"> <li>• Development of a comprehensive international strategy</li> <li>• Involvement of trainees in more community outreach initiatives</li> <li>• Increased engagement with HBI alumni via the Cumming School of Medicine's new alumni engagement program</li> <li>• Increased online presence</li> <li>• Strong interest from local community in discussing brain and mental health research, care pathways and impacts</li> <li>• Opportunity for engagement of a wider cross-section of HBI leaders with the philanthropic community</li> </ul>	<ul style="list-style-type: none"> <li>• Demand for HBI involvement with new partners (e.g. seniors' homes) may quickly outpace capacity</li> <li>• International partnerships can be costly to initiate and return on investments is uncertain</li> <li>• On-campus collaborations in brain and mental health may prove challenging to bring together groups who aren't accustomed to working together</li> </ul>	<b>THREATS</b>

## COMMUNITY & PARTNERSHIPS GOALS

**This overarching HBI goal is to engage with the community and partners as a locally relevant and internationally recognized centre of excellence for brain and mental health.**

The outcome of this engagement at a local scale will be increased awareness and understanding of neurological and mental health illness, its impact on our community and a groundswell of support for the HBI's role in addressing unmet needs through research and education. At the provincial, national and global levels, a collaborative approach will position the HBI to significantly increase its presence and impact in the neuroscience and mental health research and education communities.

### **Goal 3.1: COMMUNITY HUB**

**Become a hub for brain and mental health knowledge and engagement within the Calgary community.**

**Strategy 3.1a** – Engage the Calgary community in public outreach initiatives and discussions about the brain and mental health. Engagement will include communication of the latest research at the HBI, public lectures and outreach programs such as Science Cafés. Outreach initiatives will also be achieved by working closely with local partners (see Strategy 3.3a) and involving HBI trainees, via the HBI Trainee Organization, as ambassadors to facilitate outreach programs.

**Strategy 3.1b** – Foster the next generation of neuroscientists, through educational programs targeted at secondary students such as the Calgary Brain Bee competition, high school tours and Brain Awareness Week. This strategy is also supported by the Education goals.

**Strategy 3.1c** – Set the stage to become the authoritative voice of knowledge about neurological and mental health prediction, prevention and early intervention in the Calgary community, in partnership with the Cumming School of Medicine clinical departments. This strategy will begin to take shape over the next five years, with increased communication activities and an expanded online presence.

### **Goal 3.2: COMMUNITY STEWARDSHIP**

**Involve an increasing proportion of community members in the stewardship and advancement of the HBI's mission.**

**Strategy 3.2a** – Involve a growing proportion of the local community in the philanthropic support of the HBI. The support of the Calgary community has been essential to the HBI's ongoing success. In turn, the HBI takes its accountability and responsibility to the community very seriously, as humble stewards of this generous support. Not only do donors contribute financially to brain and mental health research and education at the HBI, but they stand behind our mission and values as ambassadors – a role that goes far beyond any financial donation.



Fundraising activities are led by the HBI Director, working in partnership with the Cumming School of Medicine development team, supported by the HBI Donor Relations Coordinator and with the guidance of the HBI Fundraising and Stewardship Committee. Tactical initiatives which foster the HBI's philanthropic support include:

- Building personal relationships with donors via the HBI Director and research leaders, to align donor interests with HBI priorities.
- Demonstrating the impact of HBI research and education to donors.
- Recognizing donor contributions via recognition events and communications.
- Engaging lead volunteers and community champions in the development of fundraising strategies for areas of personal interest and commitment.
- Regularly prioritizing fundraising projects for the Cumming School of Medicine's development team to maximize support for the HBI's education and research programs.
- Leveraging the donor base by ensuring recent donors are aware of the breadth of the Institute's activities and capitalizing on networking opportunities.



*Over 400 community members attended the Opening Minds gala in October, 2014 – a celebration of the HBI's first 10, remarkable years. The gala was presented, organized and funded by the friends and family of Harley Hotchkiss, with the support of the Calgary Health Trust.*

Additional tactics will be developed as needed to continue growing the involvement of the local community in the HBI's philanthropic support.

**Strategy 3.2b** – Increase the involvement of community members with HBI mentorship programs, educational workshops delivered through the 'Research, Education and Leadership in Neuroscience' (REALISE) program and other activities that enable increased community stewardship. Local community members already participate in several of the HBI's committees, including:

- The Strategic Advisory Board
- The Community and Partners Advisory Committee
- The Fundraising and Stewardship Committee

For a complete description of all HBI committees, please see Appendix A.

Initiatives like the REALISE mentorship and internship programs not only benefit HBI students, but also help to educate community leaders about the capabilities of trainees from the HBI to make significant contributions to a myriad of societal areas as intelligent young people with strong transferrable skills. This two-way opportunity for learning is a keystone of all the HBI's community engagement and partnerships.

**Strategy 3.2c** – Engage senior HBI members and rising stars in a coaching program to develop their skills in community engagement. Participants in this program will gain first-hand experience in donor stewardship and a deep understanding of the value of community involvement in the HBI's mission. This new program provides succession planning and will increase community interactions across a wider breadth of HBI members.

**Goal 3.3: IMPACTFUL PARTNERSHIPS**

**Build impactful partnerships that advance and enrich the HBI's research and education programs.**

**Strategy 3.3a** – Foster local partnerships within the University of Calgary and the greater Calgary community to capitalize on local resources and expertise. Current local partnerships include:

- Collaborative support for the BSc Neuroscience program from the Faculties of Science and Arts and the Cumming School of Medicine.
- HBI members regularly collaborate with researchers from the other six research institutes within the Cumming School of Medicine:
  - The Alberta Children's Hospital Research Institute (ACHRI)
  - The Libin Cardiovascular Institute of Alberta (Libin)
  - The O'Brien Institute for Public Health (IPH)
  - The Calvin, Phoebe and Joan Snyder Institute for Chronic Diseases (Snyder)
  - The McCaig Institute for Bone and Joint Health (McCaig)
  - The Southern Alberta Cancer Research Institute (SACRI)
- Multiple faculties at the University of Calgary work together on multidisciplinary, cross-campus brain and mental health research initiatives, including the Faculties of Arts, Kinesiology, Nursing, Science, Social Work and Veterinary Medicine, along with the Cumming School of Medicine, the Schulich School of Engineering and the Werklund School of Education.
- Local industry partnerships, such as with CEDA International, have enabled internships as part of the REALISE program.
- Partnerships with local science outreach organizations, including Beakerhead and TELUS Spark, enable collaborative programming and venues for promotion of the HBI's mission.
- Communications organizations such as Shaw/Global help the HBI to reach out to the community.



As part of becoming a community hub, additional partnership opportunities will be developed over the next five years with other science and health focused organizations, such as the Alzheimer Society of Calgary and seniors' centres.

**Strategy 3.3b** – Take a leadership role in building provincial research and education partnerships in the neurosciences and mental health. Current partnerships include:

- Campus Alberta Neuroscience (CAN) – This network of neuroscience and mental health researchers and trainees across the Universities of Calgary, Lethbridge and Alberta proactively forms multi-institution teams in key research areas, such as Healthy Brain Aging and Dementia and Nervous System Injury. This approach increases team grant opportunities and increases Alberta's competitiveness as national neuroscience leaders. CAN further promotes province-wide collaboration with its funding for academic exchanges and workshops offered to neuroscience trainees across all three institutions.
- Alberta Health Services Strategic Clinical Networks – Alberta Health Services launched the Strategic Clinical Networks (SCNs) in 2012, as networks of researchers, health care professionals, community groups, patients and government who are tasked with creating improvements in focused areas of health care. HBI members are currently involved with the SCNs for 'Addiction and Mental Health,' 'Cardiovascular Health and Stroke' and 'Seniors Health.' A new SCN in 'Neurological Disease, Ear, Nose, Throat and Vision' is in development and will also include HBI members. HBI involvement in the SCNs also provides a mechanism for our research to inform health care.
- Alberta Innovates – Health Solutions (AI-HS) – In addition to funding research and offering scholarships for HBI members and trainees, AI-HS partners with the HBI in discussions of the future of neuroscience investment and outcomes in Alberta and the national context for neuroscience research. These discussions also involve partners Campus Alberta Neuroscience and Brain Canada.

**Strategy 3.3c** – Enhance national research and education partnerships in the neurosciences and mental health.

- Brain Canada – This federal organization funds neuroscience and mental health research in Canada based on a competitive, matching funds application process. The HBI has been very successful in recent Brain Canada competitions, with \$7.4 million in funding for six research projects that address brain and mental health announced in October, 2014. The HBI Director has also been asked to join the Brain Canada Board of Directors.
- Ontario Brain Institute – As part of its leadership role with Campus Alberta Neuroscience, the HBI is working with the Ontario Brain Institute to build a national network of neuroscience research and education hubs. This network would position both the HBI and the Ontario Brain Institute as provincial leaders, along with the Montreal Neurological Institute in Quebec to the east and the Brain Research Centre in British Columbia to the west.
- Canadian Institutes of Health Research (CIHR) – The primary federal funding body for the health sciences, CIHR supports brain and mental health research in Canada. It also works in partnership



with select leading institutes, including the HBI, to identify, build and fund collaborative, national neuroscience research programs. The CIHR Mild Traumatic Brain Injury Research program, launched in 2013, is an example of one such partnership with the HBI.

- Canadian National Brain Bee – This competition for secondary students provides a fun and competitive atmosphere for students to challenge themselves to learn about the neurosciences, while becoming inspired to pursue careers in this field. The brain bees also raise awareness of brain research in the community. Winners of local competitions go on to compete at the national bee, held at McMaster University and sponsored by CIHR. There is also an international brain bee competition. HBI has organized a brain bee competition for the Calgary community annually since 2008.

**Strategy 3.3d** – Develop an international strategy to foster current and new partnerships in the global community. This strategy will integrate student exchanges and research collaborations, to ensure we are maximizing connections at leading international neuroscience institutions.

The Rebecca Hotchkiss International Scholar Exchange (RHISE) program broadens the educational experience of HBI trainees by offering active exchanges and providing opportunities for research collaborations. Current active partnerships are underway with the following international universities:

- University of Oxford (Oxford, UK) – Annual exchange program for undergraduate students in the BSc Neuroscience program, which began in 2013. Scholarly research visits have been ongoing between Oxford and the HBI since 2011 and an HBI-Oxford symposium was held at the HBI in 2013.
- Karolinska Institute (Stockholm, Sweden) – An emerging exchange program for undergraduate students is launching fall 2015. A scientific symposium at the Karolinska was also held in November 2014, in partnership with HBI and Oxford. Scholarly visits between the HBI and the Karolinska have been occurring since 2013.
- Florey Institute of Neuroscience and Mental Health and University of Melbourne (Melbourne, Australia) – Numerous scholarly visits have occurred and tangible opportunities for collaboration are in development as part of a joint Memorandum of Understanding. The first competition for trainee exchanges, as part of a formal exchange program at the graduate and postdoctoral level, launched in November 2014. A joint symposium between HBI and both of these institutes will be hosted in Melbourne in August 2015.

A part of the international strategy will be the expansion of relationships with these universities to increase research and education collaborations. New research partnerships are also emerging with the following countries:

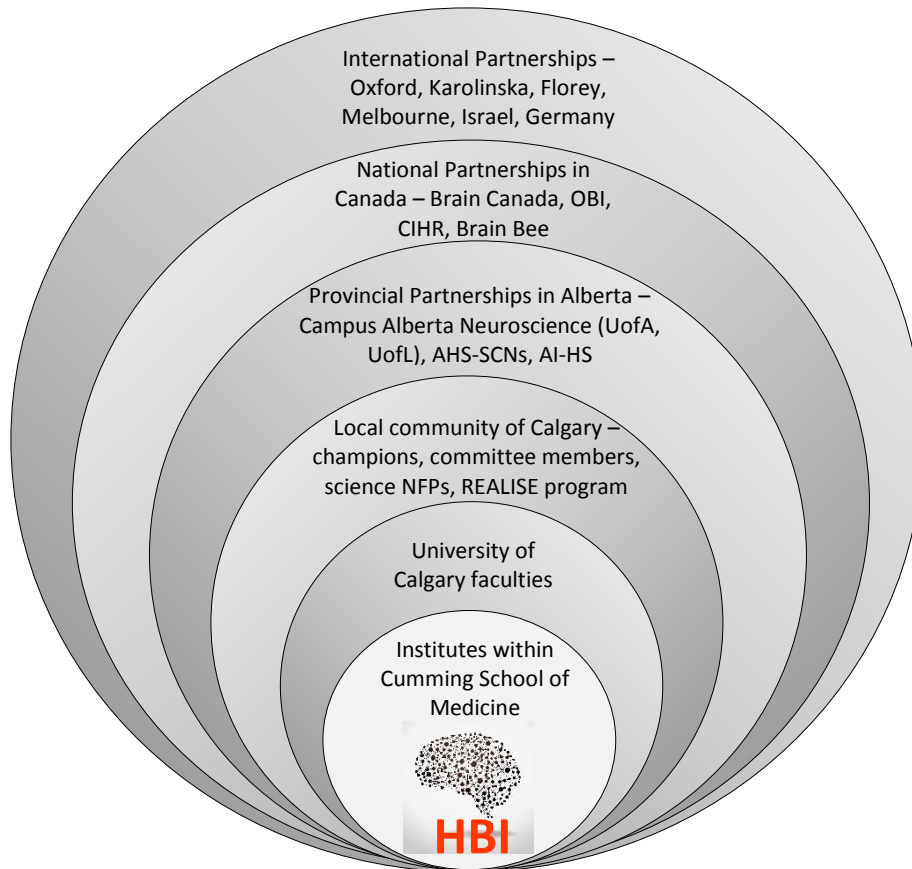
- Israel – New research partnerships with the Hebrew University of Jerusalem and the Technion – Israel Institute of Technology, are under development.
- Germany – A new research and education partnership with the Munich Centre for Neurosciences at the Ludwig Maximilian University of Munich is under development.





The HBI also learns from the international community via the Expert Advisory Committee (EAC) – a group of internationally recognized leaders in basic and clinical research in the neurosciences and mental health. EAC members serve senior leadership roles in their respective neuroscience institutions and advise the HBI on best practices to constantly improve our research and education programs and become leaders on a global scale. A full description of the EAC is available in Appendix A.

**The Hotchkiss Brain Institute’s partnerships may be envisioned as a series of nested rings:**



## METRICS OF SUCCESS

The following performance measures will capture progress towards achieving the overarching goal of engaging the community as a locally relevant and internationally recognized centre of excellence for brain and mental health. As these strategies develop, we will be looking for increasing trends with each of the following metrics.

### Community Hub:

- The expansion of outreach initiatives, measured via annual number of individuals engaged in the Calgary community.
- Analytics of web visitation rates and social media followers.

- A professional public survey of community knowledge and perceived value of the HBI conducted in 2015 and compared to results in 2018.

#### **Community Stewardship:**

- Annual donations.
- Annual number of individuals external to the University of Calgary involved with HBI committees or programs.
- Annual number of HBI members participating in philanthropic engagement activities.

#### **Partnerships:**

- The annual number of papers co-authored by HBI members with researchers at partner faculties or institutions.
- The annual number and value of team grants awarded to HBI members in partnership with researchers from other faculties or institutions.
- The annual number of international agreements, exchanges, symposia and formal scientific and clinical research collaborations with international partners.
- Conduct a social network analysis in 2015 to measure the degree of collaboration between HBI members and external partners (in other faculties and universities) and compare to results in 2018, once the new strategic plan has been in place for 3 years.

## SNAPSHOT OF SUCCESS – THE HOTCHKISS FAMILY

When the HBI was launched in 2004, it was supported by the overwhelming generosity of Calgary’s Hotchkiss family. Harley Hotchkiss’ leadership, warmth and passion remain at the foundation of the HBI’s new vision.

“My father believed that research into brain and mental health would help people,” explains Brenda Mackie, who has led the family’s involvement with the HBI since Harley passed away in 2011.

Mackie chairs both the Institute’s Strategic Advisory Board and the Fundraising and Stewardship Committee (FSC), with her brothers Richard and Jeff serving as FSC members. Mackie is also a member of the Community and Partners Advisory Committee with her mother Rebecca and sister-in-law Sheryl.

“When something has your family name, you take ownership,” Mackie says simply about her many ongoing involvements. “Research at the HBI is having a real impact. “We’re thankful we have the opportunity to be so involved and see all this happen.”





# IMPLEMENTATION

## IMPLEMENTATION

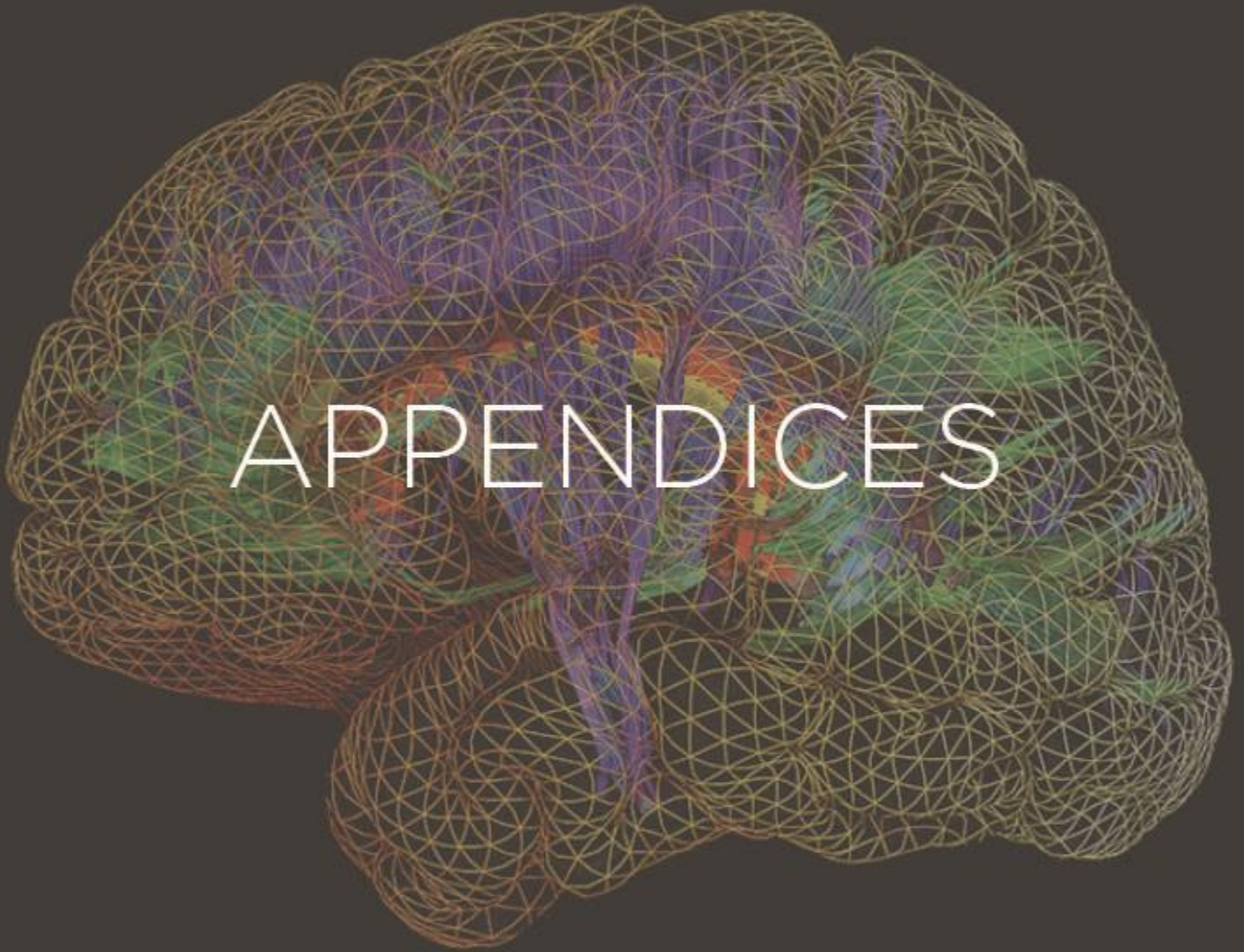
The HBI's new strategic plan will take effect April 1, 2015 and will guide the Institute over the next five years. An internal launch of the plan in February will allow for a transition period during the first quarter of 2015. During this period, HBI members, staff and trainees will re-organize themselves under the new NeuroDiscovery Framework and have the opportunity to provide feedback on the implementation of the new strategies.

Tactical and business plans will be developed annually, ensuring alignment of resources with the new goals and strategies. The development of the business plan is highly consultative with all HBI research and education groups and structured on a zero-based budgeting approach that maximizes accountability. The annual tactical plans provide a mechanism to move from goals to actions. Some of the new strategies will be implemented in year one (e.g. the new NeuroTeams), while other strategies will develop gradually over the next five years (e.g. becoming an authoritative voice for the Calgary community). This annual process provides all members and stakeholders of the HBI avenues for regular input into the roll-out of the strategic plan and ensures we remain responsive to any environmental changes.

The tactical plans for research are developed by the HBI's **Strategic Research and Innovation Committee**. For education, the HBI **Education Committee** leads the tactical planning process. The community & partnerships tactical plans will be guided by the **Strategic Advisory Board** as well as the **Fundraising and Stewardship Committee**. All tactical planning is overseen by the HBI's **Executive Committee**. Biennially, the **Expert Advisory Committee** provides an external review of the HBI's progress towards its goals in pursuit of its vision from international experts.

The metrics of success for research, education and community & partnerships, as defined in the previous sections, will be evaluated annually to chart our progress as an institute towards achieving our goals under the new strategic plan.

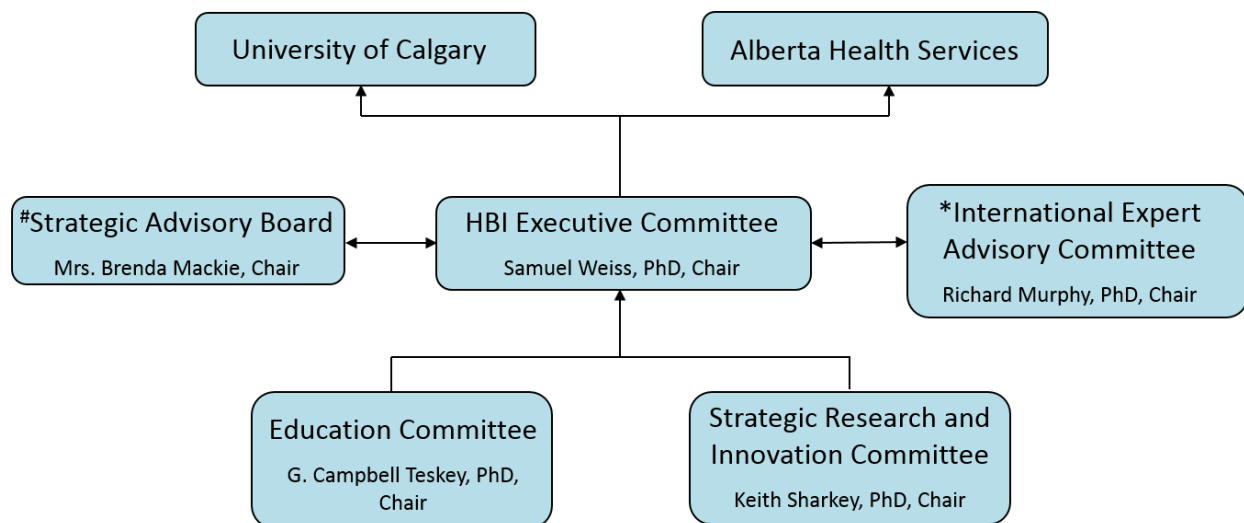
# APPENDICES



## Appendix A – Organizational Governance

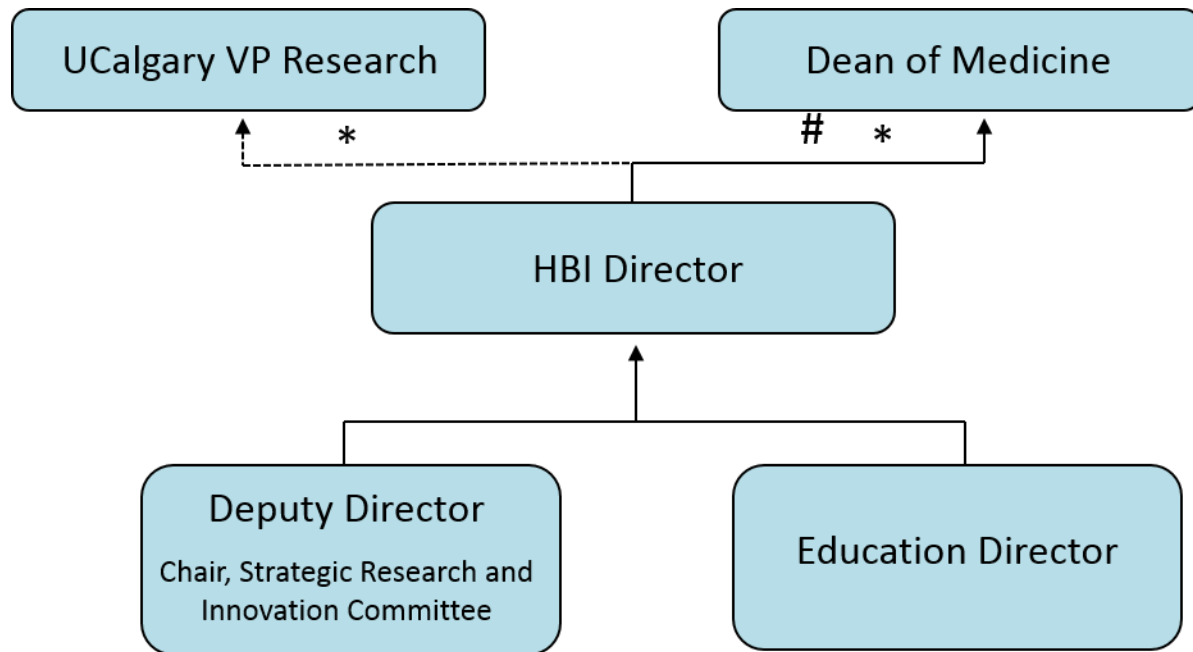
The Hotchkiss Brain Institute (HBI) is a research institute within the University of Calgary, operating out of the Cumming School of Medicine and in partnership with Alberta Health Services. The HBI is guided by oversight and advisory committees and lead by HBI Director Dr. Samuel Weiss, who reports to both the Dean of Medicine and the University of Calgary’s VP of Research. The Deputy Director, Dr. Keith Sharkey, oversees activities that drive research productivity at the HBI. The Education Director, Dr. G. Campbell Teskey, oversees all trainee funding and awards and the advancement of the HBI’s training programs.

### HBI ORGANIZATIONAL CHART



*\*Biennial - consult and advise on research and education activities and strategic directions*  
*# Semi-annual - consult and advise on the development and implementation of strategic plans*

## HBI REPORTING STRUCTURE



*\*HBI-led University of Calgary Brain and Mental Health Strategic Research Theme  
# HBI-specific finance, administration and human resources and Cumming School of Medicine physical infrastructure*

## HBI CENTRAL ADMINISTRATION

The central HBI office is comprised of the following staff members:

**Director** – Oversees the HBI’s strategic directions, daily operations, fundraising and relations with stakeholders inside and outside the University of Calgary.

**Deputy Director** – Oversees the activities that drive research productivity at the HBI, including the mentorship and peer review programs, space allocation, recruitment and oversight of the research NeuroTeams and Core Facilities.

**Education Director** – Oversees all trainee funding and awards and the advancement of the HBI’s training programs.

**Senior Manager, Business and Operations** – Responsible for finances, human resources, space and other operational matters and is the Institute’s liaison with accounting and infrastructure groups at the University of Calgary.



**Project Manager, Major Developments and Partnerships** – Responsible for institute-level partnerships, the HBI’s international strategy, strategic communications, major projects and other developments that are of strategic interest to the Institute.

**Communications Team** – Responsible for institute communications materials and activities, while serving as the link to the Cumming School of Medicine and University of Calgary communications offices.

**Education Advisor (REALISE)** – Responsible for the coordination and growth of the HBI’s REALISE program and trainee engagement.

**Education Coordinator** – Responsible for coordination and administrative support of the trainee international exchanges and education awards.

**Research Coordinator** – Responsible for the coordination of research-related activities, including providing support to the NeuroTeams and provides core administration for the HBI’s Internal Peer Review and Faculty Mentorship programs.

**Donor Relations Coordinator** – Responsible for planning and implementing both short and long-range donor relations strategies to enhance HBI and faculty relationships with donors and volunteers.

**Administrative Assistant** – Responsible for supporting the HBI Director.

## COMPOSITION OF THE HBI

At the beginning of 2015, the HBI included 127 full members, 61 associate members, over 300 trainees and nearly 300 research and professional staff. Members and trainees belong to the Departments of Cell Biology and Anatomy, Clinical Neurosciences, Physiology and Pharmacology, Psychiatry and Radiology at the Cumming School of Medicine and the Department of Psychology in the Faculty of Arts, as well as the Faculties of Kinesiology, Nursing, Science, Social Work, Veterinary Medicine, the Schulich School of Engineering and the Werklund School of Education.

Strategic recruitment of new faculty members in the five departments at the Cumming School of Medicine will ensure continued growth of the HBI in alignment with the new research themes. There are additional opportunities for growth of the HBI’s membership in the allied faculties across the University of Calgary; growth in these areas will be bolstered by the HBI’s leadership of the Brain and Mental Health Strategic Research Theme.

The new educational programs being introduced will increase both the quantity and quality of trainees at the HBI. Trainee numbers will also grow with the recruitment of new members who take students and fellows into their laboratories.

The NeuroTechnologies strategy includes plans to increase staffing support over the next 5 to 10 years for new staff scientists who can manage the HBI’s existing and upcoming Core Facilities and provide support to members and trainees in technical skills and experimental design. This staffing support is critical to maximizing the investment in the new NeuroTechnology Platforms.



## HBI COMMITTEES

**Executive Committee** – The HBI Executive Committee is chaired by the HBI Director and includes leaders from each of the HBI’s allied departments, as well as representatives of the operational committees of the Institute. This committee meets monthly and provides oversight and decision making for the HBI’s overall operations. It is responsible for coordinated planning between the HBI and the academic departments.

**Strategic Advisory Board** – This committee advises the Institute on strategic matters. With members from the local community and the University of Calgary’s Executive Leadership Team, the Strategic Advisory Board meets quarterly to provide operational oversight and represents the interests of our partner organizations and the local and university communities. It is chaired by Mrs. Brenda Mackie.

**Strategic Research and Innovation Committee** – This operational committee meets monthly to provide oversight and decision making for the HBI’s research activities. Chaired by the HBI Deputy Director, this committee is composed of representations of each of the NeuroTeams and other core HBI activities. The Strategic Research and Innovation Committee (SRIC) aims to create new points of collaboration; help to connect foundational and translational activities; identify group funding needs and projects; and to chart new research directions and required infrastructure. Beginning in 2015, SRIC will also be overseeing Brain and Mental Health activities for the university-wide Strategic Research Theme.

**Education Committee** – The HBI’s second operational committee includes highly regarded graduate supervisors, residency program coordinators, the undergraduate neuroscience program director and trainee representatives. Chaired by the HBI Education Director, the Education Committee meets monthly to provide oversight and decision making for the HBI’s education activities. The committee seeks to enhance and further develop the educational opportunities available to students and trainees in laboratory and clinical research across the Institute. More broadly, the Education Committee works to enhance the level of brain science education and awareness within the community.

**Fundraising and Stewardship Committee** – This committee ensures accountability of the HBI to community supporters. The committee meets quarterly and is chaired by Mrs. Brenda Mackie. It is advisory to the HBI and the Development office of the Cumming School of Medicine. It supports the ongoing fundraising and donor stewardship objectives of the HBI, helping to develop and refine the HBI’s fundraising strategies.

**Community and Partners Advisory Committee** – This committee is composed of business and community leaders, non-profit organizations and HBI champions. The Community and Partners Advisory Committee meets annually to enable input from a cross section of the local population and is chaired by Mrs. Brenda Mackie.

**Expert Advisory Committee** – The Expert Advisory Committee (EAC) is comprised of highly regarded and well qualified neuroscience leaders from around the world. Committee members are selected based on their international expertise in areas of neuroscience and mental health clinical and basic research that align with the HBI’s strategic direction. The EAC provides an external viewpoint of the HBI’s past and ongoing accomplishments and provides guidance for future directions during biennial site visits. The advice and guidance provided by the EAC helps to position the HBI for future success.

## Appendix B – Infrastructure and Support Programs

The HBI's infrastructure and support programs help to excel the HBI's research and education and the professional development of our members. All of these facilities and programs contribute to the success of research at the HBI, described in Appendix C.

### HBI INFRASTRUCTURE

Current Core Facilities:

- **HBI Advanced Light and Optogenetics (HALO)** – Equipment to support in vitro and in vivo optogenetics research, along with staff scientists to support HBI members in their use of this advanced technology, makes up the HALO. This facility began in 2011 with investments from both the HBI and individual HBI members' personal labs and continues to expand its capacity and expertise.
- **HBI Molecular Core Facility** – The Molecular Core is equipped with state of the art molecular biology equipment and reagents. Its services include DNA purification, gene cloning and protein analyses. A dedicated scientific manager provides expertise in experimental design, as well as training services and workshops for HBI trainees. It has operated under its current mandate since 2011. The facility is constantly working towards expanding its suite of available services.
- **Neuroimaging Research Unit (NIRU)** – Based at the Seaman Family Magnetic Resonance Research Centre, the NIRU offers technical expertise and administrative assistance to permit HBI scientists to initiate and conduct high-magnetic-field human brain imaging research. The dedicated NIRU personnel facilitate neuroimaging research from initial experimental design all the way through to the final dissemination of research findings. The NIRU will contribute to the Neuro-Imaging Platform strategy.
- **Regeneration Unit in Neurobiology (RUN)** – Plans for the RUN facility began in 2009 and full operations were initiated in 2012. Two staff scientists provide expert guidance on experimental design, data analysis and operation of the advanced microscopy, imaging and behavioural testing equipment housed in this facility, which serves as a major centre for collaborative research at the HBI.

The Clinical Research Unit (CRU) is another facility that provides significant support to clinical HBI researchers. The CRU began as an HBI Core Facility in 2007 and due to its enormous success, it was expanded to a faculty-wide facility for the Cumming School of Medicine in 2013.

New Infrastructure:

- **Collaborative Social Spaces** – Renovations are currently underway within the footprint of the HBI for common spaces that will act as nodes for increased socialization between lab members,



facilitating unstructured collaboration opportunities. The first such space, the “Collaborarium,” is a part of the Healthy Brain Aging Labs, opening March 2015.

- **NeuroResearch Clinic Initiative** – This initiative will phase in additional resources across an increasing number of University of Calgary patient clinics over the next 5 years, in the form of trained personnel and standardized databases, with oversight from a dedicated project manager operating out of the Cumming School of Medicine’s Clinical Research Unit.
- **NeuroTechnologies infrastructure** – New supportive infrastructure will develop from the implementation of the NeuroTechnologies strategy over the coming years. Some of this equipment may supplement existing Core Facilities (e.g. new advanced microscopy equipment inside the RUN facility), while other platforms may become new, stand-alone Core Facilities (e.g. a Computing Innovation Centre as part of the Neuro-Informatics Platform).

## HBI SUPPORT PROGRAMS

### Current Programs:

- **HBI Infrastructure and Small Equipment Repair and Replacement** – This initiative provides modest funds for the maintenance of existing research equipment in the labs of HBI members and represents the HBI’s needs to the Cumming School of Medicine’s Centre for Advanced Technologies. Launched in 2011, a key feature of this program is the requirement for matching funds.
- **HBI Internal Peer Review** – Launched in 2009, this program provides a formal process for peer review of provincial and national grant applications, increasing success rates of HBI members for these highly competitive funding sources. Committees of 3-5 members with expertise in the area of the proposal meet with applicants over a six-month period in advance of final grant submissions. Thanks in part to the additional support provided through this program, HBI members are approximately 17 per cent more successful than applicants from the Cumming School of Medicine as a whole.
- **HBI Mentorship** – This program for members at the assistant and associate professor levels, who have held their appointment for less than 10 years, provides academic mentorship by matching junior members with more senior faculty members in aligned career paths. Mentoring relationships are tailored based on the career path interests and professional development needs of individual members. The HBI Mentorship program began in 2012. Department heads are closely involved in the process, ensuring all junior faculty members in both basic and clinical research domains have access to the support and counsel they need to develop successful research labs and advance their careers while at the HBI.
- **HBI Ombudsman Office** – This office provides confidential advice to any HBI undergraduate student, graduate student, research assistant, postdoctoral or clinical fellow, or faculty member who has questions regarding research integrity. This office ensures all HBI members, staff and trainees are actively supported and the reputation of the Institute is upheld to the highest standards of integrity.
- **HBI Pilot Funding** – This program, which began in 2013, provides support for early-phase studies in promising new brain and mental health research directions. The HBI Pilot Funding program



operates in partnership with the Department of Clinical Neurosciences to fund clinical pilot studies and in partnership with The Mathison Centre for Mental Health Research & Education to fund mental health pilot studies.

- **HBI Team Grant Advisory Panel** – This program, operating since early 2013, provides writing, review and project management support for major team funding applications that are led by HBI members. Advisory panels facilitate rounds of review from both internal peers and external content experts who are not involved in the formal adjudication process. Advisory Panels are tailored to each unique grant and ensure that HBI members are putting forward the strongest-possible applications.
- **RHISE Exchange** – In addition to trainee exchanges, since its 2011 launch, the Rebecca Hotchkiss International Scholars Exchange program provides opportunities for HBI members to visit international institutes to build research collaborations with international colleagues. International researchers may also be brought to the HBI for seminars, symposia and other collaborative research purposes.

#### New Support Programs:

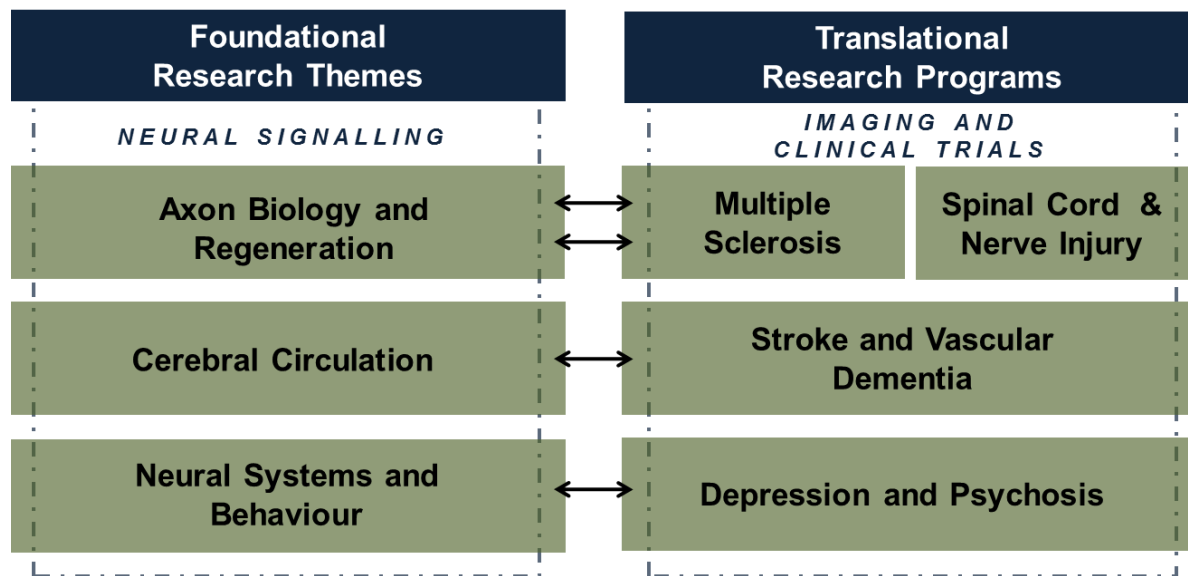
- **Community Stewardship Coaching** – Designed for senior HBI members and rising stars, this new program will increase the skill level and breadth of involvement of HBI members who interact with the philanthropic community. Participants in this program will gain first-hand experience in donor stewardship and a deep understanding of the value of community involvement in the HBI's mission. This new program also provides succession planning.
- **HBI Bridge Funding** – Launching in 2015, this program will operate collaboratively with the Cumming School of Medicine's bridge program. The HBI's program will support high-ranking CIHR grant applications that narrowly miss funding cutoffs at the faculty level. The purpose of this program is to enable continued data collection and refinement of applications, thus increasing applicants' chances of success in subsequent competitions.
- **HBI Equipment Fund** – This program will provide a mechanism for researchers to purchase new equipment for their labs. As these equipment purchases are often not eligible to be funded with research grants, this HBI program will provide much-needed support to its members.
- **CIHR Transition Support** – As CIHR transitions to its new 'Foundation' and 'Project' funding schemes in 2015, additional tactical-level programs may be required to support HBI members through this challenging transition of funding models. The HBI is committed to ensuring the continued ability of its members to conduct top-quality research through this transition, when traditional funding sources may be unpredictable. This program will support bridge funding for specific (limited) periods of time where other bridging programs fall short.
- **NeuroTeam Retreats** – Each NeuroTeam will be given the opportunity to organize annual retreats of their members and trainees, to share research progress and explore upcoming opportunities and collaborations. Retreats will be organized by the NeuroTeam Leaders.

## Appendix C – HBI Research 10-Year Report

Research has always been the foundation of the HBI. Led by the HBI’s 127 members (as of 2015), research is a collaborative activity, with HBI trainees, staff scientists and professional staff, along with partners across the University of Calgary and beyond, all making important contributions. The following information presents the HBI’s research programs and highlights of its accomplishments from 2004 to 2014, as a reflection of 10 years of excellence.

### HBI’S 2014 THEMES and PROGRAMS

Between 2009 and 2014, the HBI’s research was structured by three foundational research themes, paired with one or more translational research program. The diagram below illustrates the themes and programs and the connections between them. This framework proved highly successful in advancing HBI research, by uniting areas of strength in basic science (themes) with clinical focuses (programs) and increasing interactions among scientists within these research groups. The new NeuroDiscovery Framework, launching in 2015, builds on these successes.



#### AXON BIOLOGY and REGENERATION

The focus of this theme was to search for new ways to protect, reconnect and regenerate axons. This group worked towards advancing the fundamental understanding of axons at the cellular and molecular levels, with a view to translational applications in traumatic nerve, brain and spinal cord injuries, multiple sclerosis, peripheral neuropathies and more. The theme supported its members with annual

research retreats for trainees and PIs, twice yearly business meetings of PIs, ideas workshops, preparation and teaching of a graduate level course in Regeneration and collaborative efforts to develop team grant applications. This theme developed the Regeneration Unit in Neurobiology (described below) and received significant operating funding from multiple external sources, including CIHR, Heart & Stroke Foundation of Canada, Pfizer Canada and many more.

## MULTIPLE SCLEROSIS

This translational program integrated innovative basic and clinical research in an effort to arrest or reverse the progression of multiple sclerosis (MS) and improve the quality of life for MS patients and their families. This work included providing new standards of healthcare delivery. This program has drawn clinical research participants from the Calgary MS program's over 5,000 registered patients. The program's epidemiological research focused on how environmental factors influence MS outcomes. This program exemplified a "bench to bedside to bench" approach to research and received operating funding from Alberta Innovates, CIHR, MS Society of Canada and other sponsors. Coordinated activities included journal clubs, clinical rounds, think tanks and lectures. The Alberta endMS program, to coordinate MS training and collaborative research activities across Alberta, was also run by the HBI.

## SPINAL CORD and NERVE INJURY

This program aimed to explore emerging and undiscovered treatment avenues in order to optimize the lives of spinal cord and nerve injured patients. This includes strategies to mitigate injury, enhance neurological recovery and function, manage pain more effectively and to prevent and treat other complications associated with these injuries. This program has been active in clinical trials and successfully launched HBI investigator initiative randomized control trials in spinal cord injury, ulnar neuropathy and cervical degenerative disc disease, as well as initiated a human biomarker study in spinal cord injury. Researchers in this program received funding from a wide array of sponsors, including the Rick Hansen Institute, The Canadian Diabetes Association, NSERC, industry sponsors and more.

## CEREBRAL CIRCULATION

Researchers in this theme collectively studied structural and functional adaptations of the cerebrovasculature in health, aging and disease. A strong emphasis on applied physiology, bioengineering and imaging helped to connect participating researchers, whose research focus ranged from the cellular and molecular level through integrative animal models, to blood vessel imaging in the human brain. This theme has worked closely with the Stroke and Vascular Dementia translational program, as well as with the Libin Cardiovascular Institute of Alberta. Funding for this theme has come from AI-HS, NIH, Alberta Health Services and other sponsors. The theme's activities included a visiting speaker series, monthly Cerebral Circulation Forum events, twice yearly theme retreats and annual town hall meetings.

## STROKE and VASCULAR DEMENTIA

Beginning as the internationally recognized Calgary Stroke Program, this program expanded to include a greater emphasis on blood vessels and vascular diseases in all their manifestations, including dementias. Research includes brain vessel pathophysiology, advanced stroke imaging, brain stimulation, the relationships between vascular risk factors, silent stroke and memory and cognitive decline and testing of new approaches for prevention, detection and treatment of vascular dementia and stroke in clinical studies. Program activities included academic rounds, clinical-radiology case conferences and co-sponsored events with the HBI Cerebral Circulation theme. Funding sources have included the National Institutes of Health, CIHR, Canadian Stroke Network and more.

## NEURAL SYSTEMS and BEHAVIOUR

This foundational research theme was focused on synaptic and neuronal network physiology, with an emphasis on understanding behavioural and other outputs of the brain. Interests of the involved researchers ranged from basic synaptic physiology to whole animal and human research. Researchers have used electrophysiological and molecular characterization techniques, optogenetic tools, clinical neurology and human and animal imaging. The HBI Advanced Light and Optogenetics Core Facility was developed by researchers in this theme. Sponsors have included NSERC, Neuromed Technologies, CIHR and a wide array of others. The theme's coordinated activities included a trainee-run journal club, priority research nights for PI discussions, PI lead journal clubs, symposia and conferences.

## DEPRESSION and PSYCHOSIS

This program has focused on understanding the development and course of mental illness, with an emphasis on identifying new and improved ways to provide treatments and interventions. Focal areas of researchers in this program have included imaging of the disruption of neural mechanisms by psychosis and depression and the prediction, prevention and diagnosis of mental illness in the clinical realm. Funding for this theme has been received from Brain Canada, Alberta Heritage Foundation for Medical Research, the Movember Foundation and other sponsors. Coordinated activities included a seminar series and establishment within The Mathison Centre for Mental Health Research & Education (see below).

## THE MATHISON CENTRE for MENTAL HEALTH RESEARCH & EDUCATION

Launched in March 2012, The Mathison Centre for Mental Health Research & Education was made possible by a \$10 million investment from Mr. Ronald P. Mathison, President and CEO of Matco Investments Ltd. The Mathison Centre employs a multidisciplinary approach to the early identification, prevention and treatment of mental health disorders including depression, psychosis, schizophrenia and other conditions. Created by the HBI and the Department of Psychiatry, The Mathison Centre works in partnership with faculties across the University of Calgary. The Mathison Centre supports approximately 80 researchers, trainees, staff scientists and members with world-class expertise in brain



imaging and mental health research. These researchers and clinicians work together to inform mental health care strategies in our community and beyond. Poised to become a leader in mental health research and education, The Mathison Centre offers support and new hope to families in Calgary, throughout Alberta and around the world.

## HBI RESEARCH HIGHLIGHTS

The following 10 highlights represent a small fraction of the research successes at the HBI during its first 10 years. They provide an overview of the depth and breadth of accomplishments of the HBI and its members.

### **MS Clinical Advances:**

In 2007, Drs. V. Wee Yong and Dr. Luanne Metz, co-leaders of the HBI's Multiple Sclerosis translational program, led a study into a common acne medication that has the potential to delay the progress of multiple sclerosis and continue to create new medicines for repairing damage and recovering function in people with progressive MS.

### **Gairdner International Award:**

In 2008, HBI Director Dr. Samuel Weiss earned one of the world's most prestigious medical science awards, a Gairdner International Award. The Gairdner Awards recognize the world's most creative and accomplished biomedical scientists. These awards are given to biomedical scientists who have made original contributions to medicine resulting in increased understanding of human biology and disease.

### **Robotics in Stroke Treatment:**

In 2010, HBI member Dr. Sean Dukelow helped develop a fully customizable robotic stroke assessment tool, the KINARM: Kinesiologic Instrument for Normal and Altered Reaching Movements. With the help of KINARM, Dukelow studies the impact of strokes on patients and mechanisms to speed recovery. Beginning in 2014, Dukelow has adapted the KINARM technology for use in the assessment and rehabilitation of patients suffering from traumatic brain injury and concussion.

### **Vascular Dementia Chair:**

In 2012, HBI clinical scientist Dr. Eric Smith was named the first Chair holder of the new Kathy Taylor Chair in Vascular Dementia. The Chair was created with a generous gift of \$5 million from Calgary's Taylor family to support research in dementia. As the first Chair holder, Smith is looking at ways to treat and prevent the disease – a major health problem of our time.

### **Gait Reminder iPod App:**

HBI member Dr. Bin Hu and his team developed the Gait Reminder iPod application in 2012. This app was developed for Parkinson's disease patients, who use the technology to assist their stride length during walking exercises. This device has the potential to increase Parkinson's patients' mobility and quality of life.

### **Sport-Related Concussion Policy:**

In 2012, sport-related concussion research spearheaded by HBI members Drs. Carolyn Emery and Willem Meeuwisse contributed to a Hockey Canada ban on body checking in peewee hockey. This policy





change will prevent an estimated 3,500 concussions per year in 11 to 12 year olds across Canada. In a 2013 funding announcement by the Canadian Institutes of Health Research, *one third* of the national funding for concussion and brain injury was awarded to University of Calgary researchers.

**Brain Tumour Project:**

In 2013, HBI member Dr. Gregory Cairncross was named the lead of a new \$8.2 million drug discovery project. Thanks to funds from the Alberta Cancer Foundation, Alberta Innovates – Health Solutions, The Terry Fox Foundation and other partners, Cairncross and a team of top researchers across Canada are researching glioblastoma, an aggressive and often fatal brain disease that affects 2,600 Canadians. The group's five- to 10-year objective includes better control of tumours and a longer, high-quality life for patients.

**Recruitment Success:**

As a leader in neurological and mental health research and education, HBI is attracting the best researchers in brain and mental health. One of the world's leading experts in human-imaging science, Dr. Bruce Pike, joined the HBI in 2014, as the new Campus Alberta Innovation Program (CAIP) Chair in Healthy Brain Aging. Pike's research on brain imaging has implications for the study of normal brain development as well as the diagnosis and treatment of neurological and psychiatric diseases such as MS, stroke, depression, dementia and Parkinson's.

**Healthy Brain Aging Laboratories:**

Construction of the HBI's Healthy Brain Aging Laboratories began in 2014. This state of the art, 12,000 square foot space will support collaborative research in the areas of stroke, dementia, Alzheimer's disease and movement disorders. Clinical researchers, brain imagers and neuropathy specialists will work closely in this space, which will be opening in early 2015.

**Research Funding Success:**

After just eight years as an institute, the HBI's competitive funding success grew from \$18 million in 2004, to \$49 million in 2012. Every year since 2012, the HBI has held the title of the #1 research institute, with respect to total research revenues, in the Cumming School of Medicine at the University of Calgary.



## Appendix D – HBI Education 10-Year Report

Education has been an integral part of the HBI's mission since its founding in 2004. At the launch of this strategic plan in 2015, there are over 300 trainees at the HBI and that number has been steadily increasing. The following information presents the HBI's Education programs and accomplishments as of 2014, in recognition of 10 years of growth.

### HBI TRAINEES

Students and fellows who are supervised by a full member of the HBI, or who are registered in the University of Calgary's BSc in Neuroscience program, are considered to be HBI trainees. Our students and fellows span a variety of disciplines and academic levels:

#### UNDERGRADUATE

The Bachelor of Science in Neuroscience program launched in 2008, as an honours degree program administered out of the Faculty of Science. As a tri-faculty initiative, the Faculties of Arts, Science and the Cumming School of Medicine partner to run this innovative, interdisciplinary program. Today, there are over 100 undergraduate students in the BSc Neuroscience program. It has become the premiere undergraduate honours program at the University of Calgary, with the highest entrance average.

Students in the BSc Neuroscience program are eligible for one of 13 available Donald Burns and Louise Berlin Summer Studentships in Dementia Research. These awards, available to summer students pursuing dementia research at the University of Calgary under the supervision of an HBI faculty member, provide valuable experience to students in research labs, at the beginning of their careers. Summer Research Scholarships are also available on a competitive basis to students unable to obtain external funding to work in the research labs of HBI members.

#### GRADUATE

All MSc and PhD students in the Faculty of Graduate Studies whose supervisor is an HBI member are considered HBI graduate student trainees. Consequently, the home departments of these students are representative of the diversity of faculty affiliations of the HBI's members. Approximately 100 of the HBI's graduate students come from the Department of Neuroscience and others come from the Departments of Psychology, Engineering and Kinesiology, as well as smaller numbers from a range of other departments. The strong relationship between the Graduate Department of Neuroscience and the HBI, as a research institute, is often cited as a model for graduate programs in the Cumming School of Medicine. Graduate trainees in the HBI are provided with a well-rounded, foundational education in the neurosciences that also exposes them to clinical work. Trainees at this level also lead the HBITO (see

description below). They also have the honour of holding one fifth of the prestigious Vanier Canada Graduate Scholarships at the University of Calgary.

Several funding opportunities are available to graduate trainees at the HBI. The Graduate Student Recruitment Program aids HBI researchers in recruiting excellent PhD candidates. The Dr. T. Chen Fong Doctoral Scholarships have provided competitive entrance scholarships for PhD students training under HBI members. The Donald Burns and Louise Berlin Graduate Awards in Dementia Research provide entrance scholarships for new graduate students in both the MSc and PhD programs. The Arun Anbazhagan HBI Travel Award provides funding each year for a graduate student to attend and present at the Society for Neuroscience conference. The PhD Student Travelling Fellowship enables PhD students to access training courses that satisfy degree requirements, from around the world that are not offered in Calgary, by offsetting travel, accommodation and subsistence expenses. The Hotchkiss Brain Institute External Examiner Travel Program enables supervisory committees to bring in external examiners for PhD defenses, thus enhancing the exchange of views and scientific knowledge with a leader in the field. Finally, HBI Conference, Symposium and Workshop Grants enables trainees to bring distinguished national and international researchers and experts in the neurosciences to Alberta for HBI-organized meetings.

## POSTDOCTORAL

Postdoctoral and clinical fellows are less than five years from the completion of their doctorate, or less than 10 years from the completion of their MD, DDS or equivalent. Similar to graduate students, postdoctoral and clinical fellows at the HBI are representative of the same range of departments as their supervisors and include the Department of Neuroscience, Psychology, Engineering, Kinesiology and others. Trainees at this level also participate in the HBITO (see below) and help to organize lectures and other learning opportunities for the institute.

Funding opportunities are available at the fellowship level for HBI trainees. The Postdoctoral Recruitment Program aids HBI researchers in recruiting excellent postdoctoral candidates. The Harley N. Hotchkiss Postdoctoral Fellowship provides competitive salary support for new postdoctoral recruits. The Donald Burns and Louise Berlin Postdoctoral Fellowship in Dementia Research provide entrance awards to new postdoctoral fellows annually. Finally, HBI Conference, Symposium and Workshop Grants enables fellows to bring distinguished national and international researchers and experts in the neurosciences to Alberta for HBI-organized meetings.

## ALUMNI

While the HBI did not become an institute until 2004, the University of Calgary's Faculty of Medicine (now Cumming School of Medicine) has been producing top-quality neuroscience alumni for much longer. Under the auspices initially of the Neuroscience Research Group, one of the very first training programs in neuroscience in Canada was established at the University of Calgary in 1971, as a separate stream under the umbrella Medical Science Program. In recognition of the critical role played by neuroscience trainees in our research and academic success, the Hotchkiss Brain Institute annually recognizes an outstanding former trainee as the Hotchkiss Brain Institute Neuroscience Alumnus of the



Year. Alumni award recipients also participate in an annual lecture as part of the celebration of their achievements.

## HBI EDUCATION PROGRAMS

### ALBERTA endMS REGIONAL RESEARCH and TRAINING CENTRE

The HBI has been home to this centre from 2009 to 2014, which coordinates training and collaborative research activities on MS across the Universities of Calgary, Alberta and Lethbridge. The Alberta endMS Network also helps to implement national endMS initiatives, creating an advanced research and training environment across the country.

### BRYAN KOLB LECTURE in BEHAVIOURAL NEUROSCIENCES

This annual lecture, which began in 2010, welcomes HBI trainees each fall with a renowned guest speaker in the behavioural neurosciences. The Kolb lecture is named in honour of Dr. Bryan Kolb, a University of Calgary alumnus, in celebration of tremendous empirical contributions to the fields of behavioural neuroscience and neuropsychology, as well as his outstanding educational and administrative leadership. Past guest speakers have included Drs. Trevor Robbins (University of Cambridge), Ian Whishaw (University of Lethbridge), Barry Everitt (University of Cambridge), Melvyn Goodale (Western University) and, in the lecture's inaugural year, its namesake Dr. Bryan Kolb (University of Lethbridge).

### CALGARY BRAIN BEE

As part of the National CIHR Brain Bee, the HBI has hosted the Calgary Brain Bee since 2008. This fun competition for high school students challenges the next generation with questions about the brain and neuroscience research. It builds awareness and excitement about the neurosciences, both for the students as well as the larger community. Many brain bee competitors go on to careers in the neurosciences. Local winners advance to the National Brain Bee hosted at McMaster University and winners from that competition go on to the international championships.

### CORE FACILITIES TRAINING

The HBI Molecular Core Facility, Regeneration Unit in Neurobiology (RUN) and other HBI Core Facilities offer training modules on research techniques and equipment to advance the research skills of HBI trainees. For example, RUN provides three-week long microscopy and behaviour modules. The Core Facilities also organize seminars from industry groups related to the specialized equipment housed in these centres.



## HBI SEMINAR SERIES

HBI Education organizes a seminar series every Friday during the academic year. The primary audience for these seminars are HBI trainees. Seminars feature invited external speakers who are experts in their fields of the neurosciences and mental health research. They provide valuable exposure of trainees to historical, as well as new, leading edge theories and also provide opportunities for trainees to speak with these experts on a one-on-one basis.

## HBITO

The Hotchkiss Brain Institute Trainee Organization is the student body for HBI graduate students and postdoctoral fellows. HBI members provides oversight to HBITO activities, which includes hosting world-renowned speakers, organizing events to celebrate the achievements of HBI trainees, helping to organize journal clubs and playing an active role in the education of the Calgary community. Funding and administrative support is provided by HBI Education. The HBITO aims to facilitate and foster strong interactions between trainees while shaping their educational environment.

## INTERNATIONAL and INDUSTRIAL IMAGING TRAINING (I3T) PROGRAM

This specialized training program in medical imaging was made possible by an NSERC CREATE grant awarded to HBI member Dr. Richard Frayne in 2012. Imaging-focused trainees benefit from additional travel opportunities, courses and seminar series provided by this program. The CREATE I3T Program is intended to prepare trainees to be future academic and commercial leaders, by providing them with cutting-edge technical skills and knowledge in Medical Imaging.

## POSTDOCTORAL and PhD RESEARCHER of the YEAR AWARDS

The HBI's Postdoctoral and PhD Researcher of the Year Awards recognize outstanding trainees for research and publication excellence. Awards have been presented each year beginning in 2012, to the top two trainees who publish frequently and in the highest outlets.

## REALISE

The 'Research, Education and Leadership in Neuroscience' program is a professional development program which launched in September 2012 and has quickly become a centerpiece program of HBI Education. REALISE offers advanced training, leadership and skill development opportunities to prepare HBI trainees to be successful in any career. In addition to supporting education in research, REALISE positions HBI trainees for future success in their chosen careers, both within and beyond academia. Through REALISE, HBI trainees will develop the tools necessary to become the next generation of community, business and academic leaders.

There are three elements of programming offered by REALISE to HBI trainees at all levels, which participants may select based on individual interests, making the program fully customizable.



## Training Modules

These courses and workshops, which encompass six key competencies including Neuroscience Knowledge, Teaching Skills, Knowledge Translation, Technical Skills, Professional Skills and Career Opportunities, are offered in an adaptive schedule for HBI trainees. Modules are led by HBI scientists, professional facilitators and senior level trainees with content expertise. Content ranges from training in research-specific techniques, to knowledge translation workshops, to professional soft skills that help students develop transferrable competencies that will position them for success both in and outside of academia. The schedule of modules is constantly evolving based on the needs and interests of the trainees.

REALISE also offers an External Module Registration Award to enable students to access workshops and short courses of benefit to their professional development which are offered outside of the University of Calgary.

## Community Mentorship

This competitive program pairs successful HBI trainees with leaders from Calgary's professional community. The primary goal is to foster meaningful mentoring relationships with tangible benefits for all participants. Mentees are given the chance to engage with the community and further hone their personal and professional skills, while mentors have the opportunity to inspire and shape future leaders. The aim is to partner students and fellows with professionals who can provide insights into the business world and broader community, helping HBI trainees to transition into their professional careers. The REALISE mentorship program launched in the fall of 2014.

## Internship Opportunities

Launched in the spring of 2014, REALISE Internships are for qualified students and fellows interested in exploring professional opportunities and gaining valuable experience in the private sector, government or non-governmental organizations. This program has the added benefit of placing bright, creative, critical thinkers into alternative positions in the community, where employers may benefit from the talents of HBI trainees and realize the benefits of hiring such bright minds.

## RESEARCH DAY

This annual event has run every year since the HBI was founded. It includes presentations from internal and guest speakers, as well as a poster session of trainee research. It provides an opportunity for HBI trainees to share their own research while learning about the research of leaders in the field.

## RHISE

The Rebecca Hotchkiss International Scholar Exchange (RHISE) program was established in 2011 to develop new interactions and strengthen those that already exist between the HBI and international centres of neuroscience research and training excellence. This program allows the HBI to bring international neuroscience leaders and trainees from partner institutes to Calgary for in-depth and intensive research residencies up to three months in length. Additionally, HBI faculty members, fellows



and students may travel outside of North America to exchange ideas with and learn from the best neuroscientists. Through interactions with visiting scholars and numerous opportunities to learn new techniques and methods from the world's best and brightest, the RHISE Program helps to establish a unique learning environment for all HBI members and trainees.

A formal exchange program for undergraduate students in the BSc Neuroscience program with Oxford University launched in 2013, with two students from each institute participating annually. A partnership agreement with the Karolinska Institute in Stockholm, Sweden is in place and trainee exchanges will be launching in the fall of 2015. A joint Memorandum of Understanding has also been signed as a partnership agreement between the HBI, the Florey Institute of Neuroscience & Mental Health and the University of Melbourne in Australia. The first competition for trainee exchanges with Australia, as part of a formal exchange program at the graduate and postdoctoral level, launched in November 2014.



## Appendix E – HBI Community & Partnerships 10-Year Report

One of the HBI's great strengths over its first 10 years lies in the relationships the Institute has built with the community, locally to internationally. The following report summarizes the HBI's community activities and partnerships to 2014.

### PHILANTHROPIC SUPPORT

The philanthropic support of the Calgary community has enabled many of the HBI's research and education initiatives and significantly elevated our progress as an institute. The strong relationship between the HBI and our community has accelerated advancements in both research and education. As stewards of this humbling support, we take great responsibility in maximizing the impacts in brain and mental health for our community.

Since the formation of the HBI 10 years ago, we have raised over \$110 million in donations, pledges and bequests. In 2014, brain and mental health research at the HBI was earmarked as one of two areas to receive funds from the newly established Cumming Medical Research Fund – supported by a \$100 million philanthropic gift and matching funds from the Government of Alberta, for a total of \$200 million – over the next 25 years.

### COMMUNITY OUTREACH

#### MEDIA

The HBI continually shares exciting new research – from the launch of major projects led by HBI scientists, to the published results of successful clinical trials – via a range of media outlets. Press releases, media events, television interviews, published stories, online articles and social media are all used as conduits to inform the public about the advances in brain and mental health research and education happening in our own community.

#### PUBLIC LECTURES

The HBI periodically organizes lectures on brain and mental health topics which are open to public audiences. Some of these lectures feature HBI researchers, while the HBI hosts internationally recognized guest speakers for others. One such public lecture series hosted at the HBI was the Margarete Wuensche Memorial Lecture, jointly presented by the HBI and the Wuensche family. The





annual lecture was originally created in 2004 to honour the late Margarete Wuensche and concluded in 2014. Speakers included the neurologist and bestselling author Oliver Sacks, Director of the NIMH, Dr. Thomas Insel and Nobel Laureate, Dr. Peter Agre. A public lecture held in celebration of the HBI's 10-year anniversary, featuring distinguished neuroscientist and author Baroness Susan Greenfield, attracted over 400 people.

## REPORT TO THE COMMUNITY

This annual publication highlights key research and education stories from the past year at the HBI, framed within a context of their relevance to the community. The Reports also document many of the HBI's cumulative accomplishments on an annual basis and highlight key statistics. Reports are shared with HBI donors, partners and friends of the Institute and made available to the general public.

## SCIENCE CAFÉS

Science Cafés are informal discussions between scientific experts and public audiences on topics which are highly relevant, though often poorly understood, in the community. Held in a downtown pub venue, Science Cafés successfully encourage important dialogue within our community about brain and mental health. The informal setting makes complex topics like seizure disorders accessible to adults from all walks of life. The HBI has been leading Science Cafés in Calgary since 2009 in partnership with TELUS Spark (formerly TELUS World of Science) and CIHR. Each Science Café has attracted between 60 and 200 people.

## PARTNERSHIPS

### LOCAL PARTNERSHIPS in CALGARY

The HBI has worked diligently to become well-connected with groups and organizations whose mission aligns with our own within the Calgary community. As of 2014, local partnerships include:

- Collaborative support for the BSc Neuroscience program from the Faculties of Science and Arts and the Cumming School of Medicine.
- HBI members regularly collaborate with researchers from the other six research institutes within the Cumming School of Medicine:
  - The Alberta Children's Hospital Research Institute (ACHRI)
  - The Libin Cardiovascular Institute of Alberta (Libin)
  - The O'Brien Institute for Public Health (IPH)
  - The Calvin, Phoebe and Joan Snyder Institute for Chronic Diseases (Snyder)
  - The McCaig Institute for Bone and Joint Health (McCaig)



- The Southern Alberta Cancer Research Institute (SACRI)
- Multiple faculties at the University of Calgary work together on multidisciplinary, cross-campus brain and mental health research initiatives, including the Faculties of Arts, Kinesiology, Nursing, Science, Social Work and Veterinary Medicine, along with the Cumming School of Medicine, the Schulich School of Engineering and the Werklund School of Education.
- Local industry partnerships, such as with CEDA International, have enabled internships as part of the REALISE program.
- Partnerships with local science outreach organizations, such as Beakerhead, enable collaborative programming and venues for promotion of the HBI's mission.
- Communications organizations such as Shaw Communications help the HBI to reach out to the community.

#### PROVINCIAL PARTNERSHIPS in ALBERTA

Across Alberta, the HBI has taken a leadership role in building the following partnerships to raise the bar for province-wide brain and mental health research and education:

- Campus Alberta Neuroscience (CAN) – This network of neuroscience and mental health researchers and trainees across the Universities of Calgary, Lethbridge and Alberta pro-actively forms multi-institution teams in key research areas, such as Healthy Brain Aging and Dementia and Nervous System Injury. This approach increases team grant opportunities and increases Alberta's competitiveness as national neuroscience leaders. CAN further promotes province-wide collaboration with its funding for academic exchanges and workshops offered to neuroscience trainees across all three institutions.
- Alberta Health Services Strategic Clinical Networks – Alberta Health Services launched the Strategic Clinical Networks (SCNs) in 2012, as networks of researchers, health care professionals, community groups, patients and government who are tasked with creating improvements in focused areas of health care. HBI members are currently involved with the SCNs for 'Addiction and Mental Health', 'Cardiovascular Health and Stroke' and 'Seniors Health'. A new SCN in 'Neurological Disease, Ear, Nose, Throat and Vision' is in development and will also include HBI members. HBI involvement in the SCNs also provides a mechanism for our research to inform health care.
- Alberta Innovates – Health Solutions (AI-HS) – In addition to funding research and offering scholarships for HBI members and trainees, AI-HS partners with the HBI in discussions of the future of neuroscience investment and outcomes in Alberta and the national context for neuroscience research. These discussions also involve partners Campus Alberta Neuroscience and Brain Canada.



## NATIONAL PARTNERSHIPS in CANADA

Within Canada, the HBI has connected with national brain and mental health initiatives, in partnership with the following organizations:

- Brain Canada – This federal organization funds neuroscience and mental health research in Canada based on a competitive, matching funds application process. The HBI has been very successful in recent Brain Canada competitions, with \$7.4 million in funding for six research projects that address brain and mental health announced in October, 2014. The HBI Director has also been asked to join the Brain Canada Board of Directors.
- Ontario Brain Institute – As part of its leadership role with Campus Alberta Neuroscience, the HBI is working with the Ontario Brain Institute to build a national network of neuroscience research and education hubs. This network would position both the HBI and the Ontario Brain Institute as provincial leaders, along with the Montreal Neurological Institute in Quebec to the east and the Brain Research Centre in British Columbia to the west.
- Canadian Institutes of Health Research (CIHR) – The primary federal funding body for the health sciences, CIHR supports brain and mental health research in Canada. It also works in partnership with select leading institutes, including the HBI, to identify, build and fund collaborative, national neuroscience research programs. The CIHR Mild Traumatic Brain Injury Research program, launched in 2013, is an example of one such partnership with the HBI.
- Canadian National Brain Bee – This competition for secondary students provides a fun and competitive atmosphere for students to challenge themselves to learn about the neurosciences, while becoming inspired to pursue careers in this field. The brain bees also raise awareness of brain research in the community. Winners of local competitions go on to compete at the national bee, held at McMaster University and sponsored by CIHR. There is also an international brain bee competition. HBI has organized a brain bee competition for the Calgary community annually since 2008.

## INTERNATIONAL PARTNERSHIPS

Current active partnerships are underway with the following international centres of excellence in the neurosciences and mental health:

- Florey Institute of Neuroscience and Mental Health and University of Melbourne (Melbourne, Australia) – Numerous scholarly visits have occurred and tangible opportunities for collaboration are in development as part of a joint Memorandum of Understanding. The first competition for trainee exchanges, as part of a formal exchange program at the graduate and postdoctoral level, launched in November 2014. A joint symposia between HBI and both of these institutes will be hosted in Melbourne in August 2015.
- Hebrew University of Jerusalem and the Technion – Israel Institute of Technology (Israel) – New research partnerships with these two institutions began to develop in 2014, with visits to both



Israeli universities by the HBI Director in 2013 and 2014. An Israel-Alberta Neuroscience Symposium will be occurring in partnership with Campus Alberta Neuroscience in spring 2015.

- Karolinska Institute (Stockholm, Sweden) – An emerging exchange program for undergraduate students is launching fall 2015. A scientific symposium at the Karolinska was also held in November 2014, in partnership with HBI and Oxford. Scholarly visits between the HBI and the Karolinska have been occurring since 2013.
- University of Oxford (Oxford, UK) – Annual exchange program for undergraduate students in the BSc Neuroscience program, which began in 2013. Scholarly research visits have been ongoing between Oxford and the HBI since 2011 and an HBI-Oxford symposium was held at the HBI in 2013.



## Appendix F – Recruitment Plan

Recruitment of research scientists and clinician scientists who will become HBI members and contribute to the HBI’s research and education goals are made in collaboration with the academic departments. The following schedule represents planned recruitments in 2015 and 2016, which will contribute to the HBI strategic plan. This schedule is updated annually by the HBI Executive Committee.

### SCHEDULE OF RECRUITMENTS

Title	Departmental Partner	Advertisement Date
Director, Mathison Centre	Psychiatry (AI-HS Chair)	advertised in 2012/2013
Neurologists (2) - neuromuscular	DCNS	advertised in 2014
Neurologists (2) - epilepsy	DCNS (joint with ACHRI & IPH)	advertised in 2014
CRC Tier 2 in Traumatic Brain Injury. MR Spectroscopist.	Radiology (joint with ACHRI)	advertised in 2014
Psychiatry Recruit -1 (Mathison)	Psychiatry	Late Spring / early Summer 2015
Psychiatry Recruit -2 (Mathison)	Psychiatry	Late Spring / early Summer 2015
Psychiatry Recruit -3 Neurostimulation researcher	Psychiatry	2015
Neuroimmunologist	DCNS	2015
Optogenetics	CBA	2015
Neuroinformatician	Community Health Sciences	2015
Movement Disorders leader	DCNS	2015/2016
MR Scientist	Radiology	2016 or 2017

**Legend:** ACHRI – Alberta Children’s Hospital Research Institute; CBA – Department of Cell Biology and Anatomy; DCNS – Department of Clinical Neurosciences; IPH – O’Brien Institute of Public Health.





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