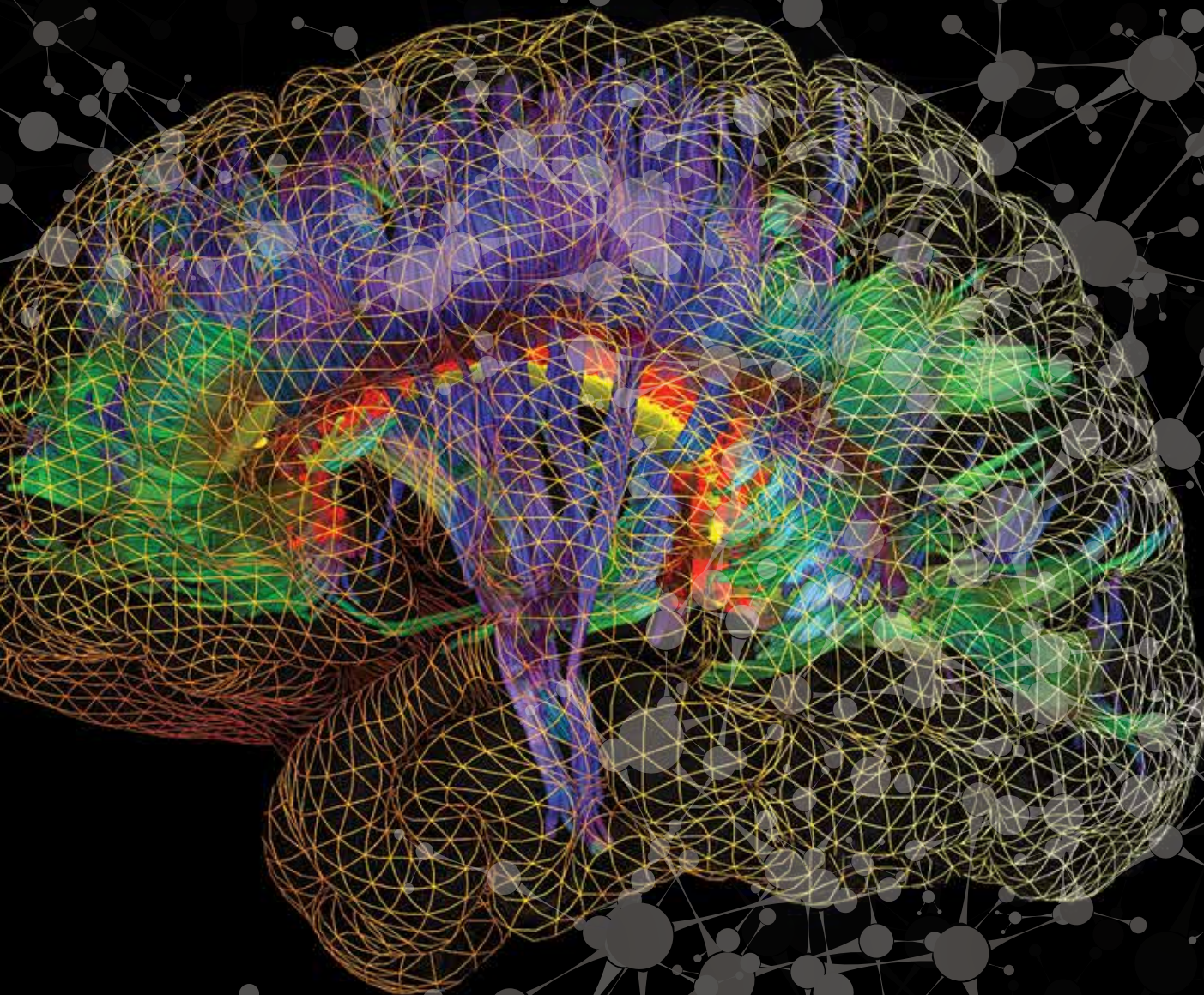


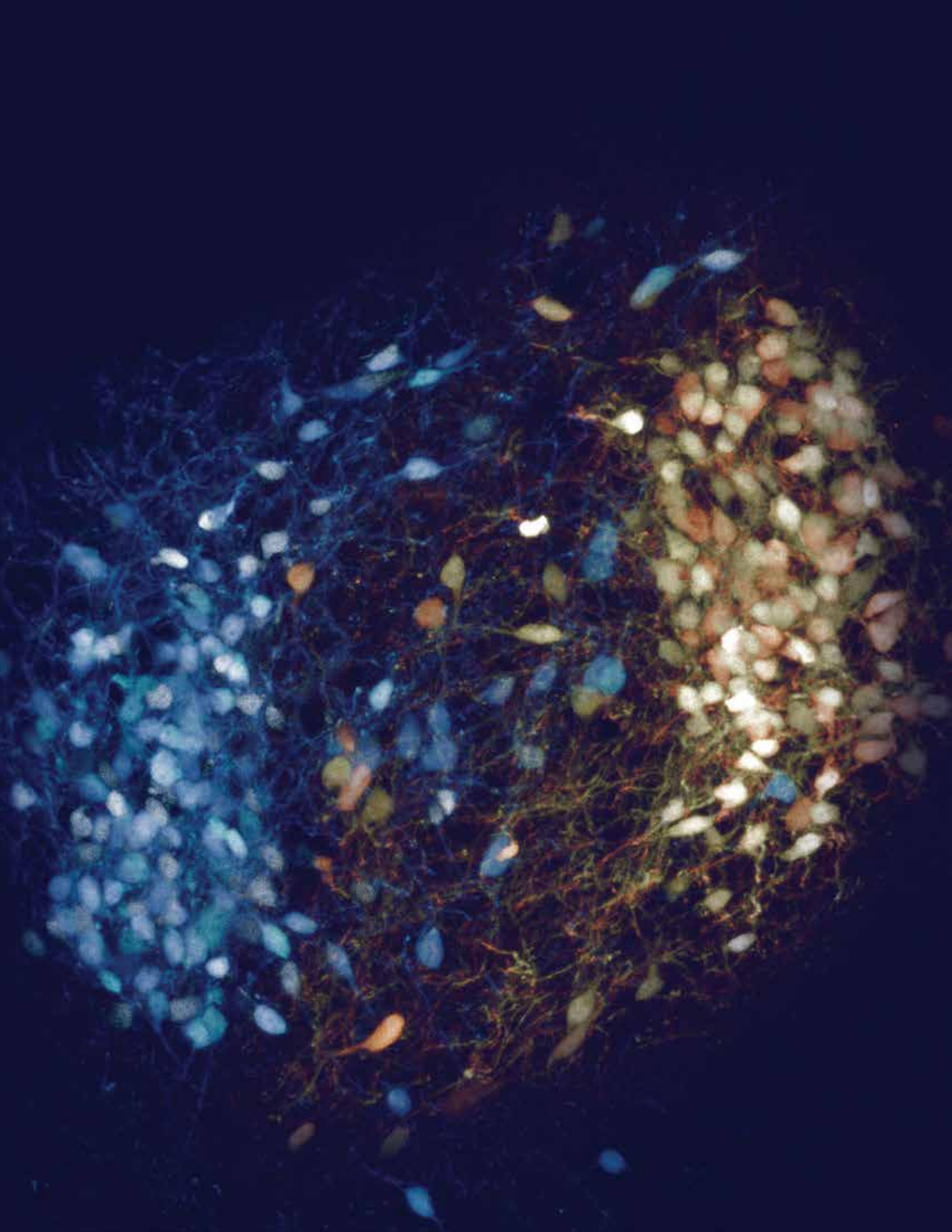


UNIVERSITY OF
CALGARY



Brain and Mental Health

Research Strategy
May 2015



Brain and Mental Health — a global health challenge

Brain disorders are an increasing public health concern, surpassing both cardiovascular disease and cancer with respect to global burden of disease. These disorders have familiar names, including depression, multiple sclerosis, stroke, Alzheimer’s disease and many more. They have a devastating impact, not only to those afflicted, but also on families, the community and the health care system.

In Canada, one in three people will be affected by a brain or nervous system illness, disorder or injury within their lives. These conditions span the life cycle:

- With an estimated 75 per cent of mental illnesses beginning before the age of 24, mental health conditions are hitting young people in the prime of their lives.
- Injuries to the nervous system, such as multiple sclerosis and traumatic brain injury, happen relatively early in life and often lead to lifelong disability.
- Dementia-related health care has taken over as the largest financial burden on the Canadian health care system due to our aging population.

Recently, there has been a global spotlight on the neurosciences and mental health. In the United States, President Obama’s 2013 BRAIN Initiative has provided new resources to the neurosciences. Similarly, the European Commission’s Human Brain Project has united 112 partners across over 20 countries to catalyze a global collaborative effort towards new

discoveries and treatments for the brain and mental health. Closer to home, the national non-profit organization Brain Canada develops and supports collaborative neuroscience research across Canada. Brain Canada began as the NeuroScience Network, established in 1990 by the Government of Canada. Today, it aims to increase the scale of funding for Canadian brain research, raise awareness and broaden the scope of interdisciplinary approaches to the understanding and treatment of neurological and mental health disorders.

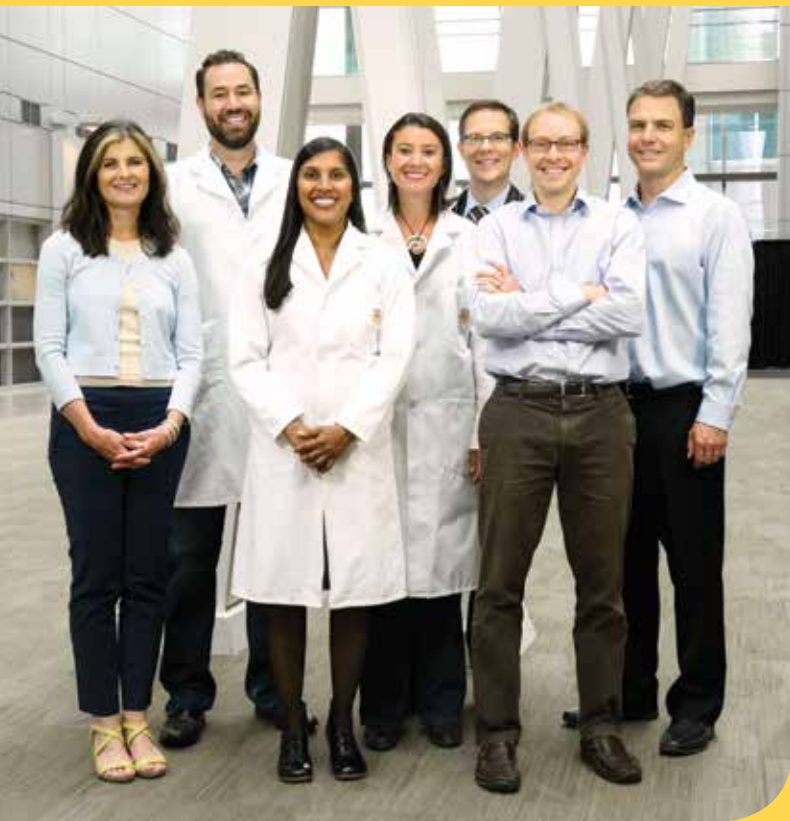
Remarkable progress has been made in understanding the central and peripheral nervous systems and applying new discoveries towards the treatment of neurological diseases and mental health disorders. Yet the brain remains the least understood organ in the human body; there is a great deal to learn. The intricacies and challenges of the brain stimulate researchers dedicated to making new discoveries and contributing to health care solutions, for this generation and the next.

Hotchkiss Brain Institute

The Hotchkiss Brain Institute (HBI) is leading the Brain and Mental Health research strategy. 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 the University of Calgary. By bringing together and supporting research and education within a collaborative network of basic, clinical and population health scientists, the Institute would become more than the sum of its 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.

Today, the HBI continues to achieve success as an integrated institute within the University of Calgary. With a vision of ‘healthy brains for better lives’, the HBI operates within the Cumming School of Medicine and in partnership with Alberta Health Services. The HBI’s membership has grown significantly and 43 researchers have been directly recruited to the HBI since 2007, 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. Additionally, multidisciplinary researchers from faculties across the university have joined the HBI because they recognized the benefits of working within the institute’s collaborative framework. There are a total of 127 full members and 61 associate members of the HBI as of the beginning of 2015. Together with members, trainees, research and professional staff, the HBI includes approximately 750 people working together towards a shared vision. The HBI continues to be the number-one research institute at the Cumming School of Medicine, with respect to total research revenue — a position it has held every year since the school first began collecting these statistics in 2011.

hbi.ucalgary.ca



Brain and Mental Health at the University of Calgary

The Brain and Mental Health research strategy provides a unifying direction for brain and mental health research at the University of Calgary. This exciting strategy positions University of Calgary researchers to unlock new discoveries and treatments for brain health in our community by working in interdisciplinary teams.

The Brain and Mental Health research strategy will be led by the Hotchkiss Brain Institute (HBI). The HBI is an internationally recognized centre of excellence in brain and mental health research and education, operating within the Cumming School of Medicine and fully engaged with the city of Calgary. Its mission is to inspire discovery and apply knowledge towards innovative solutions for neurological and mental health disorders. As an institute, the HBI is competitive in the Canadian neuroscience research landscape in its attraction of top funding support, high-profile publications and recruitment of the best and brightest researchers. The majority of researchers at the University of Calgary who are engaged in brain and mental health research are members of the HBI.

In addition to those at the Cumming School of Medicine, a diverse and growing pool of investigators from a range of academic disciplines contribute to brain and mental health research, both as HBI members and as collaborative partners. This includes investigators from the Faculties of Arts, Kinesiology, Nursing, Science, Social Work, and Veterinary Medicine; the Schulich School of Engineering; the Werklund School of Education and others. Given this existing network, and the HBI’s infrastructure to propel brain and mental health research, the HBI was chosen to lead the Brain and Mental Health research strategy for the University of Calgary.

The Brain and Mental Health research strategy aims to best support brain and mental health scientific research through targeted goals and strategies that

maximize impact for researchers at the University of Calgary and for our society. As leader of the Brain and Mental Health research strategy, the HBI 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

At the University of Calgary, solutions to these complex issues involve both engagement and intellectual exchange across the breadth of expertise in all faculties across the university. The university has created a rich environment for brain and mental health research. We have developed strong partnerships with the external community and these help us translate and integrate the knowledge we generate into meaningful outcomes for society. This strategic research plan builds upon our existing strengths, which have elevated the university to international recognition in brain and mental health.

Brain and Mental Health research capacity

Over 200 researchers from across the academy are engaged in brain and mental health research.

This confederation of scholars includes more than 30 endowed chairs and professorships — prominent research positions established to elevate critical areas of brain research via support from the philanthropic community and external organizations. The chairs support a range of disciplines, including gerontological nursing, neuroimmunology, pediatric mental health, brain tumour research and more. Building on their considerable expertise, these researchers are collaborating to identify new ways to accelerate research and translate this knowledge into outcomes in the areas of brain and mental health. Over 200 postdoctoral fellows and graduate students and 100 undergraduate students in the university’s progressive Bachelor of Science (BSc) in Neuroscience program also contribute to brain and mental health research at the university in significant ways.

The University of Calgary is committed to stimulating collaboration and recognizes the essential roles and contributions of all partners in achieving this university-wide vision. Success is already being achieved in the national funding landscape for the team-based approach to brain and mental health research. Examples include two five-year Canadian Institutes of Health Research (CIHR) grants in sports-related childhood concussion; three Brain Canada grants in youth mental health and epilepsy; and a Movember Foundation grant in men’s workplace depression.

Since 2011, the university has received over \$35 million annually in competitive external grants for brain and mental health research. 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 Geoffrey Cumming and matching provincial support. In addition to the Cumming gift, the University of Calgary has

received in excess of \$100 million since April 1, 2011 in philanthropic support from the Calgary community for brain and mental health research.

The Government of Alberta’s Health Research and Innovation Strategy identifies several key elements that align with the University of Calgary’s Brain and Mental Health research strategy. These include mental health, wellness at every age, cross-disciplinary translational research, participation in national and international networks and enhancing clinical trials and technology. The Government of Alberta provides funding support for brain and mental health research through Alberta Innovates — Health Solutions (AI-HS) and Alberta Health Services (AHS). 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.

Campus Alberta Neuroscience — a network of neuroscience researchers across the University of Calgary, University of Lethbridge and University of Alberta — also supports brain and mental health research on a provincial scale. At the national level, ‘neurosciences and mental health’ is one of the Government of Canada’s four research priorities for the life sciences as articulated in the 2014 national Science and Technology strategy.

Led by the HBI, the University of Calgary Brain and Mental Health strategy unites and supports research in a collaborative network of basic, clinical and population health scientists. University of Calgary scholars from multiple research institutes and a wide range of faculties all participate in translating discoveries into innovative health care solutions.



Partners who contribute essential resources to the implementation of the Brain and Mental Health research strategy include:

Alberta Health Services

Alberta Health Services (AHS) is the provincial health authority responsible for planning and delivering health supports and services for more than four million adults and children living in Alberta. Its mission is to provide a patient-focused, quality health system that is accessible and sustainable for all Albertans.

albertahealthservices.ca

Alberta Children’s Hospital Research Institute

The Alberta Children’s Hospital Research Institute (ACHRI) is a multi-disciplinary research institute partnered with the University of Calgary, Alberta Health Services and the Alberta Children’s Hospital Foundation. The institute conducts research and provides leadership and services to scientists and experts in education, clinical care and community health to tackle the most pressing child and maternal health problems.

research4kids.ca

The Mathison Centre for Mental Health Research & Education

The University of Calgary is home to The Mathison Centre for Mental Health Research & Education. This centre, launched in 2012, employs an interdisciplinary approach to the early identification, treatment and prevention of mental health disorders including depression, psychosis, schizophrenia and other conditions. Created by the HBI and the Department of Psychiatry, The Mathison Centre partners with the Cumming School of Medicine and other faculties at the University of Calgary to inform mental health care strategies in our community and offer new hope to families in Calgary, throughout Alberta and the world.

mathison.ucalgary.ca

Cumming School of Medicine Research Institutes

The HBI also works collaboratively with the Calvin, Phoebe and Joan Snyder Institute for Chronic Diseases, the Libin Cardiovascular Institute of Alberta, the McCaig Institute for Bone & Joint Health, the O’Brien Institute for Public Health, and the Southern Alberta Cancer Research Institute. Also based at the Cumming School of Medicine, these five research institutes provide specialized experts and experimental approaches that contribute to the advancement of brain and mental health research.

cumming.ucalgary.ca/research/institutes



The University of Calgary provides several collaborative research facilities and resources for researchers working in the areas of brain and mental health. These include:

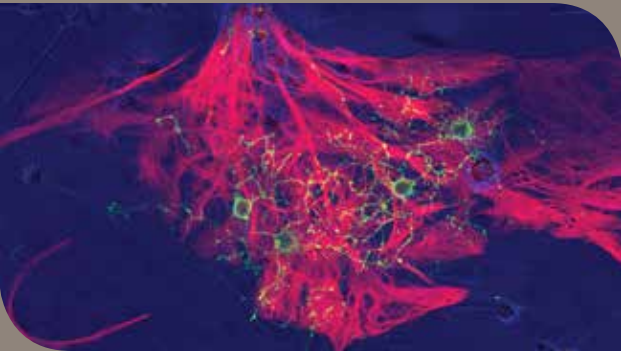
Clinical research facilities:

- The Clinical Research Unit supports researchers initiating clinical trials in the neurosciences. This support includes protocol development, research education, peer review, research data collection, data monitoring and adverse-event reporting, statistical support and publication support.
- The Behavioural Research Unit, based at the Alberta Children's Hospital, examines the basis and treatment of pediatric developmental, behavioural and emotional problems.
- The Sport Injury Prevention Research Centre is one of four International Research Centres for the Prevention of Injury and Protection of Athlete Health supported by the International Olympic Committee. The centre focuses on reducing the risk of injury in sport and recreation, with particular emphasis on injury prevention for children and adolescents. World-class research into traumatic brain injuries related to sport, such as concussion, is conducted out of this centre.



Molecular biology facilities:

- The HBI Molecular Core Facility is operated by the HBI. It 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.
- University Core DNA Services provide custom DNA and RNA synthesis and automated DNA sequencing and fragment analysis services. These services are not restricted to the University of Calgary and are also available to external academic and commercial researchers.
- The Alberta Children's Hospital Research Institute Genomics Facility provides next-generation DNA sequencing to University of Calgary researchers. Services available in this facility include whole genome sequencing, whole human exome sequencing, amplicon sequencing and transcriptome and small RNA profiling.



Imaging facilities:

- Based at the Seaman Family Magnetic Resonance Research Centre, the NeuroImaging Research Unit is another brain and mental health research facility operated by the HBI. This research unit offers technical expertise and administrative assistance to researchers initiating and conducting high-magnetic-field human brain imaging research. Dedicated personnel facilitate neuroimaging research from initial experimental design to final dissemination of research findings. Based at the university's Foothills campus, the NeuroImaging Research Unit also offers a satellite data analysis facility in the Department of Psychology on the main university campus.
- The Cumming School of Medicine's Experimental Imaging Centre provides state-of-the-art imaging modalities to the research community, and facilitates the translation of imaging technology into the clinic. The current strength of the Experimental Imaging Centre is in high-field MRI and optical technologies — for use in animal and human studies.
- The Cumming School of Medicine also operates a specialized Magnetic Resonance scanner for pediatric research at the Alberta Children's Hospital. This 3 Tesla scanner is one of the most advanced instruments available in Canada, providing non-invasive, radiation-free technology for Alberta pediatrics research.



Brain and Mental Health research themes and platforms

Animal services:

- The Health Science Animal Resource Centre (HSARC) provides infrastructure and expertise in laboratory animal care and use for biomedical research. The facility and operations of the HSARC meet or exceed standards set by the Canadian Council on Animal Care. The HSARC occupies a footprint totaling more than 4600 square metres.
- The Clara Christie Centre for Mouse Genomics (CMG), a part of the HSARC, is run by the Cumming School of Medicine. This centre incorporates all of the necessary tools to create, analyze and cryopreserve transgenic mice. The development of genetically engineered mouse models using transgenic and embryonic stem cell technologies has been a cornerstone of key scientific discoveries for over 30 years, but available only to elite groups. Increasingly the techniques are becoming more broadly applicable and essential for routine inquiry. The CMG brings the construction and use of transgenic animals within the reach of all University of Calgary investigators. The CMG is comprised of three integrated components: Embryonic Stem Cell, Transgenic Mouse and a newly created Molecular Biology Core. These combined facilities provide an enhanced, comprehensive and coordinated means for investigators to effectively generate, study and archive genetically engineered mouse models.



Specialized facilities:

- The HBI Advanced Light and Optogenetics Facility houses equipment to support in vitro and in vivo optogenetics research, along with staff scientists to support brain and mental health researchers in their use of this advanced technology.
- The HBI also operates the Regeneration Unit in Neurobiology. This specialized neuroscience research facility houses advanced microscopy, imaging and behavioural testing equipment, and provides expert guidance on experimental design, data analysis and operation of its technology.
- Opening in the spring of 2015, the Ron and Rene Ward Centre for Healthy Brain Aging Research is a state-of-the-art 1100 square metre space that will support collaborative research in the areas of stroke, dementia, Alzheimer's disease and movement disorders. Clinical researchers, brain imagers and neuropathology specialists will work closely in this new innovative centre.



The University of Calgary Brain and Mental Health strategy is built on more than a year of meaningful discussions with internal and external stakeholder groups. The strategy launches an era of accelerated discovery and translation of new knowledge at the University of Calgary.

Brain and mental health research at the University of Calgary will be focused under three discovery-based themes: Brain & Behaviour; Neural Injury & Repair; and Healthy Brain Aging, which are supported by NeuroTechnologies platforms. The themes cultivate cross-campus, collaborative research programs that capitalize on interdisciplinary approaches to brain and mental health research. They address brain and mental health research across the life course of the developed brain, which is defined 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 university. The NeuroTechnologies platforms elevate research within all three themes. Under each theme, researchers will be organized around 'NeuroTeams' to foster collaboration and innovation.

NeuroTeams are networks of researchers focused on specific research areas within the brain and mental health research themes. Teams are grounded in discovery-based research, operate collaboratively with basic, clinical and population health research members, and take an interdisciplinary approach to brain and mental health research questions. Teams are 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 NeuroTeam structure will aid researchers in doing top-quality science, by aligning individuals with shared interests into small, interdisciplinary groups.



Brain & Behaviour research theme:

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 lost will be understood by studying the synaptic circuitry of the brain. Neurological and mental health conditions that range from epilepsy to 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. These conditions frequently affect adolescents and young adults during the prime of their lives. Understanding the basis of neurological and mental health conditions is the focus of Brain & Behaviour.



NeuroTeams in Brain & Behaviour:

1. Mental Health

Mental illness indirectly affects all Canadians at some time through a family member, friend or colleague. Twenty per cent of Canadians will personally experience a mental illness in their lifetime. The Mental Health 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.

2. Epilepsy

One in every 100 Canadians has active epilepsy. Next to migraine headaches, epilepsy is the most common neurological disorder. The Epilepsy team will have strong links to the Alberta Children’s Research Institute (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. 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.

Impact – Mental Health

The University of Calgary has partnered with Wood’s Homes to create the Wood’s Homes Research Chair in Children’s Mental Health, an innovative, community-based research position focused on improving the lives of children with mental health issues. For the first time, the position will be embedded in the community of people that this research aims to support. The Chair initiative represents a vibrant collaboration between the Faculty of Social Work and Wood’s Homes to develop useful strategies that can support front-line delivery of mental health services for children.

Impact – Stress

Scientists are working to understand how stressful situations can lead to long-term changes in the function of individual brain cells and neural circuits. Researchers use advanced technologies such as optogenetics — genetically engineered, light-based proteins used to visualize or activate the brain circuits that control behaviour in animal models. The Stress NeuroTeam is working to establish 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.

Impact – Epilepsy

The Epilepsy NeuroTeam aims to improve the lives of people with epilepsy by studying the basic mechanisms of the disease and its consequences. This team is also identifying the best diagnostic, therapeutic and health care delivery methods for those with epilepsy. University of Calgary epilepsy researchers recently developed an online tool to help physicians determine if a patient is a potential candidate for epilepsy surgery evaluation. This online resource is helping to facilitate earlier surgical treatment, ultimately improving the quality of care for those with epilepsy.



Neural Injury & Repair
research theme:

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 the spinal cord injuries that frequently occur after motorcycle accidents. 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.



NeuroTeams in Neural Injury & Repair:

1. Multiple Sclerosis

MS research is a long-standing focus area at the University of Calgary where basic and clinical researchers support a cyclical process of discovery and translation, contributing to new treatments for patients. Canada has the highest rate of MS in the world. An estimated 100,000 Canadians have multiple sclerosis; 15,000 of those individuals are from Alberta. The high prevalence of MS in Alberta reinforces the continued importance of this team.

2. Spinal Cord/Nerve Injury & Pain

Spinal cord and nerve injuries are often a consequence of accident or illness and therefore difficult to predict or prevent. The focus of the Spinal Cord/Nerve Injury & Pain 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.

3. Traumatic Brain Injury

In Canada, 300,000 concussions occur in competitive sports and recreational activities each year. 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.



Impact – Multiple Sclerosis

In 2007, University of Calgary researchers led a clinical study into a common acne medication that has the potential to delay the progress of multiple sclerosis, a degenerative disease that attacks the central nervous system. Researchers are continuing to create new medicines for repairing damage and recovering function in people with progressive MS.

Impact – Spinal Cord/Nerve Injury & Pain

In the University of Calgary Acute Neurorehabilitation (UCAN) program, scientists and clinicians will work together to investigate ways to quickly mobilize the plasticity — or ability of the body to compensate for a disabled area — of the nervous system after injury. In addition to advanced robotics, imaging and stimulation technologies, researchers are using biomarkers in the blood to predict recovery from neural injuries.

Impact – Traumatic Brain Injury

Concussion and brain injury research spearheaded by University of Calgary researchers is influencing changes in public policy. Research findings contributed to a landmark Hockey Canada ban on body checking in peewee hockey that will prevent an estimated 3,500 concussions per year in 11- to 12-year-old children across Canada. These researchers are leading new international collaborations that have the potential to transform the prevention and treatment of brain injury in a broad range of sports.

Healthy Brain Aging research theme:

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. The Healthy Brain Aging research theme is focused on understanding the fundamental causes and developing new and improved treatments for neurological and mental health conditions affecting the aging brain.



NeuroTeams in Healthy Brain Aging:

1. Dementia & Cognitive Disorders

As Canada’s population ages, Alzheimer’s disease and dementia are growing concerns. By 2031, more than one in five Albertans will be age 65 or older. 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 focal areas of this team’s work. The Dementia & Cognitive Disorders team is also a key collaborator in the Canadian Consortium on Neurodegeneration in Aging.

2. Stroke

One in four Canadians will have a stroke in their lifetime, with the risk increasing with age. 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 international expertise in acute stroke treatment.

3. Movement Disorders

Nearly 100,000 Canadians have Parkinson’s disease, with approximately 5,500 new cases diagnosed each year in Canada. The Movement Disorders team will take an interdisciplinary 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.

Impact – Stroke

An international study led by HBI researchers showed a dramatic reduction in disability and deaths from stroke. Researchers used a clot retrieval procedure, known as endovascular treatment, to treat ischemic stroke patients. The new treatment reduced the mortality rate of participants by 50 per cent and also showed a dramatic improvement of disability outcomes. This breakthrough will be applied to medical practice guidelines, which have the potential to improve the lives of the 15 million people who suffer strokes worldwide each year.

Impact – Dementia & Cognitive Disorders

In 2015, the Ron and Rene Ward Centre for Healthy Brain Aging Research opened at the Cumming School of Medicine. This state-of-the-art facility supports collaborative research in the areas of stroke, dementia, Alzheimer’s disease and movement disorders. This advanced research space will bring together psychiatrists, brain imaging experts, population health researchers, molecular scientists and clinical investigators to accelerate discovery and dramatically transform our approach to the prevention and care of age-related brain dysfunction.

Impact – Movement Disorders

University of Calgary researchers developed the Gait Reminder iPod application in 2012. This mobile app is used by Parkinson’s disease patients to assist their stride length during walking exercises. The app has the potential to increase Parkinson’s patients’ mobility and quality of life. A team led by the new Tourmaline Oil Chair in Parkinson’s Disease will conduct patient-focused, groundbreaking research on the disease. These researchers are testing treatments that help improve — or slow down the evolution of — cognitive deficits in Parkinson’s patients, demonstrating a real impact for people living with this disease.



NeuroTechnologies platforms:

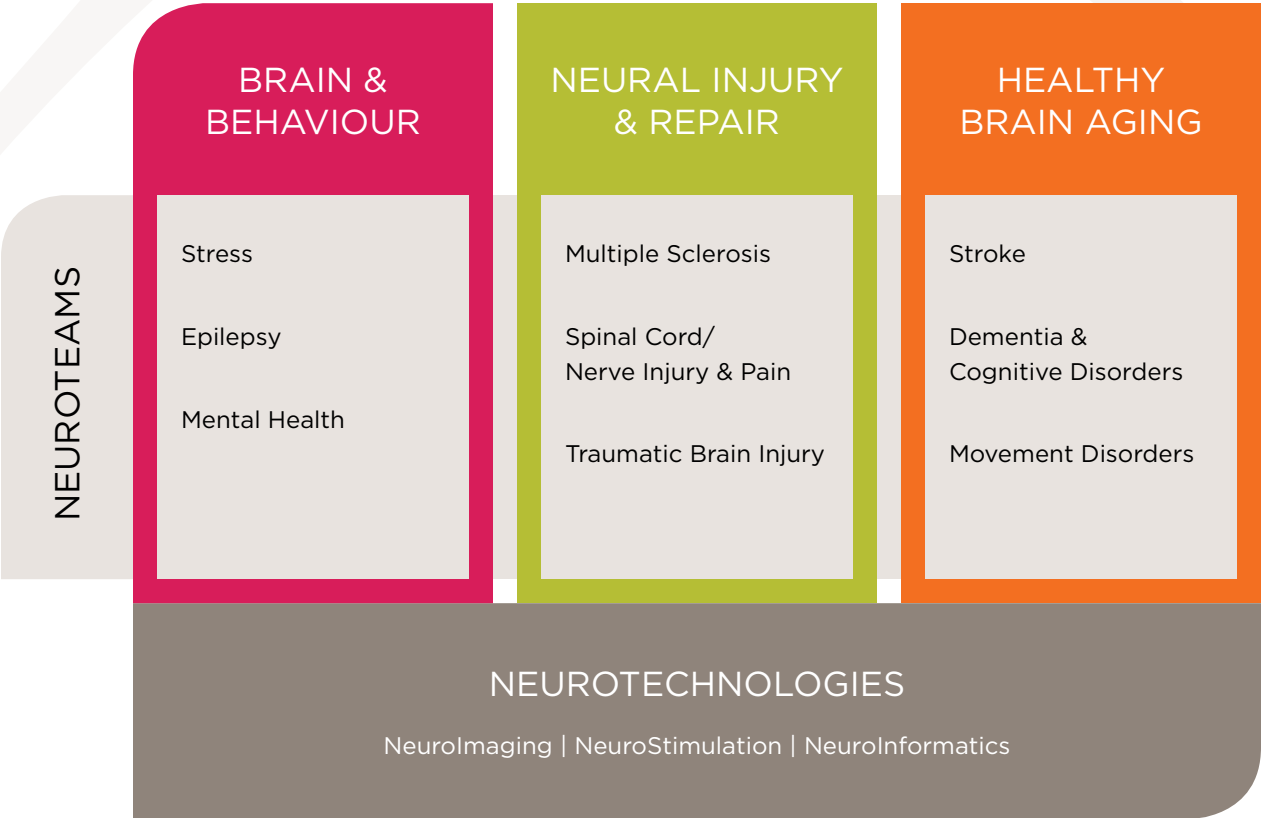
Cross-cutting NeuroTechnologies will create an environment that acts as a springboard for creativity and excellence in research. These platforms will provide researchers across all areas of brain and mental health with the most advanced equipment available, enabling University of Calgary researchers to be competitive with the top neuroscience facilities in the world. The NeuroTechnologies platforms incorporate a long-term plan for maintenance and operation, including technical expertise to facilitate and capitalize on research within the new infrastructure. The NeuroTechnologies platforms encompass:

- 1. **NeuroImaging** — imaging 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. **NeuroStimulation** — 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. **NeuroInformatics** — 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. Clinical, genetic, imaging and behavioural data will be collected and analyzed to better understand and predict factors affecting brain health.

Foundational scientists and clinicians at the University of Calgary are working together to examine the use of NeuroStimulation techniques such as Transcranial Magnetic Stimulation (TMS) — a non-invasive technology that uses electromagnetic fields to stimulate nerve cells in the brain. TMS shows great promise in its potential to improve motor symptoms in patients with Parkinson's and as a potential new treatment for depression.



The Brain and Mental Health discovery research framework



Brain and Mental Health research initiatives

Initiatives that enhance the brain and mental health research themes will enhance the University of Calgary’s impact in the neurosciences and mental health research in our community. These initiatives continue to build on the established and emerging strengths of University of Calgary researchers.

Initiative 1 — Recruit excellent researchers and trainees. The University of Calgary will invest in the best people and organize them along a fully integrated continuum of basic to clinical to population health research excellence. A recruitment plan will ensure brain and mental health recruitment continues to align with the Brain and Mental Health Discovery research framework.

Initiative 2 — Increase the profile of our research accomplishments in the local and global communities. This initiative involves increased print and digital presence (including social media) to promote brain and mental health research at the university. Additionally, we will engage all brain and mental health researchers, trainees, staff and community partners to act as ambassadors of the University of Calgary locally and abroad.

Initiative 3 — Establish an ‘Emerging NeuroTeams Pipeline’. Research strengths will change over time, as University of Calgary brain and mental health researchers develop their programs and new recruits join the university. Similarly, the community’s needs in brain and mental health research and treatment will evolve. To anticipate these changes, the university is implementing 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.

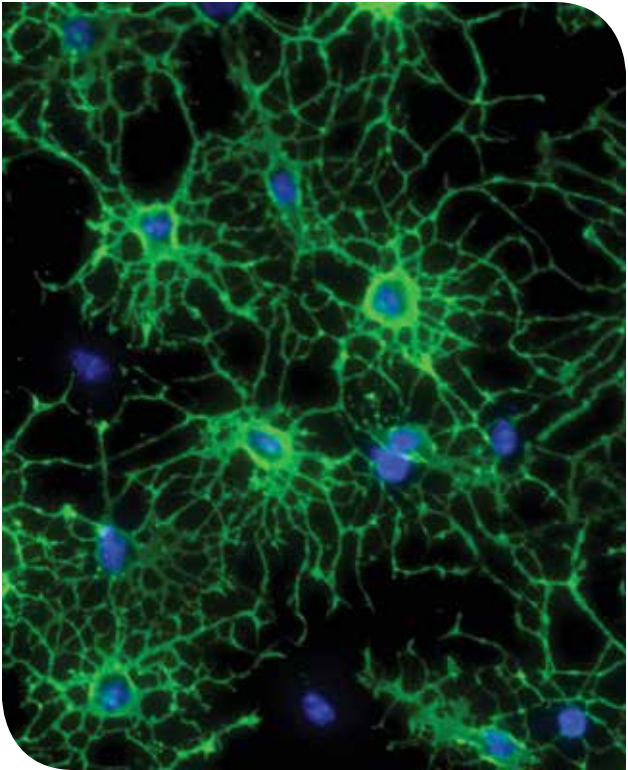
Initiative 4 — Develop a NeuroResearch Clinic initiative to enable the involvement of an increasing percentage of patients as participants in research trials and epidemiological studies, through the use of registry platforms. A harmonized NeuroResearch Clinic initiative will improve neurological care by standardizing and supporting the collection and use of patient data across multiple specialized University of Calgary clinics. This initiative also provides a mechanism for brain and mental health research at the university to help inform health care, working in partnership with Alberta Health Services (AHS) and the AHS Strategic Clinical Networks.

Initiative 5 — Fully develop the leadership and academic potential of brain and mental health researchers via support programs, including:

- Team grant-writing support and peer review to increase grant application success
- NeuroTeam leadership positions
- Annual retreats of the NeuroTeams to provide space and time for researchers to discuss novel approaches to their work
- Mentorship for junior brain and mental health faculty members
- International exchanges and research collaborations with provincial, national and international partners

Initiative 6 — Support innovative brain and mental health research with programs that have the potential to leverage external funding sources. This will include pilot funding programs, which provide support for early-phase studies in promising new brain and mental health research directions that fully engage the campus community.

Through these initiatives and a focus on the identified research themes and platforms, University of Calgary researchers will seek to achieve internationally recognized key discoveries and transformative clinical research in the neurosciences and mental health.



The University of Calgary is a leading Canadian university located in the nation's most enterprising city. The university has a clear strategic direction to become one of Canada's top five research universities by 2016, where research and innovative teaching go hand in hand, and where we fully engage the communities we both serve and lead. This strategy is called Eyes High, inspired by the university's Gaelic motto, which translates as 'I will lift up my eyes.' As part of the roadmap to achieve these goals, the university's Strategic Research Plan identifies six research themes that will leverage our distinct capabilities while addressing the unmet needs and challenges of our society as a whole:

- Energy innovations for today and tomorrow
- Engineering solutions for health: biomedical engineering
- Brain and mental health
- Infections, inflammation and chronic diseases in the changing environment
- New Earth-space technologies
- Human dynamics in a changing world: smart and secure cities, societies, and cultures

Learn more about the University of Calgary's Strategic Research Plan and Brain and Mental Health Research Strategy.

Contact the Office of the Vice-President (Research) at vpr@ucalgary.ca

ucalgary.ca/research