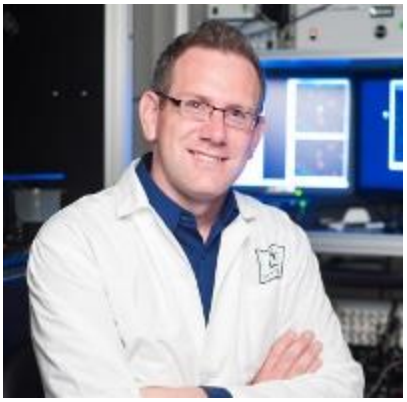
Brain Canada

2014 Platform Support Grant (PSG) Funded Researchers

Manitoba Neuroimaging Platform



Christopher Anderson
University of Manitoba

Neurological disorders represent an enormous medical burden in Canada and require focused, multi-pillar research initiatives to advance their prevention, diagnosis and treatment. The Brain Canada Manitoba Neuroimaging Platform (MNP) combines Kleysen Institute for Advanced Medicine (KIAM) human neuroimaging capacities with matching modalities for small animals. This project seeks to standardize the acquisition and processing for neuroimaging protocols and clinical trials across a broad spectrum of neurological disorders, as well as to facilitate efficient animal modelling and neuroimaging to feed into translational human neuroimaging capacity. The transformative MNP approach will streamline research translation leading to high-impact deliverables that will improve patient health and enhance the international profile of neurosciences research in Manitoba.

Team Members: Marco Essig, Alan Mutch, Tiina Kauppinen, Ruth Ann Marrie, Chase Figley, Tamra Ogilvie, Soheila Karimi, Marc Del Bigio, Thomas Klonisch

The Canadian Neurophotonics Platform

Advances in understanding brain function and treating neurological and psychiatric diseases critically depends on the development and use of novel light technologies to control and visualize neurons, collectively known as photonics and optogenetics technologies. Several key complementary core facilities have developed across the country for development of these innovative neurotechnologies. The proposal of this project is to crystalize this network of complementary infrastructures into the Canadian Neurophotonics Platform which will serve as a catalyst to create, validate, and disseminate neurophotonics tools, and train the wider community for their use. The Platform will connect Core Facilities, where tools and services are created/provided and Early Adoption & Testing Nodes, used as benchmarks and validation for those tools and services. The development of this platform will not only improve our understanding of the causes for a range of brain disorders, but also increase Canada's competitiveness within the research landscape, multiplying the value of funding support and consolidating long term sustainability.

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Le Consortium d'Imagerie en Neurosciences et santé mentale de Québec: leader régional en neuroimagerie humaine

Simon Duchesne
Université Laval

The Consortium d'Imagerie en Neurosciences et santé mentale de Québec (CINQ) is a coalition of multidisciplinary researchers whose goal is to develop neuroimaging in the Quebec region. CINQ, created in 2009, is an expanding multi-insitutitional consortium with a growing number of clinical and fundamental human neuroimaging research projects. The proposed project by CINQ is to solicit support from Brain Canada to maintain its fast-paced growth, establish new student training and knowledge transfer initiatives and prepare for the launch of the human and animal MRI translational platform dedicated to neuroscience and mental health research in Quebec City in 2016.

Team Members: Pascale Tremblay, Philip Jackson, Catherine Mercier, Cyril Scheider, Amélie Achim, Shirley Fecteau, Carol Hudon, Laura Monetta, Maximiliano Wilson

The Experimental Imaging Centre: a Local Brain Canada Platform for Preclinical MR Neuroimaging

Magnetic resonance imaging (MRI) has evolved over the past decades as the preeminent tool to noninvasively interrogate brain structure, physiology, chemistry, and the progression or treatment of disease. This Platform Support Grant is a collaboration between the Experimental Imaging Centre (EIC) and the Hotchkiss Brain Institute (HBI) at the University of Calgary. The HBI has over 120 members of talented neuroscientists and is providing leadership in neuroscience research in Canada. The EIC is a small-animal (preclinical) imaging facility, using advanced MRI system to serve the University's neuroscience community. The proposed grant is the bridge to a sustainable future for this scientifically successful collaboration, which will include the development of new funding partners, a revised fee structure and the expansion of the grant-funded neuroscience user base.

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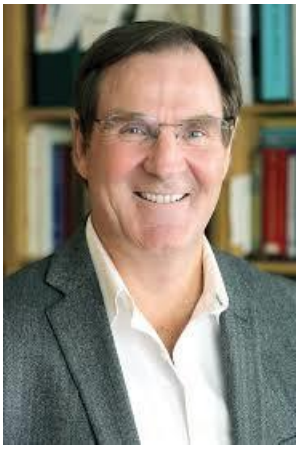
CBRAIN: Canadian Brain Research And Informatics Platform



Alan Evans
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The Canadian Brain Research and Informatics Platform (CBRAIN) provides researchers with a web portal to the Canadian national high-performance computing infrastructure. It is integrated with Alzheimer's disease initiatives in Canada, the US, Europe, India, China and Korea and coupled with the widely-used online database, LORIS. This project looks to gain support for customizing the CBRAIN/LORIS infrastructure to underpin a Canadian national platform for Alzheimer's disease research. This will allow integration of imaging, behavioural and genetic data from large-scale Alzheimer's disease initiatives under one roof and make it available to Canadian researchers for compute intensive analysis. Such a national repository of Alzheimer's disease data will interface with international efforts. Successful implementation of these goals will establish a national platform for the neuroinformatics of research into neurodegenerative disorders.

Team Members: Faisal Beg, Pierre Bellec, Louis Collins, Sultan Darvesh, Maxime Descoteaux, Simon Duchesne, Jason Lerch, Bruce Pike, Vesna Sossi, Stephen Strother

Building the Rick Hansen Alberta Spinal Cord Injury Registry

Spinal cord injury is a devastating condition with substantial human and financial costs. It is broadly classified into traumatic (e.g. due to motor vehicle accident) or non-traumatic (e.g. caused by infection, vascular causes) categories, with almost equal distribution in each. This project will support development of the Rick Hansen Alberta Spinal Cord Injury Registry (ABSCIR), to be built by a group of Alberta spinal cord injury researchers, clinicians, health care administrators, community partners and national research collaborators. This registry will include individuals with traumatic and non-traumatic spinal cord injury throughout the acute, rehabilitative and community phases of their life span, thereby improving our understanding and treatment methods for this disorder.

Team Members: Jaynie Yang, Monica Gorassini, Vivian Mushahwar, Vanessa Noonan, Andrew Nataraj, Brad Jacobs, Dalton Wolfe, Luc Noreau, Patrick Whelan

Chester Ho
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A National biobank and database for patients with traumatic brain injury

Traumatic brain injury is the leading cause of death and disability in children and young adults in Canada. The funding for this project will help link current and planned biobanks for traumatic brain injury, to a central state-of-the art neuroscience database at the Ontario Brain Institute. It will enable molecular biomarker research to bridge the gap between the bench and the bedside and improve the quality of care and outcomes in patients with traumatic brain injury. It will also position Canadian scientists to lead groundbreaking neuroscience research as part of the International Initiative for Traumatic Brain Injury Research.

Team Members: Andrew Baker, Karen Barlow, David Clarke, Michael Esser, Robin Green, Anne-Marie Guerguerian, Jacques Lacroix, Alain Ptito, Keith Walley

Jamie Hutchison
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A Novel Zebrafish-Based Platform for Anticonvulsant Drug Development

Epilepsy is a common neurological condition that affects 1-2% of the population. Despite dozens of anticonvulsant medications, over a third of patients remain refractory to drug therapy. The funding for this project will be used to create a national platform for anticonvulsant drug discovery. This platform is comprised of a drug screen locally in Calgary using re-purposed drugs and 50 Associate Members nationwide who will receive newly uncovered therapies to conduct open-label trials in their home institutions. Screening will be conducted in an innovative platform using bioengineered living zebrafish models that harbor similar genetic mutations as observed in human counterparts of the disorder. All promising candidates will be verified in rodent models of epilepsy, prior to entry into the clinic. The project design will allow for the rapid translation of the findings to the clinic ahead of launching large, multi-center trials, holding the potential to significantly improve epilepsy drug-discovery and treatment of patients throughout the world.

Deborah Kurrasch
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Jong Rho
University of Calgary

Team Members: Jeffrey Buchhalter, Mary Connolly

The Ontario Brain Epigenomics Platform

Art Petronis
Centre for Addiction and Mental Health

Epigenetic modification of the human brain genome is required for unique brain functions such as learning, memory, and stress response. Epigenetic misregulation may contribute to the development of neuropsychiatric diseases. To gain a better understanding of these processes, this project supports development of the Ontario Brain Epigenomics Platform (OBEP) which will be hosted at the Centre for Addiction and Mental Health (CAMH) in Toronto. The platform will provide services for isolation of small brain structures, access to a sequencing facility specialized for epigenomic assays, and data analysis for the mouse and human brain epigenome. Collectively, this effort will strengthen research at the level of individual groups and the community, and will improve Canada's standing in international epigenomic neuroscience research.

Team Members: Cathy Barr, Andrew Lim, Patrick McGowan, Freda Miller, Lennard Niles, Nathalie Berube, Michael Poulter, Ian Weaver, Stephen Matthews, Vincenzo De Luca

Human inducible pluripotent stem cells (iPSC) platform

Induced pluripotent stem cells (iPSCs) are adult cells that have been genetically reprogrammed to an embryonic stem cell–like state, and therefore can be used to derive various specialized cell types within the body. The derivation of human inducible pluripotent stem cells (hiPSC) is a time-consuming, complex and a highly sophisticated procedure. This project will address this issue by supporting the development of a core facility. The core facility will provide derivation services for various forms of hiPSCs as well as serve as a repository for ipSC cells. An iPSC core facility at the CRCHUQ will provide several advantages including increasing the pace of stem cell research and building translational bridges that facilitate the clinical use of stem cells to treat patients.

Team Members: Jean-Pierre Julien, François Berthod, Sebastien Herbert, Mohamed Chahine, François Gros-Louis, Jacques P Tremblay, Michel Maziade, Francesca Cicchetti, Nicolas Dupré, Sachikko Sato, Solange Landreville

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Montreal Functional Brain Imaging Platform

Functional MRI (fMRI) is an excellent tool for visualizing all brain regions that are active during the presentation of sensory stimuli or the execution of motor tasks. With a spatial specificity and resolution on the order of 1-2 mm, fMRI has excellent coverage of the brain while offering the best spatial resolution of all non-invasive functional imaging modalities. We will establish a local fMRI platform that will include a setup for training subjects to perform the research task in the closed, noisy environment of the MRI scanner. This platform will be accessible to all interested researchers.

Team Members: Paul Cisek, Erik Cook, Kathleen Cullen, Numa Dancause, Julio Martinez-Trujillo, Christopher Pack, Michael Petrides

Amir Shmuel
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A research platform to study animal and human cellular models of neurological disorders

Drug development for the treatment of brain disorders has always posed a significant challenge for the neuroscience research community. This project proposes to circumvent this issue by developing a neural-focused drug discovery platform, the Stem Cell and Cancer Research Institute (SCCRI) at McMaster University. The purpose of this platform is to develop new human and mouse neural cellular models of neurological disorders and utilize them for drug discovery with high-throughput screening. This platform is designed to meet the needs of projects focused on neurological disorders, including specialized infrastructure, and personnel that will interface with a Laboratory Information Management (LIM) system. This system establishes a central location for data storage and management, which allows for users to compare results across different modalities to make discoveries not possible using traditional lab-specific data storage. This will significantly streamline experimental protocols; improve research productivity and collaboration that will lead to better understanding of disease pathology and new drug therapies.

Karun Singh
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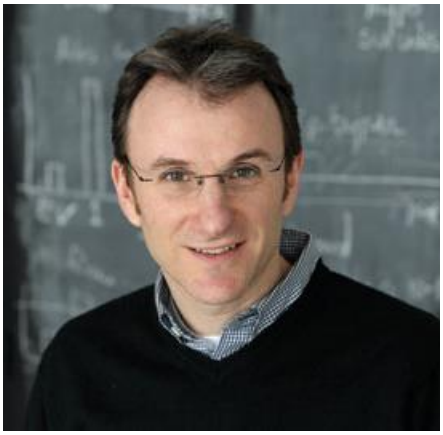
Team Members: Mick Bhatia, Kristin Hope, Sheila Singh, Eva Szabo

Douglas-Bell Canada Brain Bank, an essential platform for brain research in Canada



Gustavo Turecki
Douglas Hospital Research Centre

The Douglas-Bell Canada Brain Bank (DBCBB) is one of the rare brain banks in the world to collect brains from people who suffered from diverse mental disorders, including schizophrenia, major depression, bipolar disorder, and substance use disorders, as well as brains from individuals who were affected with different neurodegenerative diseases such as Parkinson's disease, Alzheimer's disease, and other dementias. This bank has access to a wealth of longitudinal data from its donors, and fulfills a large number of tissue requests from researchers around the world. The current funded proposal will help update the infrastructure of this highly essential bank, streamlining its operations to make the excellent resources available to the world in a more efficient and timely manner.

Team Members: Naguib Mechawar, Michael J. Meaney, Guy Rouleau, Michael Kobor, Martin Alda, Paul R. Albert, Cathy Barr, Darrell Mousseau, Satyabrata Kar, Shimon Amir, Ana Andreazza, Gilbert Bernier, Diane Boivin, Bernard Brais, Nicolas Cermakian, Balu Chakravarthy, Cletus D'Souza, Salah El Mestikawy, Carl Ernst, Ken Evans, Harriet Feilotter, Nicolas Flamand, Cecilia Flores, David Fortin, Edith Hamel, Michael R. Hayden, Sébastien Hébert, Martin Hirst, Jack Jhamandas, Sidney H. Kennedy, Christine Lavoie, Marco Marra, Anne McKinney, Daniel Mueller, Gerhard Multhaup, Lisa Münter, Art Petronis, Bruce Pike, Judes Poirier, Alexandre Prat, Rémi Quirion, Pedro Rosa-Neto, Xavier Roucou, Elizabeth M. Simpson, Abbas Sadikot, Lalit Srivastava, Moshe Szyf, Derek van der Kooy, Christine Vande Velde, Lan Xiong, L. Trevor Young

Integrated Neurostimulation Platform for Neuropsychiatric Research

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University of British Columbia

The Integrated Neurostimulation Platform for Neuropsychiatric Research will offer the capacity to perform interleaved transcranial magnetic stimulation (TMS) with functional magnetic resonance imaging (fMRI), a complex and demanding technique used to study brain function in neuropsychiatric disorders. The proposed platform will allow scientists in the fields of neuroscience, neurology, and psychiatry to collaborate on innovative studies of brain function in health and disease states. Furthermore, it will support truly translational projects by enabling researchers using non-human primate models to investigate brain function. This project holds the promise of delivering cutting-edge contributions to clinical and basic neurosciences, as well identifying novel treatments and their impact on brain function.

Team Members: Lara Boyd, Ray Lam, William Honer, Ivan Torres, Mario Liotti, Alex MacKay, Jon Stoessl, Doris Doudet

Regeneration Unit in Neurology: A platform for research and training in advanced microscopy and behavioural approaches

The Regeneration Unit in Neurobiology Core facility is a purpose-built centre specializing in state of the art microscopic imaging of cells and tissue, as well as sophisticated behavioural analysis of laboratory rodents. The funding for this platform would directly support expansion of training platforms to provide value-added one-on-one training in behavioural assessment and microscopy, to provide establishment of “pilot data programs,” and to provide long-term sustainability to this core facility. Collectively, this platform will provide researchers with a cutting-edge facility to conduct high quality, collaborative research, to lead to an overall improvement in neuroscientific research and knowledge generation.

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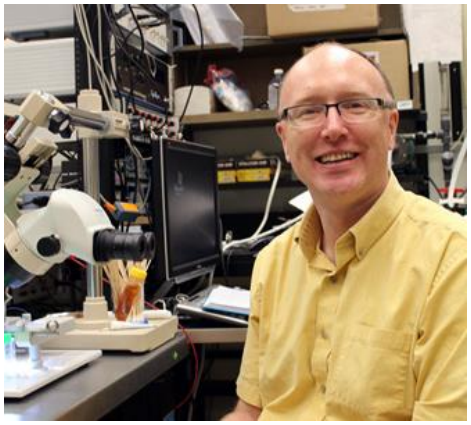

Patrick Whelan
University of Calgary

Z-BRAIN: A Zebrafish Drug Screening Platform Targeting Brain Disorders

Xiao-Yan Wen
St. Michael's Hospital

Zebrafish have recently emerged as an advanced organism for disease modeling and high-throughput chemical screening in drug development. This project, Z-BRAIN, proposes a new national state-of-the-art drug-screening platform to target brain disorders using zebrafish brain disease models. The large-scale project will engage a multidisciplinary research team involving over 30 PIs across Canada from zebrafish biomedical research, medicinal chemistry and industry, to identify and develop drugs targeting brain disorders including, but not limited to Alzheimer's disease, Parkinson's disease, dementia, amyotrophic lateral sclerosis (ALS), epilepsy, schizophrenia, depression/stress, stroke and traumatic brain injury.

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The Canadian Neonatal Brain Platform

Brain injury and abnormal maturation in the neonatal period is associated with long-term changes in microstructure and connectivity underlying significant cognitive, motor, language and behavioural disorders. Gregory Lodygensky at the CHU Sainte-Justine in Montreal has assembled together with Steven Miller at the Hospital for Sick Children in Toronto and Tim Oberlander at the Child and Family Research Institute in Vancouver, a unique, multidisciplinary team of researchers and clinicians from across Canada with diverse complementary expertise to establish a unique and innovative pan-Canadian framework, the Canadian Neonatal Brain Platform. Taking advantage of this standardized, multi-centre platform, researchers will work together to identify causes of brain dysmaturation and develop strategies to minimize brain injury in the neonatal period. They will also aim to promote brain nurturing care using an innovative educational approach to empower parents to enhance their child's development. The platform will create a sustainable framework that will generate novel insights with the highest standards and provide major breakthroughs in neonatal brain research for the benefit of preterm and term born infants at risk.

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