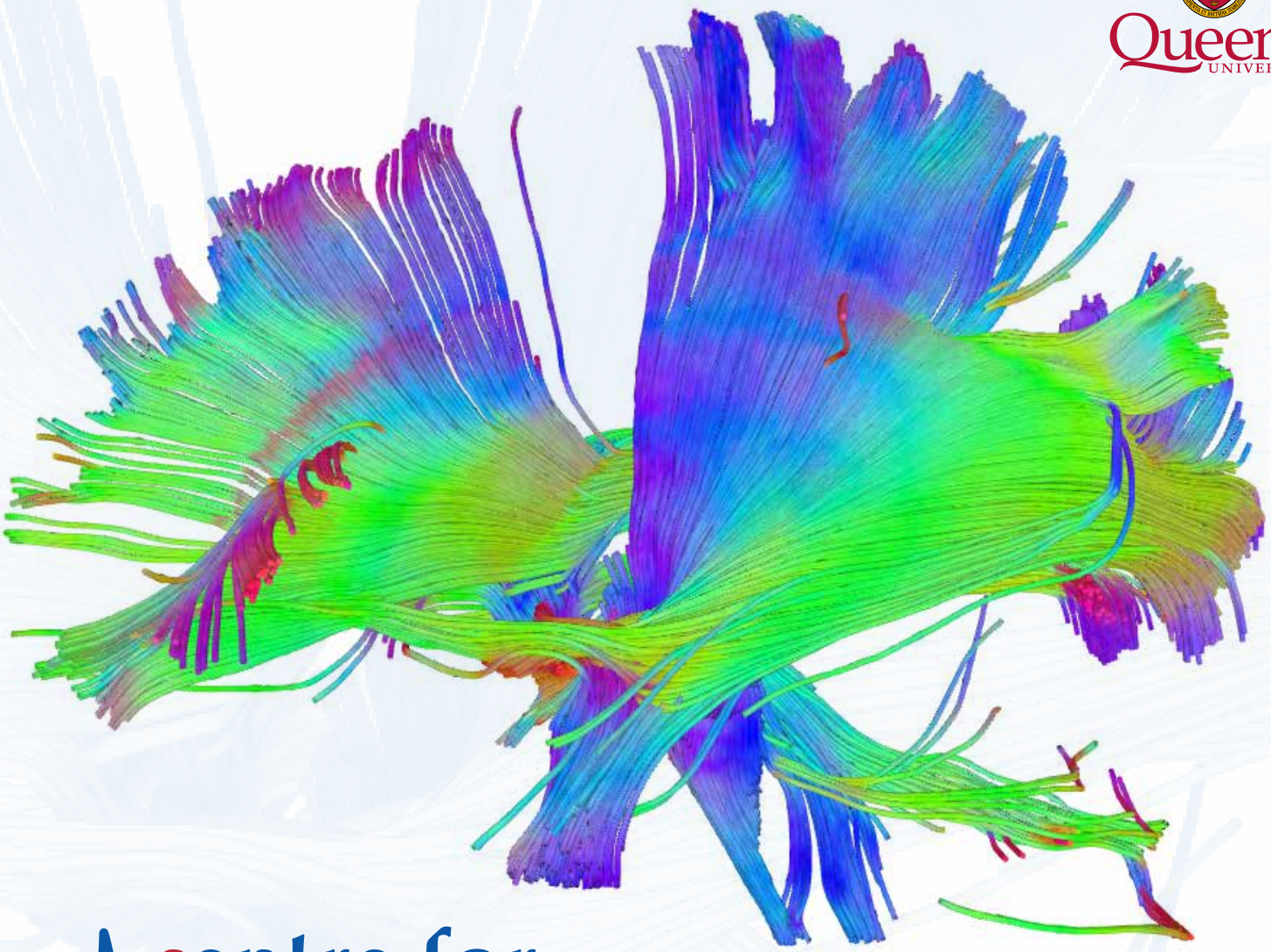
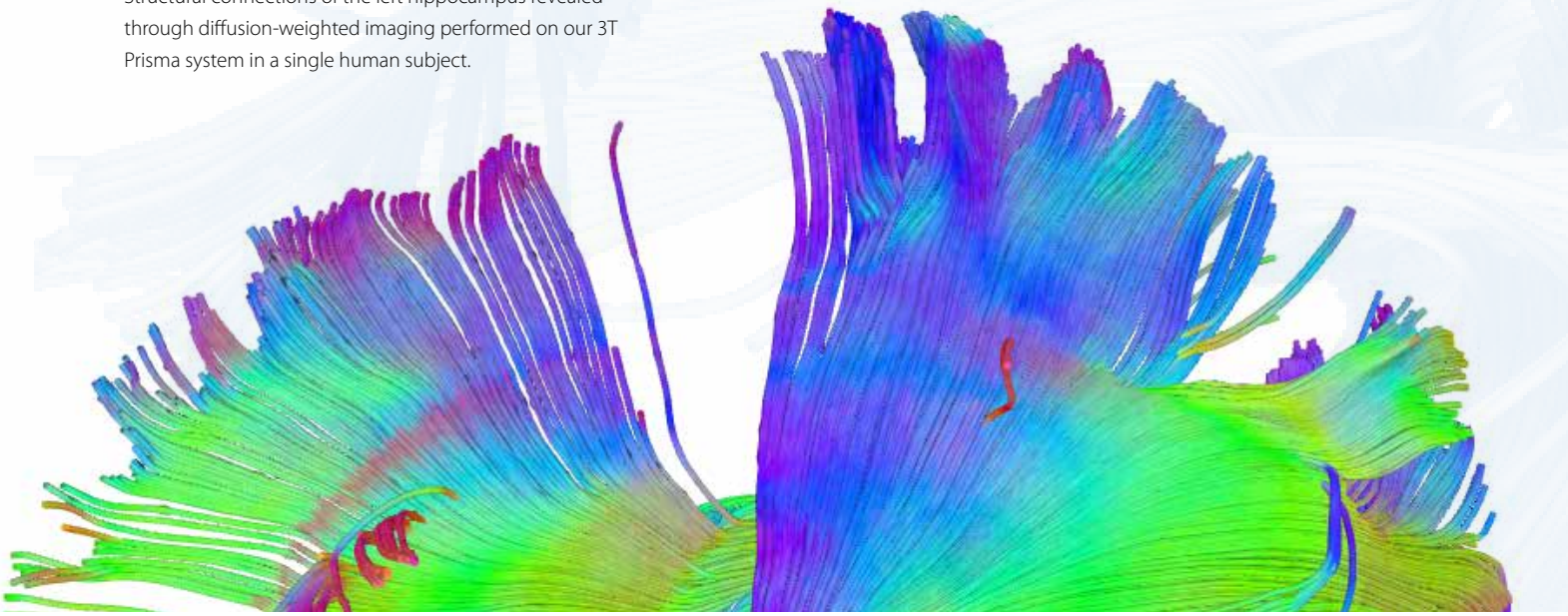
Queen's UNIVERSITY



centre for neuroscience studies

AT QUEEN'S UNIVERSITY

Structural connections of the left hippocampus revealed through diffusion-weighted imaging performed on our 3T Prisma system in a single human subject.



Message from the Director

Dear Colleagues, Students, Staff and Friends!

Last spring when I wrote my message from the Director for the annual report, I had no inkling that a year from now we would still be facing covid waves and that we would once again be in a lock down situation in the province of Ontario. I am happy to report that with the massive vaccination campaign, the situation is looking promising, and we will hopefully be resuming a new normal life over the coming months. It goes without saying that the last year has been difficult on all of us. Despite our limitations and restrictions, I am happy to report that the Centre for Neuroscience Studies has continued to be productive, we have weathered the covid storm and we are moving forward with our ongoing initiatives.

"I would like to take this opportunity to thank everyone who contributes so much to neuroscience research at Queen's University."

Over the last year, we were able to identify four major research themes and relevant infrastructure that will be used for planning and priorities going forward. The four themes identified are: Decision Making and Adaptive Control, Mood Disorders, Neurodegeneration and Pain. Although not all researchers identify in one of these groups, through vigorous data collection and analysis we were able to determine these strengths as a Centre.

Although we did face restrictions on the usage of the MR facility over the past year, we were still operational with many new studies coming. We had great success with our first Pilot Time Competition, and we look forward to having the recipients of this competition launch their studies once we are assured, we can remain open without interruptions. We look forward to launching our second such competition soon to encourage even more growth of the MR facility.

Our graduate program as always continues to grow in leaps and bounds. In September 2020 we saw the start of our virtual academic year with 35 MSc and 47 PhD candidates. Our focus in the Centre is to continue to encourage growth of our PhD program and look forward to the introduction of an Industry Specialization and/or micro-credential program.

The research productivity was outstanding with our members holding more than $26M in funding. As you will see further on in the report, more than $10M of this funding has come in the form of industry relationships with our faculty. As government tri-council funding has become more and more difficult to obtain, we can see the increasing importance of industry relationships with basic science research. We are also able to boast 815 research publications and over 34,000 research citations. These numbers represent an enormous amount of research productivity and an increase of more than 300 publications over last year's report.

I would like to take this opportunity to thank everyone who contributes so much to neuroscience research at Queen's University. Our outstanding faculty, students, postdoctoral fellows, and staff work together tirelessly to improve the quality of lives affected by neurological and psychiatric disease. The Centre for Neuroscience Studies plays a vital role in facilitating these successes.

Roumen Milev, MD, PhD, FRCPsych, FRCPC
Professor of Psychiatry and Psychology
Director, Centre for Neuroscience Studies

VISION

The CNS is internationally recognized for ground-breaking inter-disciplinary neuroscience research and teaching, through:

- Defining and being known for significant achievements in 3-4 research themes where we hold significant expertise and where we continually strive for excellence
- Being a hub in a pan-Canadian neuroscience network linking medical, industry and other partners in collaborative research and teaching
- Proactively engaging faculty across Queen's and in other institutions in collaborative, multi-disciplinary initiatives
- Developing and delivering innovative graduate education programs;

BY 2023, WE WILL:

- Recruit new faculty with primary appointments in neuroscience
- Ensure financial sustainability with mechanisms in place. Benefactors have been secured and endowments are in place
- Have a plan in place to establish a physical research centre, where trainees and faculty can meet
- Have outstanding public outreach and strong community relations

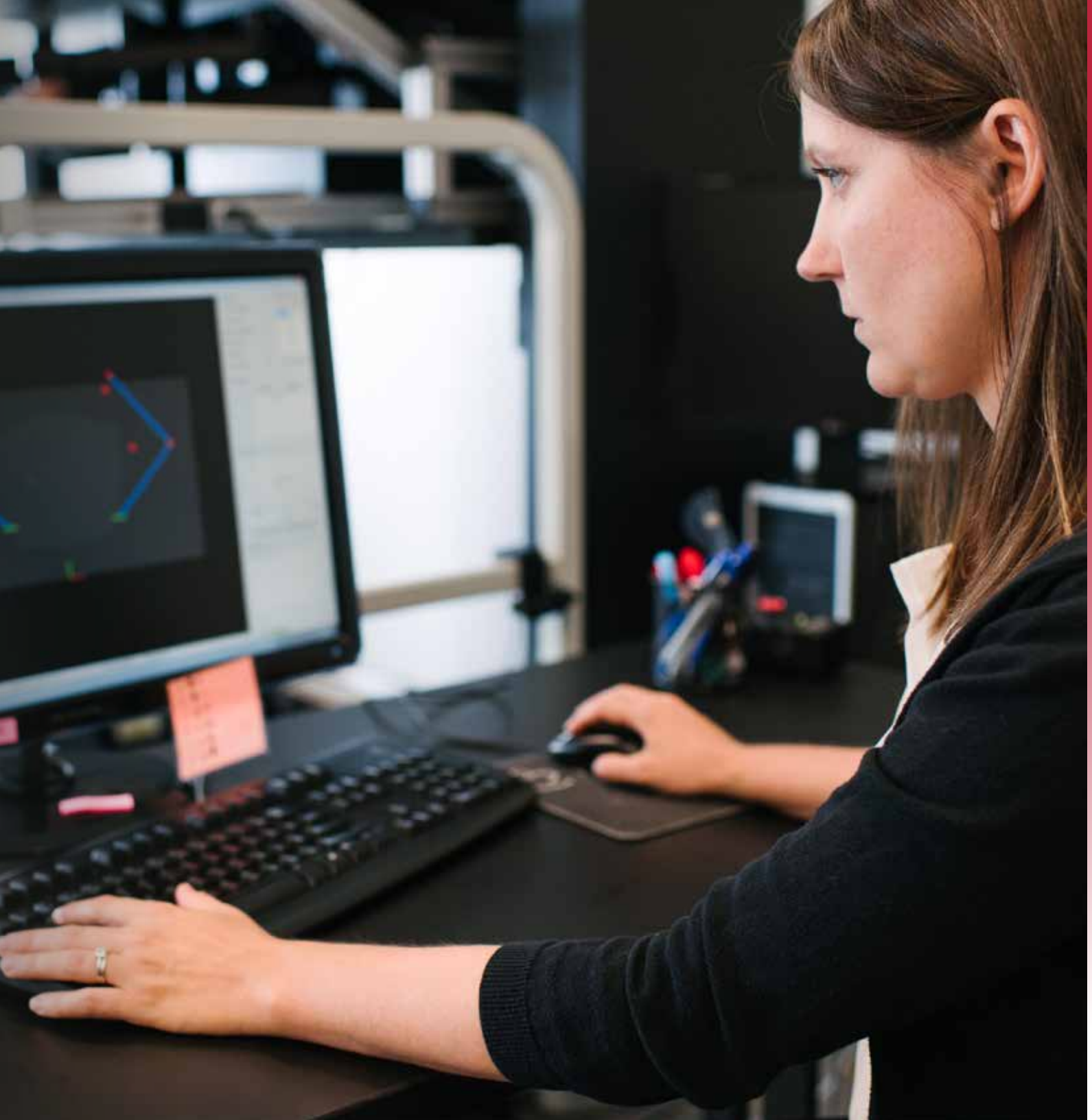
MISSION

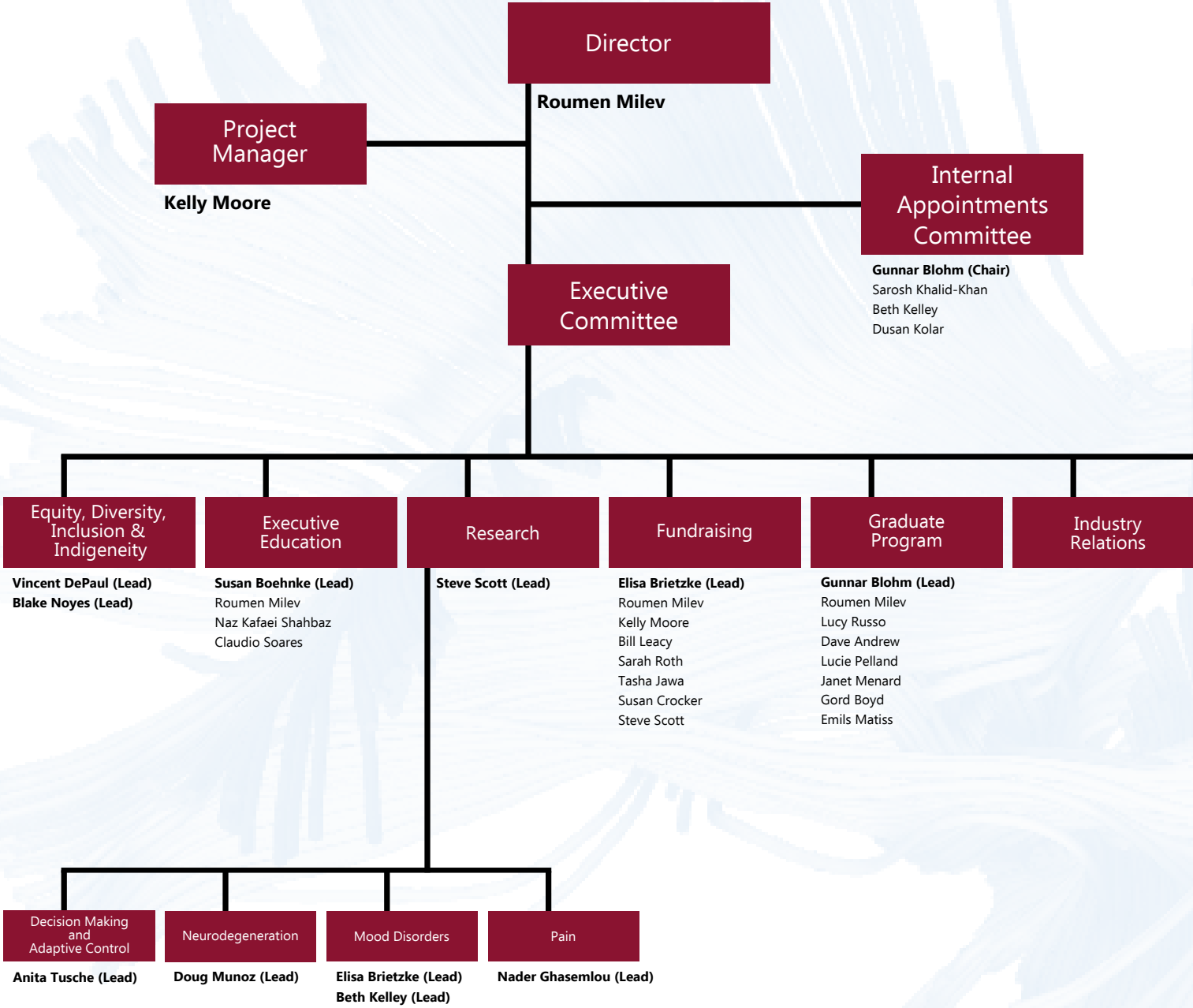
Lay the foundations for a sustainable program of innovative, inter-disciplinary neuroscience research and teaching, and so assure the future success of the Center through:

- Creating a well governed organization with 2 -3 major research themes
- Raising the profile and accomplishments of the Center and neurosciences activities at Queen's, and enhance the dialogue and collaboration around neuroscience research among Queen's faculty members
- Establishing a plan for a sustainable financial model for the Center's operations
- Effectively modifying our graduate program

PRIORITIES

- Research
- Education
- Profile and Awareness
- Governance
- Financial Sustainability




Director
Roumen Milev
Project Manager
Kelly Moore
Internal Appointments Committee
Gunnar Blohm (Chair)
Sarosh Khalid-Khan
Beth Kelley
Dusan Kolar
Executive Committee
Equity, Diversity, Inclusion & Indigeneity
Vincent DePaul (Lead)
Blake Noyes (Lead)
Executive Education
Susan Boehnke (Lead)
Roumen Milev
Naz Kafaei Shahbaz
Claudio Soares
Research
Steve Scott (Lead)
Fundraising
Elisa Brietzke (Lead)
Roumen Milev
Kelly Moore
Bill Leacy
Sarah Roth
Tasha Jawa
Susan Crocker
Steve Scott
Graduate Program
Gunnar Blohm (Lead)
Roumen Milev
Lucy Russo
Dave Andrew
Lucie Pelland
Janet Menard
Gord Boyd
Emils Matiss
Industry Relations
Decision Making and Adaptive Control
Anita Tusche (Lead)
Neurodegeneration
Doug Munoz (Lead)
Mood Disorders
Elisa Brietzke (Lead)
Beth Kelley (Lead)
Pain
Nader Ghasemlou (Lead)

Queen's University
Centre for Neuroscience Studies

MR Facility

Roumen Milev (Lead)
Jason Gallivan (Lead)
Don Brien
Kelly Moore
Gavin Winston
Tim Salomons
Charles Sumbler
AJ Conway
Gabriela Ioachim

Finance

Roumen Milev (Lead)
Dale Best
Kelly Moore
AJ Conway
Lucy Russo
Najat Khalifa
Dusan Kolar
Gunnar Blohm
Nicole Hunniford
Kelly Hart

Student Leadership

Ryan Kirkpatrick (Lead)
Tasha Jawa
Karys Peterson-Katz
Blake Noyes
Aleksandar Biorac
Dure Khan
Emils Matiss

Seminars

Doug Munoz (Lead)
Jonathan Coutinho
Olivia Calancie
Evan Forth
Sydney Dore
Rafaella Araujo Goncalves
Aleksandar Biorac

Safety

Kelly Moore (Lead)
Kim Moore (NHP)
AJ Conway (HDH)
Simone Appaqaq (KGH)
Mike Lewis (Abramsky)
Don Brien (MRI)
Kim Suffron (Botterell 2)
Dure Khan

MEET OUR

FACULTY

Nazanin Alavi Tabari

ASSISTANT PROFESSOR
PSYCHIATRY

RESEARCH INTEREST:

Dr. Alavi Tabari research focuses on the effectiveness of online Cognitive Behavioural Therapy (CBT) in treatment of mood and anxiety disorders. Currently they are designing an online psychotherapy clinic to address different mental health disorders.

Ryan Alkins

ASSISTANT PROFESSOR
SURGERY

RESEARCH INTEREST:

Dr. Alkins is interested in ultrasound for therapeutic interventions, particularly in combination with ultrasound contrast agents (microbubbles), with a focus on malignant brain tumors and stroke recovery.

Shideh Ameri

ASSISTANT PROFESSOR
ELECTRICAL AND COMPUTER ENGINEERING

RESEARCH INTEREST:

Dr. Ameri's research interests are in developing electronic devices, sensors and circuits using novel nano materials for realization of highly reliable sensors and systems with applications in biosensing, mobile health care, internet of things and human-machine interfaces.

David Andrew

PROFESSOR
BIOMEDICAL AND MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. Andrew studies how our higher brain is susceptible to global ischemia while our brainstem is dramatically resistant.

Ramana Appireddy

ASSISTANT PROFESSOR
MEDICINE

RESEARCH INTEREST:

Dr. Appireddy's research focuses on examining the role of social determinants of health in affecting access to stroke care and stroke outcomes.

Martha Bailey

PROFESSOR
FACULTY OF LAW, CENTRE FOR NEUROSCIENCE STUDIES

RESEARCH INTEREST:

Dr. Bailey's research interests are in Neuroscience and the Law.

William Bendena

PROFESSOR
BIOLOGY

RESEARCH INTEREST:

Dr. Bendena uses Caenorhabditis elegans as a genetic model to dissect neuropeptide signaling pathways.

Brian Bennett

PROFESSOR
BIOMEDICAL AND MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. Bennett is using an oxidative stress-based mouse model of late onset Alzheimer's disease and a mouse model of Down Syndrome to assess the efficacy of therapeutic agents for improving memory and for slowing, preventing, or reversing pathological changes associated with these conditions.

Andrew Bickle

ASSISTANT PROFESSOR
PSYCHIATRY

RESEARCH INTEREST:

Dr. Bickle's research interests are in Transcranial Direct Current Stimulation applied to risk factors for offending behaviour, such as abnormal impulsivity and substance misuse. Otherwise interested in research conducted within criminal justice system settings.

Etienne Bisson

ADJUNCT ASSISTANT PROFESSOR
ANESTHESIOLOGY AND PERIOPERATIVE MEDICINE, SCHOOL OF REHABILITATION THERAPY

RESEARCH INTEREST:

Dr. Bisson's works on Translational pain research to improve clinical care of adults with chronic pain with special interests in the relationships between pain, fatigue, mobility, physical activity and falls. His main research currently focuses on understanding how falls, their underlying physical and psychological factors and prevention interplay in the development, treatment and management of chronic pain.

Michael Blennerhassett

PROFESSOR
MEDICINE

RESEARCH INTEREST:

Dr. Blennerhassett examines factors influencing development and plasticity of postnatal enteric neurons, and promotion of survival in the face of challenge. This increases the understanding of inflammatory damage and can find ways to reduce the impact of disease on intestinal motility.

Gunnar Blohm

PROFESSOR
DEPARTMENTS OF BIOMEDICAL & MOLECULAR SCIENCES, PSYCHOLOGY, MATHEMATICS & STATISTICS, AND SCHOOL OF COMPUTING

RESEARCH INTEREST:

Dr. Blohm's lab uses a combination of mathematical modeling, computer simulations and human experimentation to understand brain function through studying sensory-motor processes. Our goal is to uncover general neurocomputational principles underlying healthy and impaired brains.

Susan Boehnke

ASSISTANT PROFESSOR
BIOMEDICAL AND MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. Boehnke studies the development and validation of a non-human primate model of Alzheimer's Disease. In addition, she is understanding the neural representation of visual and auditory signals, and how they elicit behavioural responses such as eye movements and changes in pupil size.

Amanda Bongers

ASSISTANT PROFESSOR
CHEMISTRY

RESEARCH INTEREST:

Dr. Bonger's leads the Queen's Chemistry Education Research Group, studying learning in chemistry and science. They are using eye-tracking and EEG to explore how the brain encodes and manipulates scientific models.

Christopher Bowie

PROFESSOR (PHD, CPSYCH)
PSYCHOLOGY, PSYCHIATRY

RESEARCH INTEREST:

Dr. Bowie studies the causes and correlates of functional disability and recovery in mood disorders and schizophrenia. His lab designs experimental studies to better understand mechanisms involved and develop treatments to modify these mechanisms and improve outcomes.

Gordon Boyd

ASSOCIATE PROFESSOR (MD, PHD, FRCPC)
MEDICINE (NEUROLOGY) AND CRITICAL CARE MEDICINE

RESEARCH INTEREST:

Dr. Boyd's research group is interested in the neurological complications of critical illness, cardiac disease, and kidney disease.

MEET OUR **FACULTY**

Elisa Brietzke

PROFESSOR (MD, PHD)
PSYCHIATRY

RESEARCH INTEREST:

Dr. Brietzke is interested in the investigation neurobiology of mood disorders, with a special emphasis on immune-inflammatory abnormalities, metabolic changes and domains of psychopathology, such as anhedonia and cognitive decline. I am also focused on the application of these findings to the development of innovative treatments for bipolar disorder and depression.

Inka Brockhausen

ASSOCIATE PROFESSOR
BIOMEDICAL AND
MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. BrockhauPsen studies glycosylation of proteins and lipids, aggregation mechanisms of synuclein in Parkinson's and bacterial polysaccharide synthesis.

Monica Castelhano

PROFESSOR
CHAIR OF COGNITIVE
NEUROSCIENCE
PSYCHOLOGY

RESEARCH INTEREST:

Dr. Castelhano's primary research interests are in the visual attention and visual memory and how they function in our everyday lives. Her lab is currently studying these processes as they relate to real-world scenes. Across various studies they investigate how people perceive, explore, search through and remember information from complex, natural stimuli.

Meredith Chivers

ASSOCIATE PROFESSOR, PHD, CPSYCH, QUEEN'S NATIONAL SCHOLAR, CANADIAN INSTITUTES OF HEALTH RESEARCH NEW INVESTIGATOR
PSYCHOLOGY, CENTRE FOR NEUROSCIENCE

RESEARCH INTEREST:

Dr. Chiver's primary research focuses on sexual attractions, sexual response, and sexual functioning, and the influence of gender and sex on these aspects of our sexualities. Her current work focuses on the neurocognitive factors associated with sexual response in women with and without sexual difficulties.

Elvina Chu

ASSOCIATE PROFESSOR
PSYCHIATRY, CROSS
APPOINTMENT WITH
NEUROLOGY

RESEARCH INTEREST:

Dr. Chu's research interests are allied to clinical neuropsychiatry and investigating psychiatric presentations and behavioural alterations that manifest in neurological conditions such as brain injury, stroke, epilepsy, Parkinson's and Huntington's disease.

DJ Cook

ASSOCIATE PROFESSOR
SURGERY

RESEARCH INTEREST:

Dr. Cook studies transitional stroke research, pre-clinical validation of stroke therapy, neuroplasticity and stroke recovery.

Wendy Craig

PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:

Dr. Craig's current research projects include: understanding the biological, psychological, and social correlates of cyberbullying, peer victimization and peer defending; investigating the role of shame in bullying and the associated mental health consequences; and evaluating knowledge mobilization of bullying research and its impact.

Susan Crocker

ASSISTANT PROFESSOR
PATHOLOGY AND
MOLECULAR MEDICINE

RESEARCH INTEREST:

Dr. Crocker's research interests are in cytogenomics and biomarker discovery for neurodegenerative disease.

Claire Davies

ASSISTANT PROFESSOR
MECHANICAL AND MATERIALS ENGINEERING

RESEARCH INTEREST:

Dr. Davies primary research goal focuses on increasing independence of people with disabilities. Understanding the perceptual and physical responses of all the senses, primarily vision, haptics and sound, has provided insight into how design of devices should be undertaken to create human-machine interfaces that are easily navigated and accepted.

Fernanda De Felice

ADJUNCT ASSOCIATE PROFESSOR
BIOMEDICAL AND MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. Felice's research focuses on investigating the molecular mechanisms linking Alzheimer's disease (AD) to diabetes and to an unhealthy lifestyle. Clinical/epidemiological studies have linked AD to diabetes, with each disease increasing the risk of developing the other.

Vincent DePaul

ASSISTANT PROFESSOR
SCHOOL OF REHABILITATION THERAPY

RESEARCH INTEREST:

Dr. DePaul's research focuses on the development, testing, and translation of interventions for the recovery of walking in individuals with stroke, other neurological conditions, and in older adult populations. This work specifically explores how individuals optimally learn and re-learn gait and balance-related skills; and how therapeutic strategies such as such as instruction, feedback, guidance, and supervised and unsupervised practice impact motor learning.

Nandini Deshpande

ASSOCIATE PROFESSOR
SCHOOL OF REHABILITATION THERAPY

RESEARCH INTEREST:

Dr. Deshpande's research focuses on vestibular and somatosensory functions; sensory integration process; impact of aging and diabetes on sensory functions and possible consequent modulation in sensory integration process and their impact on postural control during functional activities; other factors responsible for sustaining mobility in older adults with specific emphasis on fear of falling.

Anne Duffy

PROFESSOR (MD, FRCPC)
PSYCHIATRY

RESEARCH INTEREST:

Dr. Duffy studies the onset of mental illness in young people at variable risk including university students and children of mentally ill parents.

Ali Etemad

ASSISTANT PROFESSOR
ELECTRICAL AND COMPUTER ENGINEERING

RESEARCH INTEREST:

Machine learning and deep learning in the context of human-centric computing with wearables and intelligent systems.

Alastair Ferguson

PROFESSOR
BIOMEDICAL AND MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. Ferguson operates an interdisciplinary Neuroscience research group studying the role of the central nervous system in autonomic processing, with a specific emphasis on understanding changes in brain function associated with hypertension and obesity.

Randy Flanagan

PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:

Dr. Flanagan's aim for his Cognition and Action Lab is to understand the cognitive and computational processes underlying movement control and learning. Visit the web site to learn how they use virtual reality and other tools to study eye-hand coordination, object manipulation, sensory-motor adaptation, and links between action and perception.

MEET OUR **FACULTY**

Luis Flores

ASSISTANT PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:

The central theme of Dr. Flores' research is how close relationships and interpersonal functioning confer protection or risk in the development and clinical course of depression. His research program includes examining the role of altered neural response to social-affective interactions in depression.

Rafael Freire

ASSOCIATE PROFESSOR
(MD, PHD)
PSYCHIATRY

RESEARCH INTEREST:

Dr. Freire's research focuses on anxiety disorders and obsessive-compulsive disorder (OCD). He studies neurobiology, biomarkers, neurostimulation and pharmacological interventions for anxiety disorders and OCD. He is also interested in studying provocative tests for anxiety disorders, such as exposure to carbon dioxide, pictures and virtual reality.

Jason Gallivan

ASSISTANT PROFESSOR
PSYCHOLOGY & BIOMEDICAL AND MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. Gallivan's lab is interested in the cognitive and neural mechanisms that underpin processes related to action, learning and memory, decision-making, and perception.

Nader Ghasemlou

ASSISTANT PROFESSOR
ANESTHESIOLOGY;
BIOMEDICAL & MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. Nader's Pain Chronobiology and Neuroimmunology Laboratory seeks to understand how the interaction between circadian, inflammatory and sensory systems modulate pathophysiology. His translational research program takes advantage of functional/behavioural, cellular, and molecular approaches in both humans and animal models to identify new therapeutic targets for the treatment of nervous system injury and disease.

Ian Gilron

PROFESSOR AND DIRECTOR OF CLINICAL PAIN RESEARCH
(MD, MSC, FRCPC)
ANESTHESIOLOGY & PERIOPERATIVE MEDICINE, AND BIOMEDICAL & MOLECULAR SCIENCES (CROSS-APPOINTED)

RESEARCH INTEREST:

Dr. Gilron's work is on translational research on mechanisms and treatment of acute and chronic pain, clinical trials of pain management interventions, systematic review and meta-analysis of pain research studies.

Fabiano Gomes

ASSISTANT PROFESSOR
PSYCHIATRY

RESEARCH INTEREST:

Dr. Gomes is interested in studying effective ways to implement evidence-based treatments as well as developing innovative therapeutic approaches to patients with mood disorders.

Dianne Groll

ASSOCIATE PROFESSOR
PSYCHIATRY AND PSYCHOLOGY (CROSS APPOINTMENT)

RESEARCH INTEREST:

Dr. Groll's research interests are in Operational Stress Injuries (OSI) in military and first responders, evaluation of OSI treatment programs and therapies.

Kate Harkness

PROFESSOR (PHD, CPSYCH)
PSYCHOLOGY, PSYCHIATRY
(CROSS APPOINTMENT)

RESEARCH INTEREST:

The goal of Dr. Harkness' research is to understand the role of stress and early trauma in the etiology and ongoing pathology of major depression in adolescence and adulthood. Her current work focuses on neurohormonal, social cognitive, and motivational/reward factors that increase the sensitivity to, and generation of, stress in major depression.

Tariq Hassan

ASSISTANT PROFESSOR
PSYCHIATRY

RESEARCH INTEREST:

Dr. Tariq Hassan has an interest in neurostimulation and its effects on impulsivity and addiction in the forensic population.

Michael Hendry

ASSISTANT PROFESSOR
SURGERY

RESEARCH INTEREST:

Dr. Hendry's lab examines the regulatory pathways responsible for peripheral nerve regeneration with the aim to improve outcomes following nerve injury.

Tom Hollenstein

ASSOCIATE PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:

Dr. Hollenstein's research is in emotional development across the adolescent transition to understand how emotion regulation improves, how appraisals, autonomic arousal, and expressions cohere during an emotional episode, and how socioemotional flexibility relates to psychopathology.

Felicia Iftene

ASSOCIATE PROFESSOR
PSYCHIATRY (CROSS
APPOINTMENT PSYCHOLOGY)

RESEARCH INTEREST:

Dr. Iftene's research interests are focused on schizophrenia and cognitive behavioural therapy for psychosis, quality of life of clients with severe mental disorders.

Al Jin

ASSOCIATE PROFESSOR
MEDICINE

RESEARCH INTEREST:

Dr. Jin's research laboratory focuses on the use of experimental models of stroke to understand the roles of spreading depolarization and neuroinflammation in post-stroke cerebral injury. He is also interested in the use of robotic technology to assess cognitive and motor behaviour impairment in stroke and other neurological disorders.

Michael Kawaja

PROFESSOR
BIOMEDICAL AND
MOLECULAR SCIENCES

RESEARCH INTEREST:

The nervous system is viewed as having plasticity, that inherent ability to adapt both structurally and functionally to injury or disease. In Dr. Kawaja's laboratory, they are taking two approaches to address this issue. First, they are studying the role that growth factors and their receptors play during the generation of new axonal processes. Second, they are studying how grafting different cell types into the injured spinal cord of adult rats can enhance both axonal growth and functional recovery.

Beth Kelley

ASSOCIATE PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:

Dr. Kelley is interested in the social, cognitive, language, and mental health aspects of development in children and adolescents with neurodevelopmental disorders.

MEET OUR **FACULTY**

Sarosh Khalid-Khan

ASSOCIATE PROFESSOR
PSYCHIATRY

RESEARCH INTEREST:

Dr. Khalid-Khan's areas of interest are: prevention of childhood anxiety disorders, psychotherapeutic interventions in adolescent mood and anxiety disorders, enhancing primary care capacity to treat childhood psychiatric disorders and transcultural psychiatry.

Najat Khalifa

ASSOCIATE PROFESSOR (MD, MRCPSYCH (UK)
FORENSIC PSYCHIATRY,
CORRECTIONAL SERVICE OF CANADA

RESEARCH INTEREST:

Dr. Khalifa studies the use of non-invasive brain stimulation techniques to modulate impulsivity, empathy and decision making; mental disorder and offending behaviour; and risk factors for terrorism.

John Kirby

PROFESSOR EMERITUS
FACULTY OF EDUCATION,
CROSS-APPOINTED TO THE CENTRE FOR NEUROSCIENCE STUDIES

RESEARCH INTEREST:

Dr. Kirby's research concerns the cognitive processes involved in reading, including phonological awareness, naming speed, orthographic knowledge, morphological awareness, and comprehension processes.
He investigates the application of these processes to the diagnosis of reading disabilities and the design of instruction.

Dusan Kolar

ASSOCIATE PROFESSOR
PSYCHIATRY

RESEARCH INTEREST:

Dr. Kolar's research includes the treatment resistant mood disorders, anxiety disorders, ECT and rTMS, comorbidity in psychiatry, multimodal treatment, combination of medication and psychotherapy.

Valerie Kuhlmeier

PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:

Dr. Kuhlmeier studies cognition from a developmental and evolutionary perspective. She examines the origins of our cognitive capacities in a comparative manner, studying infants, young children, non-human primates, and canines.

Benjamin Kwan

ASSISTANT PROFESSOR,
ASSISTANT PROGRAM DIRECTOR DIAGNOSTIC RADIOLOGY RESIDENCY, CBME LEAD, FACULTY RESEARCH DIRECTOR RADIOLOGY
RADIOLOGY

RESEARCH INTEREST:

Dr. Kwan examines the usage of high-resolution vessel wall imaging in giant cell arteritis and competency based medical education in diagnostic radiology.

Ron Levy

ASSISTANT PROFESSOR
SURGERY

RESEARCH INTEREST:

Dr. Levy's lab studies electrophysiology and novel electrical neuromodulation paradigms in patients and animal models of Parkinson's disease.

Alan Lomax

ASSOCIATE PROFESSOR
BIOMEDICAL AND MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. Lomax's lab studies enteric neurons and nociceptive neurons to understand how neuroplasticity can lead to pain and altered function during disease. Their research on neurogenesis focuses on factors that suppress the generation of new neurons in the adult enteric nervous system.

Neil Magoski

PROFESSOR
BIOMEDICAL AND
MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. Magoski's research looks at the regulation of ion channel function and long-term changes to excitability in neuroendocrine cells that initiate reproduction. Electrophysiology, live-cell imaging, as well as cell and molecular biology are used to study both native and cloned acetylcholine receptors, non-selective cation channels, calcium channels, and gap junctions.

Alina Marin

ASSOCIATE PROFESSOR
PSYCHIATRY

RESEARCH INTEREST:

Dr. Marin's research initiatives focus on the role of the context in shaping voluntary and automatic emotion regulation, as well as the mechanisms underlying these processes.

Janet Menard

ASSOCIATE PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:

Dr. Menard's research is concerned with the neural circuits responsible for mediating fear as a useful adaptation, as well as with how altered brain function might promote maladaptive levels of fear. They use animal models of anxiety (rats being our animal of choice) to study how fear is regulated in the brain (e.g., what brain structures, neurochemicals and receptor types are involved?). They also explore how these neural systems and the defensive behaviors they regulate are modified by prior experience (e.g., maternal neglect in early life and/or chronic stress in adulthood).

Roumen Milev

PROFESSOR
PSYCHIATRY (CROSS
APPOINTMENT PSYCHOLOGY)

RESEARCH INTEREST:

Dr. Milev's research interests include biomarkers for treatment response in depression, psychopharmacological and neurostimulation treatments for mood disorders, sleep architecture, and overcoming stigma because of mental illness.

Michele Morningstar

ASSISTANT PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:

Dr. Morningstar's research focuses on the development of emotional communication and social cognition from childhood to adulthood. She uses a variety of methods, including speech analysis and functional neuroimaging, to determine how these basic emotional skills contribute to social functioning and psychological well-being across development.

Doug Munoz

PROFESSOR
BIOMEDICAL AND
MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. Munoz's research is devoted to: understanding the neural circuitry controlling visual fixation and the generation of saccadic eye movements, and using the knowledge of this circuitry to probe a variety of neurological and psychiatric disorders such as Attention Deficit Hyperactivity Disorder, Parkinson's Disease, Alzheimer's, Tourette's Syndrome and ALS.

Jose Alberto Neder Serafini

PROFESSOR
MEDICINE

RESEARCH INTEREST:

Dr. Neder is a clinician scientist interested in the multiple mechanisms that interact to produce breathlessness (dyspnea) and exercise intolerance in patients with cardiorespiratory diseases. Knowledge created by his research has been successfully translated into patients' care, ranging from early diagnosis to target therapy and innovative rehabilitation approaches.

MEET OUR **FACULTY**

Mary Olmstead
PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:
Dr. Olmstead's research is directed towards understanding the neural and psychological interface between motivation and cognition, or how rewarding stimuli influence learning. Her working hypothesis is that goal-directed behaviours and cognitive processes, as part of a dynamic interactive system, reciprocally modulate each other.

Martin Paré
PROFESSOR
BIOMEDICAL AND
MOLECULAR SCIENCES

RESEARCH INTEREST:
Dr. Paré's research interest is in neural basis of cognitive and active vision.

Lucie Pelland
ASSOCIATE PROFESSOR
SCHOOL OF REHABILITATION
THERAPY

RESEARCH INTEREST:
Dr. Pelland's research aims to understand the development of sensory-motor control in both typical child development and in selected paediatric clinical populations. Visually-guided reaching is used as a model to explore the dynamic influences of neural maturation, cognition and limb mechanics on the development and learning of sensory-motor control.

Jordan Poppenk
ASSISTANT PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:
Dr. Poppenk researches the consequences of bringing memories to life. To this end, his studies frequently incorporate monitoring of human brain activity with fMRI. Using computational methods, he tracks neural evidence of memory reactivation within participants' brains, which he relates to other processes such as memory formation, forgetting, planning for the future, and perception.

Caroline Pukall
PROFESSOR, CLINICAL
PSYCHOLOGIST
PSYCHOLOGY, SCHOOL OF
REHABILITATION THERAPY,
DEPARTMENT OF BIOMEDICAL AND MOLECULAR SCIENCES

RESEARCH INTEREST:
Dr. Pukall's work is in human sexuality, sexual dysfunction, vulvodynia, sexual arousal, psychophysics, psychophysiology, brain/spinal cord and blood flow imaging.

Taras Reshetuka
ASSISTANT PROFESSOR
PSYCHIATRY

RESEARCH INTEREST:
Dr. Reshetuka's research interests are in the fields of suicide, emergency psychiatry and PTSD.

James Reynolds
PROFESSOR
BIOMEDICAL AND
MOLECULAR SCIENCES

RESEARCH INTEREST:
Eye movement control is a powerful tool for assessing various aspects of brain function, including sensory-motor control and cognitive flexibility. Dr. Reynold's studies have demonstrated that behavioural deficits in eye movement control can be measured in children with FASD. Future studies will be aimed at developing eye movement tasks and other novel tools that can be used to assess brain function in children with FASD and other neurodevelopmental disorders.

Francois Rivest
ASSOCIATE PROFESSOR
SCHOOL OF COMPUTING

RESEARCH INTEREST:
Dr. Rivest studies artificial intelligence, machine learning, reinforcement learning, animal learning, interval timing, dopamine, and computational neuroscience.

Mel Robertson

PROFESSOR
BIOLOGY

RESEARCH INTEREST:

Dr. Robertson's laboratory investigates how neuronal mechanisms underlying behaviour of model organisms (locusts and Drosophila) are affected by abiotic environmental factors (e.g. temperature or oxygen availability). His lab's current focus is on reversible neural shutdown in response to anoxia via a process of spreading depolarization of neurons and glia.

Jacob Rullo

MD, PHD
OPTHALMOLOGY,
BIOMEDICAL AND
MOLECULAR SCIENCES

RESEARCH INTEREST:

Dr. Rullo's research interest is Understanding the relationship between small locally accumulating biomolecules and ocular disease. Optic neuropathy and neuroprotection.

Mark Sabbagh

PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:

Dr. Sabbagh's lab is focused on understanding the social, cognitive, and, neurobiological bases of cognitive and conceptual development. In particular they are interested in the mechanisms that promote developmental change in preschool-aged children's social cognitive and language development.

Tim Salomons

PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:

Dr. Salomons is interested in how thoughts and feelings affect how pain is processed and how it is experienced, as well as how cognitive and affective factors sensitize some individuals to pain.

Stephen Scott

PROFESSOR
BIOMEDICAL AND
MOLECULAR SCIENCES,
MEDICINE

RESEARCH INTEREST:

Dr. Scott's lab studies voluntary motor function, computational neuroscience, robotics, and neurological assessment.

Jessica Selinger

ASSISTANT PROFESSOR
SCHOOL OF KINESIOLOGY
AND HEALTH STUDIES CROSS
APPOINTMENT, MECHANICAL AND MATERIALS
ENGINEERING

RESEARCH INTEREST:

Dr. Selinger's research focus is on understanding the fundamental principles that underlie the neuromechanics of legged locomotion, as well as the application of these principles to wearable technology that can improve human mobility and overall health.

Garima Shukla

PROFESSOR
MEDICINE

RESEARCH INTEREST:

Dr. Shukla's research focus has been on the fascinating interface of sleep, cognition and behavior in epilepsy populations. Previous work investigated various non-seizure outcome determinants of quality of life among people with refractory focal epilepsy receiving surgical treatment. Research interests in Sleep Neurology include Restless legs syndrome and other primary sleep disorders with neurological co-morbidity.

Calvin Sjaarda

ADJUNCT ASSISTANT
PROFESSOR
PSYCHIATRY

RESEARCH INTEREST:

Dr. Sjaarda's research includes using bioinformatics, genomics, and big data to identify novel genetic, epigenetic, and environmental factors that contribute to the etiology of complex mental health disorders, genetic disorders, and infectious diseases
Photo: sent to Kelly

MEET OUR **FACULTY**

Jonathan Smallwood
PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:
The focus of Dr. Smallwood's research is the neural basis of higher order cognition. He uses machine learning and techniques such as EEG and MRI.

Claudio Soares
PROFESSOR
PSYCHIATRY

RESEARCH INTEREST:
Dr. Soares' primary research focus is on female-specific mood and anxiety disturbances, including: a) efficacy and safety of new treatments for premenstrual dysphoric disorder (PMDD); b) efficacy and safety of hormonal and non-hormonal strategies for the management of depression, sleep disturbances and other complaints (e.g., vasomotor symptoms) during the menopausal transition; c) risk factors associated with new onset of depression and anxiety during the menopausal transition.

Jeremy Stewart
ASSISTANT PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:
Dr. Stewart's research focus aims to understand and quantify vulnerability to suicidal and self-injurious behavior in youth across distinct units of analysis (e.g., environmental circumstances, behavior, physiology). Our studies focus on how individual differences in executive functioning, trait impulsivity, stressful life events (particularly peer rejection), reward responsiveness, and other variables may contribute to the escalation from suicidal thinking to action in adolescents and young adults.

Patrick Stroman
PROFESSOR
BIOMEDICAL AND
MOLECULAR SCIENCES

RESEARCH INTEREST:
The focus of research in Dr. Stroman's lab builds upon important new developments that enable fMRI to be applied in the spinal cord and brainstem. This work significantly enhances the benefit of fMRI for neuroscience research and will eventually support clinical assessments. One key advantage of adding spinal cord fMRI to conventional brain fMRI is the ability to study distributed networks, such as related to pain or central sensitization, across the entire CNS from the cord to the cortex.

Donatella Tampieri
PROFESSOR
RADIOLOGY

RESEARCH INTEREST:
Dr. Tampieri's research interests are in the areas of cerebrovascular disease, stroke, aneurysm and arteriovenous malformation.

Martin ten Hove
PROFESSOR
OPHTHALMOLOGY

RESEARCH INTEREST:
Dr. ten Hove's research focus is on visual attention and concussion, ischemic optic neuropathies and vascular imaging.

Anita Tusche

TITLE: ASSISTANT PROFESSOR
DEPARTMENT: ECONOMICS, PSYCHOLOGY

RESEARCH INTEREST:

Dr. Tusche's lab studies human decision-making in various domains (e.g. dietary behavior, altruism, consumer choice). To better understand the mechanisms that drive human decisions, they employ a variety of techniques (e.g., computer experiments, gaze pattern, functional and structural MRI) together with computational modelling approaches.

Sari Van Anders

PROFESSOR (CANADA 150 RESEARCH CHAIR IN SOCIAL NEUROENDOCRINOLOGY, SEXUALITY, & GENDER/SEX, AND PROFESSOR OF PSYCHOLOGY, GENDER STUDIES, & NEUROSCIENCE) PSYCHOLOGY AND GENDER STUDIES

RESEARCH INTEREST:

Dr. Van Ander's explores sexuality, gender/sex and sexual diversity, and social modulation of hormones like testosterone, all with a feminist and queer (bio)science lens.

Gustavo Vazquez

PROFESSOR (MD, PHD, FRCPC) PSYCHIATRY

RESEARCH INTEREST:

Dr. Vazquez's main scholarly activity is currently focused on the study of the clinical features, neurocognitive characteristics and pharmacological treatments of unipolar depression and bipolar disorders.

Jagdeep Walia

ASSISTANT PROFESSOR
MEDICINE

RESEARCH INTEREST:

Dr. Walia has an active clinical and basic genetics research program. His lab is focused on developing novel gene therapy approaches for inherited and acquired neurodegenerative disorders. Currently they are focusing on GM2-gangliosidoses (Tay-Sachs, Sandhoff diseases and AB variant) and use adeno-associated virus vector (AAV) system as a tool for gene transfer to the central and peripheral nervous system.

Jeffrey Wammes

ASSISTANT PROFESSOR
PSYCHOLOGY

RESEARCH INTEREST:

The research in Dr. Wammes' lab uses behavioural, computational and neuroimaging methods to investigate how we learn, retrieve, and reorganize and strengthen information in memory. They are also interested in how mind wandering, attention and perception influence learning and memory.

Gavin Winston

ASSOCIATE PROFESSOR
MEDICINE

RESEARCH INTEREST:

Dr. Winston studies people with epilepsy aiming to improve their diagnosis and treatment using computational neuroimaging, machine learning and cognitive assessment. Examples include tractography and machine learning for surgical planning, microstructural imaging, robotic assessment and neuroimaging biomarkers of cognitive impairment.

MEET OUR

ADMINISTRATIVE TEAM

Don Brien

MR MANAGER

RESPONSIBILITIES:

Manages the daily operations and staff of the CNS MRI Facility.

Adrian Conway

DEPARTMENTAL AND FINANCIAL ASSISTANT

RESPONSIBILITIES:

Provides an advanced level of organizational administrative and financial support to the Centre for Neuroscience Studies.

Mike Lewis

NETWORK ADMINISTRATOR

RESPONSIBILITIES:

Manages the network and server infrastructure for the Centre for Neuroscience Studies. Provides technical support to Faculty, Staff and Students within the centre.

Kelly Moore

PROJECT MANAGER

RESPONSIBILITIES:

Oversees finance and operations of the Centre and provides expertise with external funding opportunities.

Lucy Russo

GRADUATE ASSISTANT

RESPONSIBILITIES:

Provides administrative support to the Faculty Graduate Coordinator, graduate students and the graduate faculty in the CNS and acts as a liaison between this graduate program and the School of Graduate Studies (SGS).

Kim Suffron

SENIOR SECRETARY

RESPONSIBILITIES:

Provides secretarial support in the research environment for research faculty, staff and trainees. Kim provides support for all administrative bodies and committee within the Centre, the Neuroscience Lecture Series and the Neuroscience Outreach Program.

MEET OUR

RESEARCH TEAM

Simone Appaqaq

RESEARCH ASSISTANT

RESEARCH RESPONSIBILITIES:

Focus is on maintaining the health and welfare of approximately ten non-human primates, delivering behavioral training, carrying out surgical preparation and administering anesthetics. Simone also uses a robotic assessment device to evaluate human patients from a variety of pathologies such as stroke, multiple sclerosis, renal failure and concussion.

Brittney Armitage-Brown

RESEARCH ASSISTANT

RESEARCH RESPONSIBILITIES:

Coordinate and implement research protocols as well as oversee student, monitor and evaluate research models. Organize and maintain records on research models.

Helen Bretzke

COMPUTER PROGRAMMER/ DATABASE ADMINISTRATOR

RESEARCH RESPONSIBILITIES:

Writes analysis, data entry and reporting software for the Scott Lab. Manages storage and retrieval of experimental data.

Brian Coe

SENIOR RESEARCH SCIENTIST

RESEARCH RESPONSIBILITIES:

Specializes in the use of eye movements and neurophysiology for the study of decision-making (Coe et al., 2002), computational modeling (Coe et al., 2019), and neurodevelopment & neurodegeneration (Coe et al., 2017).

Catherine Crandell

RESEARCH ASSISTANT

RESEARCH RESPONSIBILITIES:

Assist with animal training, care and procedures.

Juan Fernandez

RESEARCH ASSOCIATE

RESEARCH RESPONSIBILITIES:

Specializes in the collection and analysis of behavioural and imaging data, as well as in the elaboration of scientific manuscripts.

Ethan Heming

DATA ANALYSIS SOFTWARE DEVELOPER

RESEARCH RESPONSIBILITIES:

Develop tasks for the Kinarm robot, analysis code for the lab, and handle website and webapp development.

Sean Hickman

MECHANICAL TECHNOLOGIST

RESEARCH RESPONSIBILITIES:

Support the development and production of novel research apparatus. Provide maintenance and adaptation support to ensure ongoing data collection.

Donna Kwan

ONDRI CLINICAL PLATFORM LEAD

RESEARCH RESPONSIBILITIES:

Manage the ONDRI Clinical platform - act as a consulting scientist and clinician who liaises between the ONDRI Clinical and Neuropsychology Platforms, and the rest of the ONDRI and greater scientific community - design, develop, and execute novel data science solutions in collaboration with the ONDRI Neuroinformatics and Biostatistics group.

MEET OUR

RESEARCH TEAM

Ann Lablans

RESEARCH ASSOCIATE

RESEARCH RESPONSIBILITIES:

Manages all aspects of Munoz laboratories with specialization in human and animal ethics protocols, research policies and procedures.

Catherine Lowrey

RESEARCH ASSOCIATE

RESEARCH RESPONSIBILITIES:

Catherine conceptualizes tasks to assess sensorimotor ability in patient populations using the KINARM robot. She analyzes the data collected from patient groups as well as healthy control participants to understand impairments in ability caused by neurological disease, (primarily Stroke).

Sean Lucas

FINANCIAL OFFICER

RESEARCH RESPONSIBILITIES:

Provide budgeting and reporting oversight and support for the Ontario Neurodegenerative Disease Research Initiative (ONDRI). This is a multiple platform longitudinal study out of 15 Clinical, academic and research centres across Ontario funded by the Ontario Brain Institute.

Kim Moore

RESEARCH ASSOCIATE

RESEARCH RESPONSIBILITIES:

Kim has worked with Dr. Scott since his position at Queen's started in 1995, and actually worked with him while he was a trainee at Queen's in 1992! She is responsible for the day to day operations in Dr. Scott's laboratories from administrative duties to data collection in multiple lab locations.

Lisa Potter

MEDICAL RADIATION TECHNOLOGIST—MRI

RESEARCH RESPONSIBILITIES:

Lisa joined the CNS MRI Facility team this year and will be running imaging studies part time and after hours. We are excited to add her knowledge as a registered MRT to the new facility.

Martin York

COMPUTER PROGRAMMER

RESEARCH RESPONSIBILITIES:

Martin is responsible for developing software used to run sophisticated experiments involving robotic devices and virtual reality displays in the Flanagan and Gallivan labs. In addition, he carries out electronics work and manages the labs. Martin is responsible for training students and contributes to the design and implementation of experiments.

MEET OUR **POSTDOCTORAL FELLOWS**

Andrea de Lima-Pardini

PHD: UNIVERSITY OF SÃO PAULO - BRAZIL

Currently working with Dr. Stephen Scott

RESEARCH INTEREST:

Andrea's current research uses an animal model to investigate neuronal reorganization and motor impairments after focal brain cooling (virtual lesion). Her main interests comprise the neural correlates of movement disorders and rehabilitation.

Natalia de M. Lyra E Silva

PHD: FEDERAL UNIVERSITY OF RIO DE JANEIRO

Currently working with Dr.s Doug Munoz and Fernanda de Felice

RESEARCH INTEREST:

Natalia is interested in understanding the molecular alterations underlying brain diseases, with focus on Alzheimer's disease and the mechanisms of crosstalk between the brain and the periphery.

Jolande Fooken

PHD: UNIVERSITY OF BRITISH COLUMBIA, VANCOUVER, BC

Currently working with Dr.'s Jason Gallivan and Randy Flanagan

RESEARCH INTEREST:

Jolande's research focusses on eye and hand movement control during naturalistic tasks that require quick sensorimotor predictions and decisions. In particular, she is interested in understanding the underlying mechanisms of the interplay between eye and hand movements at different stages of sensorimotor decisions and how the two systems work in synergy during everyday tasks.

Peter Gagolewicz

PHD: QUEEN'S UNIVERSITY

Currently working with Dr.'s David Andrew and Brian Bennett

RESEARCH INTEREST:

Peter work involves synaptic plasticity, Alzheimer's, and ischemic stroke. His doctoral research examined synaptic plasticity and metaplasticity in the adult brain, especially how it relates to learning and memory. More recently he has have taken an interest in hippocampal plasticity in animal models of Alzheimer's disease, as well as the cellular mechanisms of neuronal damage during ischemic stroke.

Hui Guang

PHD: TSINGHUA UNIVERISTY, BEIJING, CHINA

Currently working with Dr. Stephen Scott

RESEARCH INTEREST:

Hui's Ph.D work is mainly focused on modeling of sensorimotor control, including the modeling of proprioceptive recognition with ANN, state estimation with Bayesian filtering, and spinal reflex of focal vibration. He is currently working on the neural substrates of sensorimotor control with non-human primates, including the cocontraction and gain scaling effect.

Brian White

PHD: JUSTUS LIEBIG UNIVERSITY GIESSEN, GERMANY

Currently working with Dr. Doug Munoz

RESEARCH INTEREST:

Brian studies the circuits and processes associated with visually guided eye movements using specialized eye movement tasks, and single/multichannel extracellular recording techniques in brain areas such as superior colliculus and the primary visual cortex (V1).

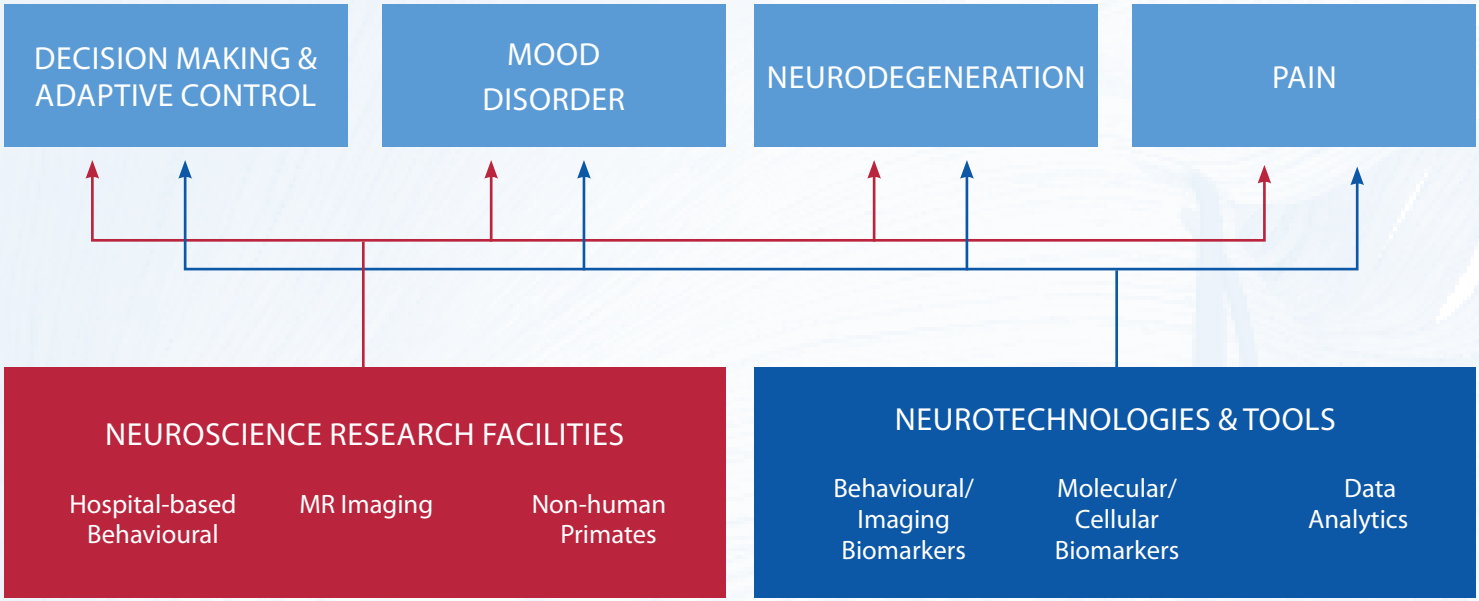
ESTABLISHING

RESEARCH THEMES

In 2020, the CNS went through a process of identifying research themes that represent major strengths and opportunities for the CNS to guide and support future training, growth and development. The process involved several rounds of consultation with the CNS members culminating with a virtual retreat in the summer of 2020 where we selected four research themes: Decision making and adaptive control, Mood Disorders, Neurodegeneration and Pain. These research themes provide a mechanism for members of our scientific community – who are housed across various departments at Queen's – to interact and collaborate on issues that are of cross-disciplinary interest and importance. We also identified key interests in developing and using biomarkers from molecular and cellular approaches to behavioural and imaging techniques. Finally, core research facilities were also identified including MR imaging, non-human primate labs and hospital-based behavioural assessment facilities that provide important opportunities for collaboration and future development.

NEUROSCIENCE

RESEARCH THEMES



Decision Making and Adaptive Control

Executing a particular action in any context relies on a complex suite of neurocognitive processes that allow us to select the most appropriate action from a range of closely competing alternatives, project and monitor performance for evidence of error, and when there are errors adapting one's decision-making processes to arrive at maximal efficacy. These processes govern everything from relatively simple motor actions like figuring out how to grasp an object, to complex social decisions like deciding whether and how one might like to share scarce resources. Successful adaptive decision making is one of the hallmarks of neurocognitive development and difficulties in adaptive decision making are characteristic of a wide range of neuropsychological and psychiatric conditions. The goal of this research group is to understand principles that influence decision making and actions, how factors such as cognitive and conceptual development, emotions, limb mechanics, environment influence these choices and how adaptive decision making can be impacted by disease, injury and aging. The group is co-led by Dr. Anita Tusche from Psychology and Dr. Stephen Scott from DBMS.

Mood Disorders

The mood disorders group is a group of researchers dedicated to study Anxiety, Bipolar Disorder, Depression and Suicide in children, adolescents, adults and seniors. To generate the discoveries that are going to transform our patient's lives, we use many different methods and approaches. We have researchers looking at psychometrics, biomarkers, neurobiological factors, genetics, neuropsychological factors, intervention methods, and prevention methods, just to name a few. We have researchers from Psychiatry and Psychology, but also from DBMS and other disciplines and collaborators from other departments, across Ontario and Canada and also in other countries. In the future, we would like to consolidate our national and international leadership, bringing our large group of psychiatrists, psychologists, geneticists, and neuroscientists to look at precision medicine interventions, ultimately achieving prevention, early detection and individualized treatments. The group is co-led by Dr. Beth Kelley from Psychology and Dr. Elisa Brietzke from Psychiatry.

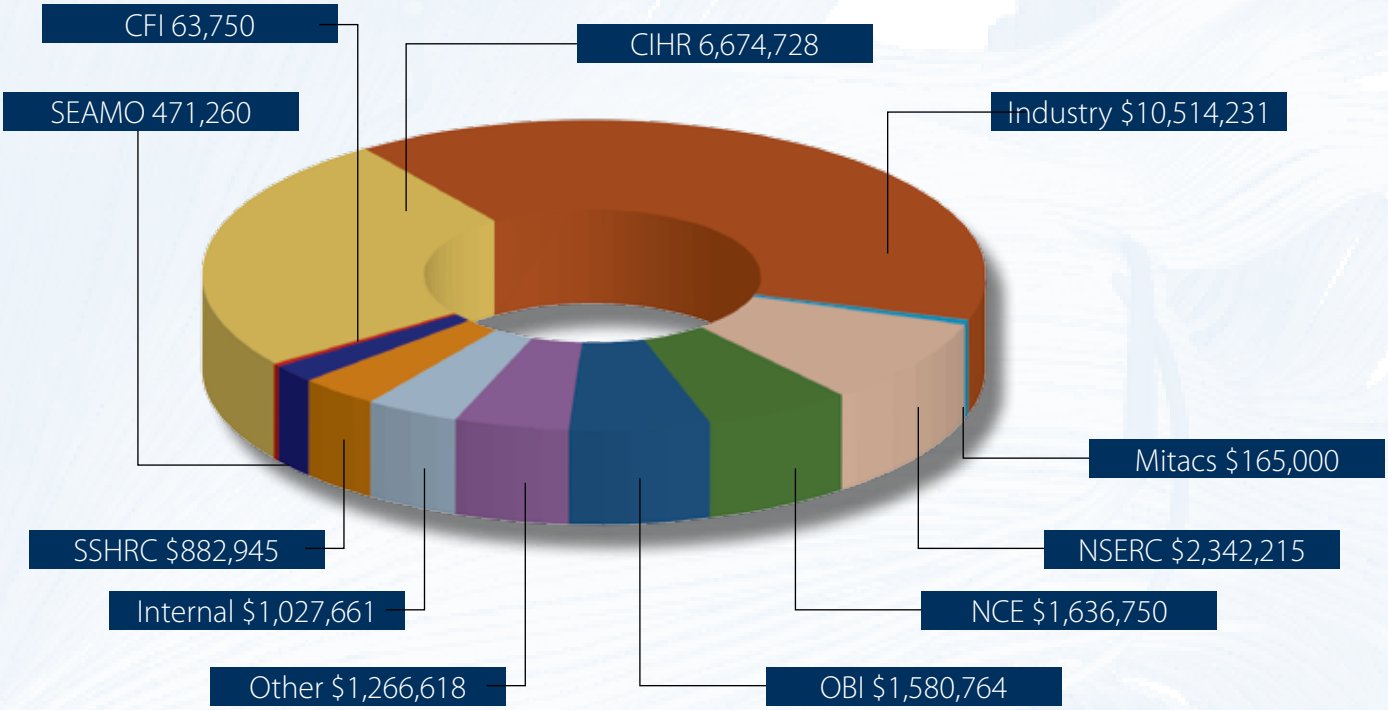
Neurodegeneration

The neurodegeneration group explores how various neurological disorders impact brain function and potential therapeutic interventions. There is not one cohesive project that the group is focused on, rather the individuals are focusing on multiple disorders (e.g., stroke, Parkinson's Alzheimer's, Huntington's, COVID, etc). There are many different experimental approaches being used in the group including genetics, surgery, physiology, behavioural, molecular and the research programs include rodent, NHP and human studies. The group is led by Dr. Doug Munoz in DBMS.

Pain

The Pain Research Group includes the Pain Chronobiology and Neuroimmunology Laboratory (led by Dr. Nader Ghasemlou), the Pain Affect and Cognition Laboratory (led by Dr. Tim Salomons), and the Kingston Health Sciences Centre's Department of Anesthesiology Chronic Pain Clinic (led by Drs. Scott Duggan and Etienne Bisson), as well as key members from the Departments of Anesthesiology, Biomedical & Molecular Sciences, Critical Care Medicine, and Psychology, among others. Using both laboratory models of pain and working with participants from across Canada and the world, key areas of interest for the Research Group include studying the molecular, cellular, and behavioural underpinnings of pain. More broadly, the team is working to bridge these various levels of research to develop a more translational study of the basic aspects of pain. The Centre for Neuroscience Studies at Queen's University brings together an inter-disciplinary team of neurobiologists, psychologists, immunologists, geneticists, sociologists, and pain clinicians to better understand why we feel pain, what we can do to better serve those suffering, and how to treat pain more effectively. The Pain Research Group at Queen's seeks to study bridge the gap that often exists between the clinic and basic scientists to bring new discoveries more rapidly to those suffering. The group not only works with people living with pain, but also those with chronic diseases where pain plays an important role including multiple sclerosis, Lyme disease, spinal cord injury, fibromyalgia, and arthritis to provide a better understanding of how pain and disease intersect.

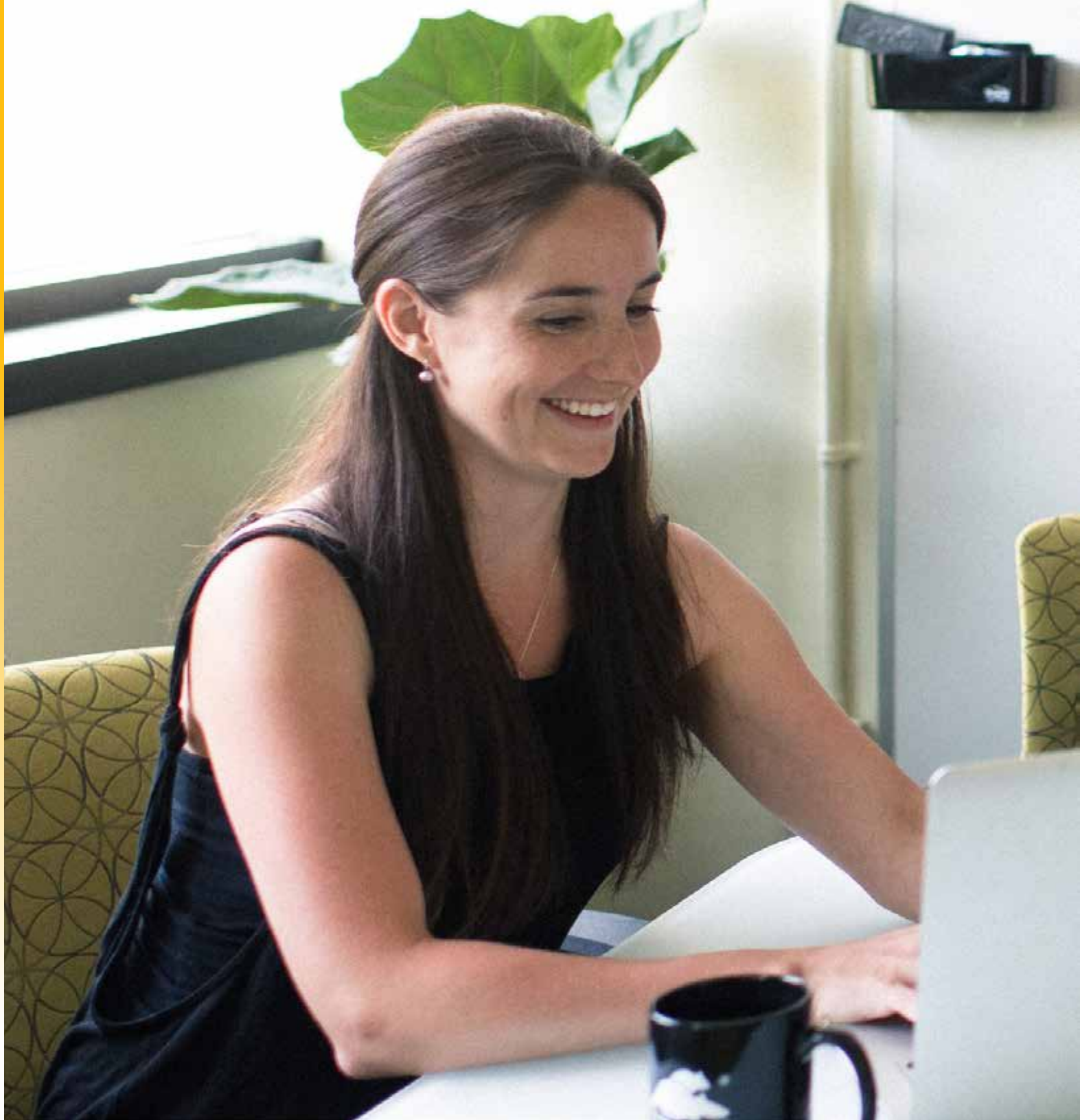
CNS FUNDING DATA



815
34,000

REFEREED JOURNAL ARTICLES AND CITATIONS

In 2020 faculty members from the Centre for Neuroscience Studies published **815 refereed journal articles** and had **over 34,000 citations**.



NEUROSCIENCE
GRADUATE PROGRAM

FUTURE DIRECTION

The CNS graduate program is devoted to training the next generation of neuroscience researchers. To ensure its future success in times of challenging academic and private sector changes, we envision a graduate program with enhanced training and professional development opportunities. Since many of our students become data scientists, we will co-develop a Deep Learning course with Neuromatch Academy. In addition, we want to enhance the job readiness of our graduates through offering an industry certificate in which students gain self-marketing skills and experience the workplace outside of academia by completing industry internships. Both these initiatives will complement our current emphasis on employability of our graduates through career development, cutting-edge knowledge acquisition and transferable soft skills training. Our goal is to be a leader in neuroscience research and training with interdisciplinary faculty specialized in basic, translational and clinical neuroscience.

> *"As attributed to Wilder Penfeild, 'The brain is the organ of destiny. It holds within its humming mechanism secrets that will determine the future of the human race'. Us students, fellows, and staff in the neuroscience program hold a unique privilege in working to uncover and understand the workings of this beautiful machine. The COVID-19 pandemic has disrupted many personal and professional plans. However, it personally has helped me value the importance of developing young scientists to have passion for experimental science in their field of study, and to acknowledge the deeply interconnected world in which we exist. I sincerely applaud the courage and strength shown by all in the Neuroscience program for your continued drive and work despite this challenging landscape. Hope to see you soon."*
>
> Kathleen Harrison, PhD Candidate, Centre for Neuroscience Studies

DIVERSITY OF RESEARCH

Research in Neuroscience has recently reached a turning point. New technologies provide an unprecedented richness of data and analysis tools. Accompanied by Open Science approaches, the field is at the beginning of a new era. In addition, we live in a world transformed by the current Machine Intelligence, Deep Learning and Big Data revolution. As a graduate program, it is our responsibility to prepare students for this rapidly changing future to ensure their success in both industry, government and academia. As an interdisciplinary graduate program, our students are broadly exposed to neuroscience research that benefits from massive cross-fertilization from other disciplines, such as computer science, ethics, business and medicine. The program draws its strength from the diversity of neuroscience research and training with interdisciplinary faculty specialized in basic, translational and clinical neuroscience. Our goal as a Graduate Program is be to ensure optimal trans-disciplinary training outcomes to prepare our graduates for the future job market in government, industry and academia.

> *Grad school is never a "breeze" no matter how much we wish that – there is so much to explore, to learn, to do and share, that at times we're confronted with the rhetoric: "am I ever going to get there?!"… and yet I found support, understanding and encouragement at every step, in all academic interactions. I think I'm not alone in saying that our confidence gets shaken and then rebuilt to meet higher and higher expectations, as scary as this seems…If I were to end this journey now, considering that this was my first year, I would say "it's been a great ride!"*
>
> Adriana Farcas, PhD Candidate, Centre for Neuroscience Studies

RECENT CHANGES

The Neuroscience Graduate Program is a very dynamic program that always thrives to stay at the cutting edge of research training and career mentorship. In the past year, we have developed training in new scientific methods, such as Open Science approaches. We have introduced a career development and learning plan for students to better define their personal goals and devise a strategy on how to attain them. We have also developed a new quantitative neuroscience course that teaches students the essentials of modern data analytics in Python. Our program has put increased emphasis on transparency of governance and communication (e.g. new graduate handbook). The promotion of diversity through scholarships as well as providing more role models (e.g. in our seminar series) have been part of an active strategy to increase equity, diversity and inclusion. These and future changes ensure that our program stays internationally competitive and attracts the best and brightest students from around the world.

MEET OUR

PhD STUDENTS

Amal Abdullah Mohammad Abu Omar	Lomax Lab
Hanin Alsaadi	Kawaja Lab
Rafaella Araujo Goncalves da Silva	Munoz/De Felice Lab
Aleksandar Biorac	Vazquez Lab
Brandon Caie	Blohm Lab
Olivia Calancie	Khalid-Khan Lab
Maude Champagne	Reynolds Lab
Alba Chavez Ramos	Reynolds Lab
Arthi Meyyappan	Milev Lab
Jonathan Coutinho	Blohm Lab
Kevin Cross	Scott Lab
Benjamin Cuthbert	Blohm Lab
Guilherme de Freitas	Munoz Lab
Natalie Deschenes	Walia Lab
Siavash Eftekharifar	Troje Lab
Adriana Farcas	Iftene Lab
Ashleigh Forsyth	Groll Lab
Daniel Gale	Gallivan Lab
Pauline Gaprielian	Levy Lab
Kathleen Harrison	Cook Lab
Po Yueh Huang	Munoz Lab
Gabriela Ioachim	Stroman Lab
Natasha Jawa	Boyd Lab
Janis Kan	Munoz Lab
Ryan Kirkpatrick	Khalid-Khan Lab
Matthew Laporte	Blohm Lab
Chloe Lowry	Andrew/Bennett Lab
Angela Luedke	Munoz Lab
Michael McGarity-Shipley	Gallivan Lab
Kathryn McIntosh	Levy Lab
Theresa McIver	Craig Lab
Joshua Moskowitz	Flanagan Lab
Samira Osman	Lomax Lab
Kayne Park	Scott Lab
Julia Perkins	Munoz Lab
Brianna Quinville	Walia Lab
Heidi Riek	Munoz Lab
Scott Robson	Kuhlmeier Lab
Joanna Semrau	Boyd Lab
Scott Squires	Poppenk/Milev Lab
Kaitlyn Tresidder	Bennett Lab
Jessica Vanderlinden	Boyd Lab
Caroline Wallace	Milev Lab
Rachel Yep	Munoz Lab
Tianyao Zhu	Gallivan/Flanagan Lab

Not only does the Centre for Neuroscience Studies have exceptional research opportunities, but there are many outreach programs that allow you to use the concepts you are studying to create tangible change in the community. For example, my graduate research focuses on sport-related concussion in football athletes, which I am able to translate into educational sessions for high school students and younger athletes through the Concussion Education Safety and Awareness Program (CESAP).

Kaden Shearer, MSc Candidate, Centre for Neuroscience Studies

MEET OUR

MSc STUDENTS

Parsa Balalaie	Scott Lab
Alexander Bambokian	Brietzke Lab
Bailey Brant	Lomax Lab
April Christiansen	Scott Lab
Sydney Dore	Blohm Lab
Spencer Finn	Winston Lab
Colleen Fleury	Scott Lab
Evan Forth	Milev Lab
Nazgol Kafaei Shahbaz	Walia Lab
Jay Kataria	Blennerhassett Lab
Dure Khan	Alkins Lab
Edwin Kiarie	Andrew Lab
Elena Koning	Stroman Lab
Kristen Lacelle	Cook Lab
Kelly Lee	Andrew Lab
Bernie Longange	Kawaja Lab
Blaire Magee	Cook Lab
Emils Matiss	Blohm Lab
Landon Montag	Solomans Lab
Blake Noyes	Khalid-Khan Lab
Jacob Peller	Kawaja / Hendry Lab
Karys Peterson-Katz	Reynolds Lab
Aaron Philipp-Muller	Alavi / Reshetukha Lab
Mohamed Rahal	Walia Lab
Lydia Reid	Scott Lab
Emma Robertson	Munoz Lab
Alexandra Ryckman	Walia Lab
Cassandra Sgarbossa	Milev Lab
Kaden Shearer	Cook Lab
Tishani Sritharan	Milev Lab
Callum Stephenson	Alavi Lab
Pranavan Thirunavukkarasu	Pare Lab

> *Starting my MSc in Neuroscience in the middle of a global pandemic was definitely not how I envisioned the start of my graduate school experience. However, I have met some great people along the way who have been incredibly supportive of my research and journey thus far. Currently, my research is focused on gut health, microbial therapy, and major depressive disorder. Looking forward to the future and all the things that Queen's University has to offer me!*

Cassandra Sgarbossa, MSc Candidate, Centre for Neuroscience Studies

GRADUATE STUDENT AWARD RECIPIENTS

Rafaella Araujo Goncalves de Silva

– HONOURABLE HUGH F. GIBSON AWARD/WEBBER AWARD

Rafaella has an undergraduate degree in Biological Sciences and a Master of Science degree in Biological Chemistry from the Federal University of Rio de Janeiro, in Brazil. She is currently pursuing her PhD at Queen's University in labs of Dr Munoz and Dr De Felice. Her doctoral research project aims to investigate the link between Alzheimer`s disease (AD) and Type 2 diabetes (T2D), which has been shown to double the risk of developing AD later in life. During her doctoral studies, Rafaella has been particularly interested in elucidating the role of inflammation and tau protein in triggering and aggravating cognitive and peripheral metabolic alterations in AD patients. More recently, she has been also involved in the identification of blood-based biomarkers associated with the diagnosis and progression of different neurodegenerative diseases.

Aleks Biorac (PhD)

– ONTARIO GRADUATE SCHOLARSHIP

Aleks completed his BScH majoring in Life Sciences at Queen's University in 2019. He began his PhD studies the same year under the supervision of Dr. Gustavo Vazquez, a psychiatrist at Providence Care Hospital. Currently, his studies focus on the characterization of treatment-resistant depression and the exploration of experimental ketamine treatment on clinical and behavioural outcomes.

Maude Champagne (MSc)

– GRADUATE ENTRANCE TUITION AWARD

Maude Champagne is a Neurosciences PhD Student under the supervision of Dr. James Reynolds. Maude has an MSW with a thesis on the Experience of parents raising children with FASD and developmental trauma during the Dyadic Developmental Psychotherapy (DDP) from Université du Québec en Outaouais. Maude also has a Social Work undergrad from Laurentian University. Her research interests include neurodevelopmental disorders, program evaluation and developmental trauma.

GRADUATE STUDENT AWARD RECIPIENTS

Benjamin Cuthbert (PhD)

– QEII IN SCIENCE & TECHNOLOGY

During his undergraduate degree in Life Science, Ben was fortunate enough to land a research position in Dr. Gunnar Blohm's neuroscience lab. He quickly saw the error of his math-less ways, and developed an affinity for modeling. Now he works with Drs. Blohm and Paré in the Centre for Neuroscience Studies, where he uses a variety of computational approaches to study short-term memory. When he's not working, he enjoys playing with dogs, synthesizers, and snowboards.

Guilherme de Freitas

– THE QUEEN'S GANG AWARD/WEBBER AWARD/BOAG FAMILY FUND

Guilherme is a Ph.D. Student in the Neuroscience Graduate Program at Queen's University. He has a Master's in Biochemistry from the Federal University of Rio de Janeiro (2017), and, a Bachelor in Biological Sciences, with a minor in Microbiology and Immunology, also from the Federal University of Rio de Janeiro (2014). Guilherme is currently in the Munoz lab investigating the possible chronic neurological alterations caused by systemic or central severe SARs-CoV-2 infection through a non-invasive biomarker approach.

Ashleigh Forsyth

– LATHAM FAMILY AWARD

MI A Veteran of the Canadian Armed Forces, Ashleigh has dedicated her academic career to researching mental health among the military. She completed her undergraduate degree in psychology through Thompson Rivers University and her Master of Science in Rehabilitation Science at Queen's University. Ashleigh is currently completing the second year of her PhD at the Centre for Neuroscience Studies at Queen's under the supervisor of Dr. Dianne Groll. Her focus in on treatment programming for posttraumatic stress disorder among military and public safety personnel.

GRADUATE STUDENT AWARD RECIPIENTS

Daniel Gale (PhD)

– NSERC GRADUATE SCHOOL SCHOLARSHIP

Dan is a fourth-year PhD Candidate supervised by Dr. Jason Gallivan in the Memory, Action, and Perception Lab, and by Dr. Randy Flanagan in the Cognition and Action Lab. Broadly, Dan uses functional MRI to study interactions between motor, sensory, and cognitive systems during object manipulation and motor learning tasks. In addition, he leads the development of non-human primate neuroimaging pipelines for the CNS and works on various open-source software packages for neuroimaging.

Natasha Jawa

– MCLAUGHLIN/BRACKEN FELLOWSHIP; GORDON WALLACE SWAN MEMORIAL FELLOWSHIP

Tasha is a first-year student in the MD/PhD program, supervised by Dr. J Gordon Boyd. Prior to entering the MD/PhD program, Tasha completed an honours BSc in neuroscience and psychology; graduate training in neuroscience through the MSc program at the Institute of Medical Sciences; and concurrently completed an MSc in Quality Improvement/Patient Safety with the Institute of Health Policy, Management, and Evaluation at the University of Toronto. Tasha completed her studies while also working as a clinical research manager in the Division of Nephrology at SickKids. Tasha's PhD work combines her passion for neuroscience, nephrology, and patient safety, by investigating short- and long-term neurological, neurocognitive, and functional changes in critically ill adults treated with dialysis in the intensive care setting.

Ryan Kirkpatrick (PhD)

- ONTARIO GRADUATE SCHOLARSHIP

Ryan is entering her third year in the MD/PhD Program and is supervised by Dr. Doug Munoz, Dr. Linda Booij and Dr. Sarosh Khalid-Khan. Ryan completed her undergraduate degree at Queen's in Life Sciences and Psychology and completed a mini-master's in the CNS in 2019. For her doctoral studies, Ryan is running a multi-site study aimed at increasing knowledge surrounding cognitive

GRADUATE STUDENT AWARD RECIPIENTS

control of saccadic eye movements in youth with eating disorders. The end goal of Ryan's project is to identify objective, rather than subjective, measures of eating disorders and treatment response in youth.

Bernie Longange

– MCLAUGHLIN/BRACKEN FELLOWSHIP

Bernie Longange is a graduate of the University of Toronto, where he completed a major in Neuroscience, as well as minors in Psychology and Ecology and Evolutionary Biology. At Queen's University, under the supervision of Dr. Michael Kawaja, Bernie's graduate research has focused on the production of nerve growth factor (NGF) by enteric neurons and the resultant effects on the digestive tract. Bernie hopes to continue in the field of research, deciphering the mysteries of the human body.

Chloe Lowry (PhD)

– ROBERT WILSON FELLOWSHIP; THE QUEEN'S GANG AWARD

Chloe is a fourth year PhD candidate co-supervised by Dr. David Andrew and Dr. Brian Bennett investigating the molecular mechanisms underlying spreading depolarization as it relates to stroke. She is also interested in how various social determinants of health can affect stroke outcome in clinical populations. Chloe previously completed her BScH (Life Sciences) in 2014 and her MSc (Neuroscience) in 2017, both at Queen's. She has been heavily involved in NOP throughout her time in the CNS and currently serves as the Co-Coordinator of the Kingston Brain Bee competition.

Blaire Magee

– MCLAUGHLIN/BRACKEN FELLOWSHIP

Blaire Magee completed her undergraduate degree in Life Sciences at Queen's University and is currently a master's student in the lab of Dr. D.J. Cook. For her master's thesis, Blaire is studying subconcussive impacts in football players. Specifically, her research aims to investigate the effects of repetitive head impacts on white matter integrity using diffusion tensor imaging.

GRADUATE STUDENT AWARD RECIPIENTS

Emils Matiss (PhD)

– ONTARIO GRADUATE SCHOLARSHIP

Emils is investigating the role of microcircuit connectivity rules in goal-directed behaviour using liquid state machines for motor control under the supervision of Dr. Blohm. Before studying at Queen's, he completed his undergraduate education at Wilfrid Laurier University in Business Administration and Computer Science. The collaborative and interdisciplinary nature of the CNS is the ideal environment to pursue research in the nexus of Artificial Intelligence and Neuroscience.

Kathryn McIntosh

– GORDON WALLACE SWAN MEMORIAL FELLOWSHIP

Kathryn McIntosh is a PhD candidate in Dr. Ron Levy's lab. She completed an undergraduate degree in Electrical Engineering with a minor in Biomedical Engineering and certificate in Entrepreneurship, Innovation and Small Business at the University of Toronto before direct entry into the PhD program at Queen's University. Kathryn developed a kindling model of epilepsy in a primate, and she uses this model to study the electrical interactions that support memory in the healthy and epileptic brain. She records simultaneously from several deep brain regions as primates learn to navigate in a 3D virtual reality world. She uses electrical stimulation, pharmacological manipulation, and signal processing techniques to investigate primate neural processes. Her work provides insight into the mechanisms underlying neural disorders and the physiologic basis of learning and memory.

Blake Noyes (MSc)

– FRANKLIN/BRACKEN FELLOWSHIP

Blake received her BSc in Psychology at Queen's University in 2018. Blake will be completing her mini-master's at the Centre for Neuroscience in the summer of 2021 and plans to begin her PhD in the fall of 2021. Blake is co-supervised by Dr. Doug Munoz, Dr. Linda Booij, and Dr. Sarosh Khalid-Khan. Her research focuses on using eye-tracking to characterize subthreshold depression in adolescents at Kingston General Hospital.

GRADUATE STUDENT AWARD RECIPIENTS

Jacob Peller

– CIHR GRADUATE SCHOLARSHIP

Jacob is a MSc student being co-supervised by Dr. Michael Hendry and Dr. Michael Kawaja. Jacob completed his undergrad at Queen's in Life Sciences with a sub specialization in Neuroscience. His CGS-M funded project is researching the use of ErbB inhibitors to promote nerve regeneration in a mouse model of nerve injury.

Brianna Quinville

– GORDON WALLACE SWAN MEMORIAL FELLOWSHIP

Bri Quinville joined the Walia lab as an undergraduate thesis student while completing her BScH in Biology with specialization in Psychology at Queen's University. After completing a mini-MSc, Bri is now a PhD student with Dr. Walia and is working on a gene therapy treatment for Sandhoff and Tay-Sachs disease. Her main research project involves using a mouse model of Sandhoff disease to determine an optimal dose for this gene therapy treatment. Her work also examines a more direct route of administration via intra-cisterna magna infusion to the central nervous system. Following the completion of this study the gene therapy will be tested in a large animal model before moving on to clinical trials.

Heidi Riek (PhD)

– QEII IN SCIENCE & TECHNOLOGY; GORDON WALLACE SWAN MEMORIAL FELLOWSHIP

Heidi is a second-year PhD student under the supervision of Dr. Doug Munoz. In her work with the Ontario Neurodegenerative Disease Research Initiative, Heidi uses video-based eye tracking to characterize saccadic eye movement behaviour in several neurodegenerative disease populations. Heidi is also interested in the effect of genetic variants on eye movements. Prior to doctoral studies, Heidi received her B.Sc.H. from Queen's University (2017) and completed a mini-master's in the CNS (2019).

GRADUATE STUDENT AWARD RECIPIENTS

Cassandra Sgarbossa

– MCLAUGHLIN/BRACKEN FELLOWSHIP

Cassandra completed her undergraduate degree at the University of Guelph, in Guelph, ON, Canada. She initially started out in the Psychology program, but quickly realized that her research interests were much more aligned with neuroscience and more specifically, the science behind psychiatric illnesses. Cassandra received her BA (Honours) in Psychology with a Minor in Neuroscience. She is very passionate about mental health research and awareness, which is why she is currently doing her MSc thesis on a new microbial therapeutic product and its long-term effects on symptoms of depression, under the supervision of Dr. Milev. Cassandra's current research interests are focused on gut health, microbe therapy, clinical neuroscience, and depression.

Kaden Shearer (MSc)

– FRANKLIN/BRACKEN FELLOWSHIP

Kaden completed his undergraduate degree in Kinesiology at Queen's University in 2019. His passion for evidence-based approaches to sport safety and performance led him to pursue his Master's degree under the supervision of Dr. D.J. Cook. He currently studies the relationship between head impact biomechanics and neuroimaging changes in football athletes. This research combines helmet-mounted accelerometers and multi-modal MRI techniques to better understand how subconcussive collisions alter brain physiology. Kaden hopes that this research will help make sports fields safer for contact sport athletes.

Scott Squires (PhD)

– NSERC GRADUATE SCHOOL SCHOLARSHIP

Scott completed his B.Sc. (Hons.) in Psychology and Medical Sciences in 2014 at the University of Western Ontario. Afterwards, he spent two years at Western as a research assistant among three labs, studying visuomotor neuroscience (under Dr. Jody Culham), cognitive risk factors for depression (under Dr. David Dozois), as well as suicide risk and resilience factors in elderly

GRADUATE STUDENT AWARD RECIPIENTS

individuals (under Dr. Marnin Heisel). From 2016-2019, Scott completed his M.Sc. in Clinical Psychology at Queen's, studying the associations among types of childhood maltreatment, frontoamygdala functional connectivity at rest, and depression symptom severity (under Dr. Kate Harkness). Scott is in the second year of his Ph.D. at the Centre for Neuroscience Studies, under the co-supervision of Dr. Jordan Poppenk & Dr. Roumen Milev. Here, he is using psychometric analysis and functional MRI to study the links between life stress, emotion, brain functional connectivity, and rumination (i.e. the tendency to dwell on negative thoughts, feelings, or events) in psychologically healthy individuals and in individuals with a recent history of prolonged psychological distress (e.g. depression, anxiety, etc.).

Callum Stephenson

– LATHAM FAMILY AWARD

Callum graduated from Queen's University in 2020 with a Bachelor of Science (Honours). He is currently completing his Master of Science in Neuroscience under the co-supervision of Dr. Roumen Milev and Dr. Nazanin Alavi in the Queen's University Online Psychotherapy Lab (QUOPL). Callum is leading a pilot study investigating the pathophysiology of obsessive-compulsive disorder using electronically delivered cognitive behavioural therapy and functional magnetic resonance imaging. Callum is passionate about furthering his research in the hopes of influencing health policy for more accessible and equitable mental health care delivery.

Kaitlyn Tresidder (PhD)

– WILSON FELLOWSHIP; THE WEBBER ENDOWMENT AWARD

Kaitlyn is a fourth-year PhD candidate in the lab of Dr. Brian Bennett. She completed her undergraduate degree at Queen's University, receiving a BScH (Life Sciences) in 2015. She then joined the Centre for Neuroscience Studies and completed a MSc in 2017 studying the chronobiology of pain with Dr. Nader Ghasemlou. Currently, Kaitlyn is interested in neurodegenerative disorders, and her research primarily focuses on the contribution of oxidative stress to the progression and pathology of Alzheimer's disease. After graduate school, Kaitlyn wishes to pursue a career as a clinician-scientist.

Despite the hardships that COVID-19 has inflicted upon us all this year and its unfortunate effects on our respective research projects, it was a pleasure to have been part of the Department of CNS. Likewise, it was a privilege to learn amongst like-minded individuals and expand my research skills. I look forward to seeing the future work produced by all of the brilliant CNS students I met this year.

April Christiansen, MSc Candidate, Centre for Neuroscience Studies

STUDENT LEADERSHIP

Despite an academic year that presented many unique challenges, the Student Leadership Committee (SLC) was as motivated as ever to advocate for the CNS' students. This year's SLC was made up of eight students from seven different labs, studying everything from computational neuroscience, to neurocognitive function after ICU admission, and ketamine therapy for treatment resistant depression. Never meeting face-to-face didn't stop this year's committee's drive to advance initiatives for the betterment of the CNS student body.

After working closely with CNS students, administration, Executive Committee, and Graduate Committee, we, this year's SLC, were able to accomplish several key items:

1. Funding mentorship program: Launching Summer 2021, we developed a mentorship program to pair current CNS students that are applying to external funding (e.g., tri-council scholarships) with previous award winners from the CNS. This will enable all those applying to benefit from the shared experience and learnings from past applications and successes.
2. Equity, Diversity, Inclusivity and Indigeneity (EDII) Committee: We advocated for a student seat on the CNS' newly formed EDII committee and emphasized the importance of having a student EDII representative with voting rights on the Executive Committee. This is an important step forward to ensure that all students are appropriately represented within our Centre, and have the ability to have their unique issues brought forward.
3. Mandatory Statistics Course: With the CNS welcoming students from a plethora of undergraduate degrees, based on feedback received from students, we advocated for the implementation of a mandatory statistics course for all incoming graduate students, allowing for a more even knowledge-base in statistics across our entire student body.
4. Supervisory Guidelines: We received feedback on the high variability that CNS students experience with respect to their supervisor-student relationships. Based on this feedback, we advocated for more guidelines to be developed for CNS members seeking to supervise graduate students, with the goal of providing a clearer understanding of the role of the supervisor and the student throughout the graduate experience.
5. Additional SLC Positions: Launching Fall 2021, we added International Student and EDII Representation positions for future SLCs, enabling future generations of SLCs to have appropriate representation for students from all backgrounds.
6. Neuroscience Outreach Program (NOP) Oversight: The SLC has commenced the process of providing support to each NOP. To start, we have assisted each NOP in developing their own Terms of Reference documents. This document will aid NOP leaders in communicating their objectives and mandates to students interested in joining.

While we are very proud of the progress we've made this year, we also have many goals for the future of the SLC:

1. Student Feedback: To allow more opportunities for students to connect with the SLC and provide feedback, we would like to hold monthly office hours.
2. Student Socials: The transition to graduate school can be very difficult - we have seen that this has particularly been the case during a pandemic! Building off of the success of the games night we hosted in March 2021, and in an effort to ease the transition into graduate studies, we would like to host more socials geared at assisting incoming students to integrate into the CNS.
3. NOP Guidelines: As it stands, each NOP operates separately and without much support from the CNS or SLC. We would like to develop more guidelines for existing NOPs and support for students looking to establish new NOPs.
4. Supervisor Reviews: Based on student feedback, we would like to provide an option for students to give anonymous feedback on issues they are experiencing with their supervisors or other faculty members. This will also allow students to rate their experience and provide any other relevant feedback to the CNS.
5. Student Elections: We have recently been made aware that the current system of student representative selection may not be inclusive or equitable. To rectify this, we will work with the EDII committee to develop an anonymous and fair election process for all student representative positions.

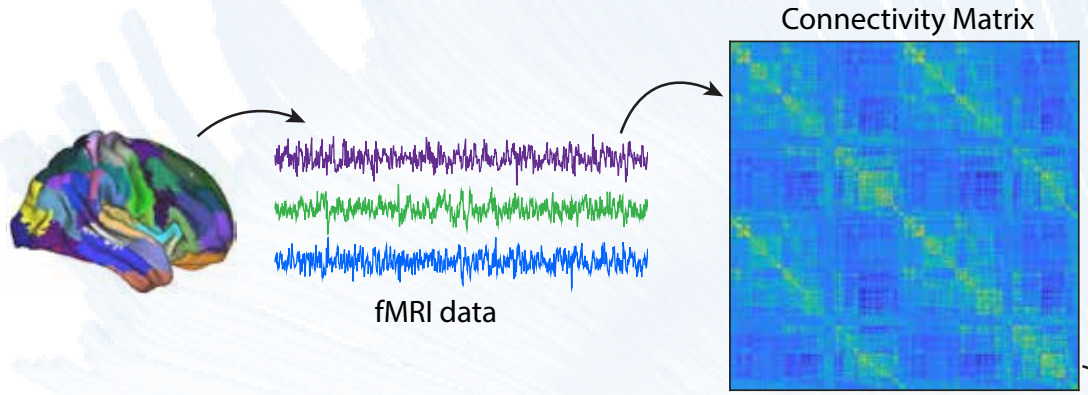
Representing the CNS student body this past year has been both an honour and a privilege. We would like to thank all of the students for their feedback as well as the administration for their constant support and assistance. We look forward to working with everyone again next year!

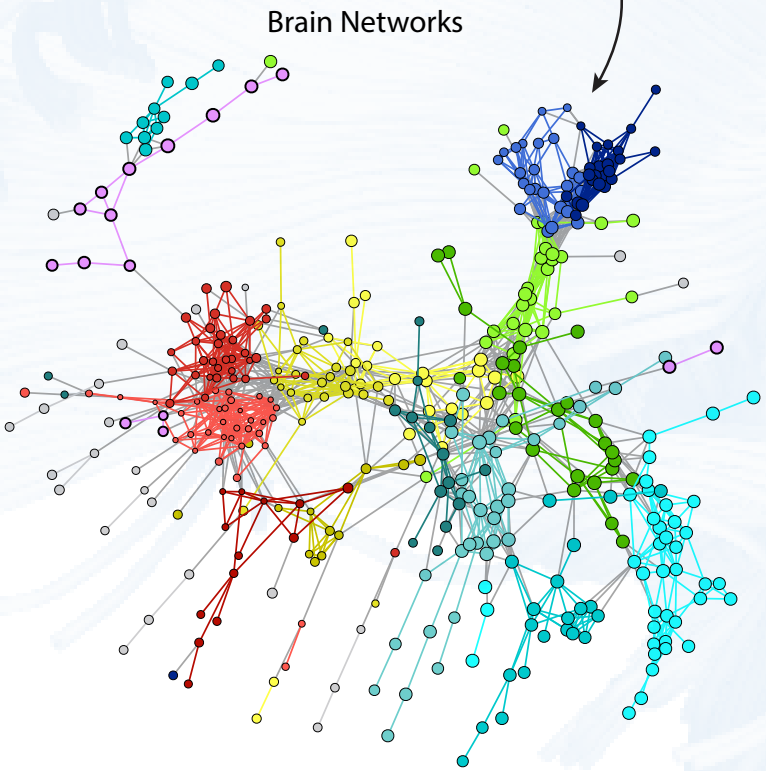
Sincerely,

Ryan Kirkpatrick, Lead
Tasha Jawa, First Year Representative & Secretary
Emils Matiss, Graduate Committee Liaison
Aleksandar Biorac
Naz Kafaei
Dure Khan
Blake Noyes
Karys Peterson-Katz

MRI FACILITY

While this has been a challenging year for all members of the Queen's University community, the MRI Facility was able to continue operations on a limited, and safe, schedule. Through careful planning with the Faculty of Health Sciences and VP Research, we enacted new, COVID-19 specific, SOPs that allowed us to continue ongoing important research and even begin some new and exciting research endeavors. We would like to thank all our MR users for rising to the occasion and supporting our facility.





Whole-brain functional network topology of a single human subject studied on our Prisma 3T MRI scanner. The subject rested in the MRI scanner while we collected functional blood-oxygenation level-dependent data. Their brain was parcellated into individual regions and the average activity from each region was extracted (top left, 3 example regions shown). The functional connectivity (covariance) between every region with every other region can be represented in a whole-brain functional connectivity matrix (top right). Graph theoretic methods were used on this matrix to reveal different functional brain networks and their relations (bottom). In this network graph, each brain region is represented as a node (circle), with a functional connection between them being represented as an edge (line). Nodes are color-coded according to their different brain network assignment."

CNS MRI PILOT TIME COMPETITION

An internal MRI pilot time competition is now held annually for full-time faculty conducting basic, clinical and health services investigations at Queen's University, the Kingston Health Sciences Centre (Kingston General Hospital, Hotel Dieu Hospital), and/or Providence Care. By providing successful applicants with reduced MRI rates, this competition supports the collection of imaging data that will support pilot projects expected to lead to and strengthen applications for external funding agencies.

2020 marked the successful completion of our first round of the competition. The CNS funded 9 successful CNS research endeavors, split between early, mid-, and late career researchers in the CNS. Despite the challenges of this year, much of this research is ongoing or in the planning phases at the facility. We look forward to the next round of the competition and the exciting variety of new research it will bring.

> *"We are excited to promote a much-expanded variety of research at the recently upgraded MR Facility. We anticipate a busy schedule once research resumes at Queen's. Congratulations to all of our successful applicants."*
>
> Dr. Roumen Milev, Director of The Centre for Neuroscience Studies

T2-weighted images of the entire spinal cord and brain, demonstrating the full-body capabilities of our 3T Prisma system (colourized)

Pilot Time Competition Winner Research Profiles

Drs. David Bardana and Allen Champagne

DEPARTMENT OF SURGERY (ORTHOPEDICS)

Using diffusion tensor imaging (DTI) as a novel objective tool to characterize the microstructural integrity of the anterior cruciate ligament (ACL) graft in-vivo post-operative reconstruction.

Dr. Elisa Brietzke

DEPARTMENT OF PSYCHIATRY

Using MR spectroscopy to investigate the potential therapeutic antidepressant effect of the ketogenic diet, as well as their underlying mechanisms, in the treatment of individuals with Major Depressive Disorder (MDD).

Dr. Jason Gallivan

DEPARTMENTS OF BIOMEDICAL AND MOLECULAR SCIENCES & PSYCHOLOGY

Using sophisticated functional neuroimaging approaches to disentangle the brain networks that underlie human motor learning.

Dr. Felicia Iftene

DEPARTMENT OF PSYCHIATRY

Improving outcomes of schizophrenia rehabilitation through the demonstration that neuroimmune, neurotrophic, and gut-microbiome factors underscore therapeutic improvement in Cognitive behavioral therapy for psychosis (CBTp), and accompany neural changes detected with fMRI.

Dr. Doug Munoz and Dr. Juan Fernandez-Ruiz

CENTRE FOR NEUROSCIENCE STUDIES

Exploring the neural bases involved in the voluntary control of eye winking and blinking, and improving their usefulness as a diagnostic biomarker.

Dr. Patrick Stroman

DEPARTMENT OF BIOMEDICAL AND MOLECULAR SCIENCES

Using novel fMRI methods to investigate the neural processes involved specifically with pain processing, in the healthy human brain, brainstem, and spinal cord, by means of functional MRI.

Dr. Anita Tusche

DEPARTMENTS OF PSYCHOLOGY AND ECONOMICS

Using a combination of novel fMRI tasks together with multivariate pattern analyses techniques to examine the psychological and neurobiological mechanisms through which variance in social connectedness might emerge and is sustained.

Dr. Jeff Wammes

PSYCHOLOGY

Shedding light on the complex dynamics driving reorganization in memory through the use of real-time fMRI-based neurofeedback.

Dr. Gavin Winston

NEUROLOGY

Linking neuroimaging with KINARM behavioural assessments to better understand the neurobiology of cognitive dysfunction in epilepsy, revealing biomarkers for future treatment.

NETWORKING INFRASTRUCTURE

The immediate shift to working from home posed challenges for all students, staff, and faculty. User support changed from a single large network to supporting individual home networks. Overnight we went from a high-speed local network connection to less than optimal home connections. Our users took this in stride and quickly adapted to the situation by subscribing to Queen's VPN services and using applications such as Remote Desktop or SSH to continue their research.

Computer security was also an immediate issue that needed to be dealt with. The number of unmanned machines on campus created a serious threat to the security of our systems and networks. We saw a significant rise in cyber-attacks on campus which forced us to make drastic changes to the way our data is accessed. Access to our data, machines, and servers was restricted to the campus VPN. Server data was then further restricted to read only access and write access granted on a as needed basis. This was a proactive measure to help protect us from ransomware type viruses.

Computer desktops, laptops, and server operating systems had a software upgrade as needed. All desktop computers and laptops were brought up to the latest version on Windows 10 or the latest version of MacOS. Server operating systems were upgraded to Ubuntu's latest long term service server edition 20.04. This latest server edition will ensure our systems are updated and patched until April of 2025.

NETWORKING INFRASTRUCTURE INCLUDES:

- 30 IBM, Dell, and Lenovo servers
- 450 terabytes of combined data storage
- 420 cpu cores
- 3 terabytes ram
- 4 Robotic LTO tapes libraries for local and offsite backup
- Hosted in an environmentally and access controlled location

FUNDRAISING AND INDUSTRY RELATIONS

The Fundraising and Industry Relations Committee takes on a leadership role for planning and coordinating strategies that give to our donors the possibility to make the difference in the lives of those living with brain diseases and foster and develop our relations with industry. Our donors' generous gifts support CNS activities in different levels, from infrastructure to the scholarships that make our students development as neuroscientists a reality. The committee also is responsible for establishing and developing CNS relations with industry, fostering initiatives of innovation, technology transfer, and partnerships. This committee is chaired by Dr. Elisa Brietzke MD, PhD, Professor of the Department of Psychiatry, and includes CNS faculty members, students and representatives from Faculty of Health Sciences and Faculty of Arts Science involved in Development and Partnerships. The main actions of the committee for the next few years are strengthening the connection of CNS with its alumni, integrate fundraising activities to the research themes, and build relations with industry that will increment cutting-edge research initiatives under development in our centre.

EQUITY, DIVERSITY, INCLUSION & INDIGENEITY

The EDII Committee was created in the Spring of 2021 to ensure that EDII best practices are implemented and adopted by the Centre for Neuroscience Studies (CNS). Identification of EDII best practices will be informed by the recent and ongoing work of the Dean's Action Table on EDI, in the Faculty of Health Sciences, the Equity office at Queen's, the work and discussions of the CNS Anti-Racism Taskforce, and other external resources as appropriate. Membership of this committee includes representatives of CNS graduate students, post-doctoral fellows, staff and faculty. The committee is co-led by Blake Noyes (Graduate Student Co-Lead) and Vince DePaul PT PhD (Faculty Co-lead). Over the next year, activities of the committee will include engaging with trainee, staff and faculty within CNS to identify EDII strengths and areas of concern regarding current processes, structures and practices. Areas of focus will include, but not limited to, admissions, recruitment and retention, culture, and EDII training opportunities for students, staff and faculty. We look forward to working to ensure that the CNS is an equitable, diverse, inclusive, and accessible research and training centre, where excellence is enhanced by the contributions of all its members.

Contacts: Vince DePaul PT PhD (vincent.depaul@queensu.ca); Blake Noyes (blake.noyes@queensu.ca)

EXECUTIVE EDUCATION PROGRAMS

Executive Education Committee Objectives

1. To translate evidence-based neuroscientific knowledge to relevant sectors of society
2. To develop certificate and graduate diploma programs in Technology and Ethics in Neuroscience.
3. To provide a sustainable revenue generating stream for the Centre for Neuroscience Studies

Progress and Success

"A Neurotech Future: Ethical, Legal and Policy Issues"

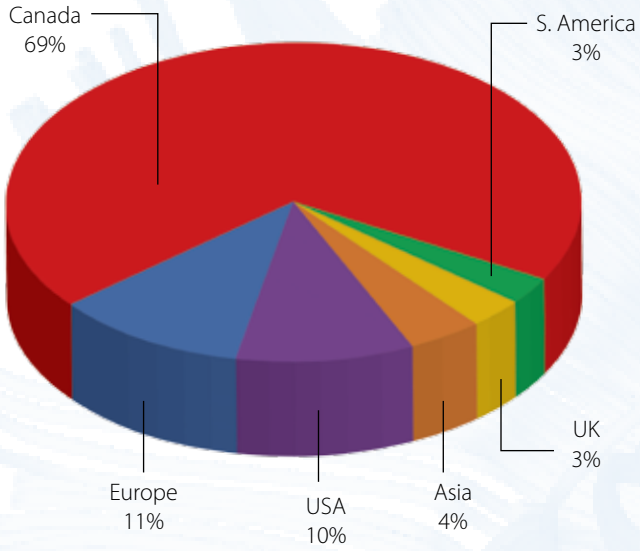
April 22-23, 2021 ZOOM Webinar and Workshops

Organizers: Susan Boehnke (DBMS, CNS) Martha Bailey(Law, CNS) and David Lyon (Surveillance Studies Centre)

Graduate Student Research Assistants: Pauline Gaprielian (CNS), Jonathan Coutinho (CNS), Rohit Revi (Surveillance Studies Centre). Graduate students RAs played a critical role in all aspects of conference planning, execution, and follow-up.

Funded by a SSHRC connection grant, along with additional funding by the Ontario Brain Institute, Faculty of Law, Centre for Neuroscience Studies. The main online conference on April 22 was a great success with 20+ speakers, Neurotech startup company participation, 286 attendees from around the world, and excellent attendee feedback. Videos of the webinar are available on the conference website: http://neuroscience.queensu.ca/neurotechfuture

Attendees (n=286)



Panel 1: Separating Neuroscience Reality from Science Fiction

Gunnar Blohm (CNS), Graeme Moffat (System2 Neuro), Steve Scott (CNS), Ali Etemad (Engineering, CNS), Ron Levy (CNS), Shideh Ameri (Engineering, CNS), Susan Boehnke (CNS).

Workshops

We held 3 well-attended workshops on April 23 to integrate knowledge attained through the conference and consider future educational and research directions related to Neurotech.

Workshop #1 - Training the next generation of Neurotech innovators

- Queen's researchers from Neuroscience and Engineering, Neurotech-related Student Groups on campus, NeurotechX, and several neurotech industry representatives brainstormed potential educational programs that could be developed at Queen's related to neurotechnology.
- In partnership with NeurotechX, we are now seeking funding to support development of a suite of microcredentials for students seeking to enter the neurotech industry.

Workshop #2 - Graduate Neuroethics Training

- With Judy Illes (Head of Neuroethics Canada), representatives from Law, Religion, Philosophy, and the CNS brainstormed curriculum ideas for a graduate level neuroethics course that could be a model for the country.

Workshop #3 - Neurotech & Surveillance Studies Research

- Representatives from the CNS, Surveillance Studies Centre, Psychiatry, and NeurotechX considered potential research collaborations regarding the risk of surveillance, and the increased paranoia regarding surveillance, with the advent of implantable neural devices.

Additional Programs in Development

Neuroscience and Business

In 2019 we partnered with the Smith School of Business Executive Education and Nielsen Neuroscience to create an interactive 2-day program geared at businesspeople to provide a general overview of neuroscience techniques and their use in understanding consumer behavior.

- This program is currently being redeveloped into an online course by the CNS to increase accessibility.

NEUROSCIENCE
LECTURE SERIES

The student-led Seminar Committee works with trainees and faculty to highlight speakers that represent the diverse research interests of our centre.

The series features renowned international and Queen's researchers at the frontiers of basic, clinical, systems and computational neuroscience. The series includes a subsection of talks termed "Growing up in Science" geared towards trainees which creates a dialogue about the personal challenges related to becoming a successful scientist. The series also demonstrates leadership and social progress in neuroscience by shining a spotlight on issues such as women's advancement in science and engineering and the open science movement.

LIST OF SPEAKERS FOR 2020/2021

June 17, 2020
DR. DOUGLAS MUNOZ
Academic Talk: Identification of biomarkers of disease using video-based eye tracking
Department of Biomedical and Molecular Science, Centre for Neuroscience Studies, Queen's University

June 24, 2020
DR. DANIELA SCHILLER
Academic Talk: On the representation and modification of affective memories
Department of Psychiatry & Neuroscience, Friedman Brain Institute, Icahn School of Medicine at Mt. Sinai.

July 22, 2020
DR. STEVE SCOTT
Growing Up in Science Talk
Department of Biomedical and Molecular Science, Centre for Neuroscience Studies, Queen's University

August 09, 2020
DR. MICHELE MORNINGSTAR
Academic Talk: The Development of Socio-Emotional Communication in Adolescence
Department of Psychology, Queen's University

August 12, 2020
DR. JEFFREY WAMMES
Academic Talk: Reorganizing memory through representational change
Department of Psychology, Queen's University

September 02, 2020
DR. JANE PHILPOTT
Growing Up in Science Talk
Dean of the Faculty of Health Sciences, Queen's University

September 30, 2020
DR. ROBERT J. ZATORRE
Academic Talk: Why do we love music? A view from cognitive neuroscience
Department of Psychology, Montreal Neurological Institute, McGill University

October 07, 2020
DR. BEVERLEY ORSER
Academic Talk: Cognitive deficits after anesthesia and surgery: new strategies for an old problem
Sunnybrook Research Institute

October 21, 2020
DR. INGRID JOHNSRUDE
Growing Up in Science Talk
The University of Western Ontario

October 28, 2020
DR. MIHAELA IORDANOVA
Academic Talk: Behavioural and neural mechanisms of secondary fear cues
Department of Psychology, Concordia University

November 18, 2020
DR. LYNN RAYMOND
Academic Talk: NMDA receptors in prodromal Huntington disease: Striatal and cortical synaptic/circuit changes
Department of Psychiatry, University of British Columbia

November 25, 2020
DR. JULIEN DOYON
Academic Talk: Neural Substrate Mediating Motor Sequence Learning and Consolidation
Department of Neurology and Neurosurgery, McGill University

December 02, 2020
DR. MACKENZIE MATHIS
Academic Talk: Using mice and machine learning to understand cortical contributions to forelimb motor adaptation
Brain Mind Institute, Center for Neuroprosthetics, and Center for Intelligent Systems at EPFL

December 09, 2020
DR. CARSEN STRINGER
Academic Talk: High precision coding in visual cortex
Janelia Research Campus, Howard Hughes Medical Institute

January 13, 2021
DR. PAUL CISEK
Academic Talk: The neural mechanisms of real-time decisions
Department of Neuroscience, University of Montreal

January 20, 2021
DR. ATHENA AKRAMI
Academic Talk: Sensory priors in working memory and perceptual decision making tasks
Sainsbury Welcome Centre, University College London

January 27, 2021
DR. JOANNE MCLAURI
Academic Talk: Mechanistic insights into Cognitive Reserve in a rat model of Alzheimer's Disease
Department of laboratory medicine and pathobiology, University of Toronto; Sunnybrook Research Institute

February 10, 2021
DR. ANURAG TANDON
Academic Talk: Preclinical Gene Therapy for Synucleinopathies
Department of Medicine, Division of Neurology, Institute of Medical Sciences, University of Toronto

February 24, 2021
DR. FRÉDÉRIC CREVECOEUR
Academic Talk: Adaptive feedback control in human reaching movements: computations and behaviour
Université Catholique de Louvain, Department of Mathematical Engineering

March 03, 2021
DR. RANDY FLANAGAN
Academic Talk: Representing the world we act on
Department of Psychology, Queen's University

March 10, 2021
DR. JEFFREY MOGIL
Academic Talk: Mistakes Were Made: How to Fix Preclinical (Pain) Research
Alan Edwards Centre for Research on Pain, McGill University

March 17, 2021
DR. SHERNAZ BAMJI
Academic Talk: Regulation of Synapse Formation and Plasticity by Palmitoylating Enzymes
Department of Cellular and Physiological Sciences, University of British Columbia

March 24, 2021
DR. SAMUEL DAVID
Academic Talk: Pumping iron: iron accumulation in neurological disorders and its role in neurodegeneration
Department if Neurology and Neurosurgery, McGill University Health Centre

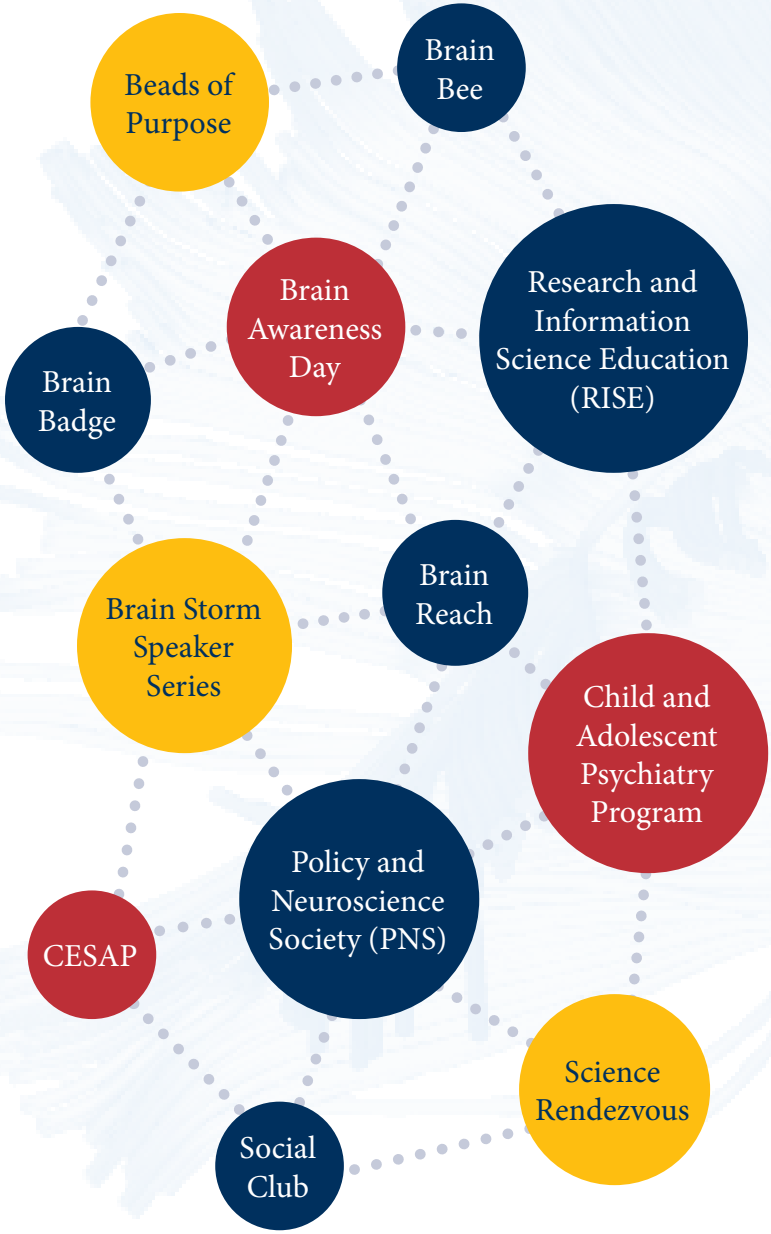
March 31, 2021
DR. JILL ATKINSON
Growing Up in Science Talk
Associate Dean (Teaching and Learning) of the Faculty of Arts and Sciences, Queen's University

April 07, 2021
DR. MICHAEL HALLQUIST
Academic Talk: Contributions of the hippocampus and dorsal attention network to resolving the explore-exploit dilemma
Department of Psychology and Neuroscience, The University of North Carolina

April 14, 2021
DR. CARMELA TARTAGLIA
Academic Talk: Precision in neurodegenerative disease
Tanz Centre for Research in Neurodegenerative Diseases, University of Toronto

April 21, 2021
DR. JORN DIEDRICHSEN
Academic Talk: Too big to ignore: Exploring the role of the human cerebellum across functional domains
University of Western Ontario

April 28, 2021
DR. NATALIE RASGON
Academic Talk: Epigenetic Modulators of Insulin Resistance in Depression and Cognitive Aging
Stanford University Medical Center, Emerita



NEUROSCIENCE
OUTREACH PROGRAM

The Neuroscience Outreach Program (NOP) in the Centre for Neuroscience Studies (CNS) is a nationally acclaimed outreach program aimed at improving the Kingston community's understanding and awareness of neuroscience. NOP was formed by students looking for a way in which to interact with each other, the department, and the Kingston community in a socially purposeful manner. All of our outreach programs are student-led and student-driven and designed to engage both researchers and the community. Currently, NOP offers twelve unique programs. Whether students wish to participate in a public lecture series, perform hands-on experiments with children and youth, or provide companionship to seniors in the community through arts and crafts, there is an outreach program for everyone. The CNS and the Student Leadership Committee are also happy to help with the creation of new outreach programs to ensure that each of our graduate students is able to get involved in a personally meaningful and impactful way.

**Please note due to COVID-19 restrictions, some of these programs were limited.*

PROGRAMS

Beads of Purpose

Beads of Purpose (BOP) is a social enterprise that aims to aid adults with developmental delays to develop skills that will guide their involvement in employment rolls. The objective was to develop a team of volunteers and participants to create and sell homemade bracelets.

Brain Awareness Day

Every May, the Centre for Neuroscience Studies plays host to approximately 250 grade 5 students from local elementary schools. The students enjoy a daylong event where they are engaged in demonstrations, activities, and hands-on experiments to teach them all about neuroscience research.

Brain Badge

Teaching young children all about the brain is extremely rewarding! The Brain Badge program is a workshop for Sparks, Scouts, Brownies, Beavers, and Cubs (age 2-15 years old) in the Kingston and greater Kingston area.

Brain Bee

The Brain Bee is a three-tiered, world-renowned competition for future neuroscientists. The Centre for Neuroscience Studies has hosted the Kingston Brain Bee for the past eleven years. This competition for high school students aims to inspire an interest in neuroscience and brain research, as well as provides students with an enrichment opportunity to learn about concepts not typically taught until the third year of university or beyond.

Brain Reach

Brain Reach is a graduate student initiative created to stimulate learning and curiosity-driven education. Once a month, dedicated volunteers from Queen's University will go to the classroom to lead sessions on different aspects of the brain's mysterious machinery.

Brain Storm Speaker Series

Each month from January through June students from Queen's Centre for Neuroscience Studies talk about their research. These series are hosted in collaboration with the Kingston Frontenac Public Library.

CESAP

The Concussion Education Safety and Awareness Program (CESAP) is an outreach initiative led by Queen's students from the Faculties of Medicine and Neurosciences. Our goal is to provide concussion education sessions in accordance with Rowan's Law to high school students and young athletes in the Kingston area.

Child and Adolescent Psychiatry Program

The Child & Adolescent Psychiatry Program currently consists of graduate students from the Centre for Neuroscience Studies who visit the child and adolescent inpatient unit at Kingston General Hospital. The goal of our program is to encourage health and well-being, so we often focus on activities that are relaxing or beneficial to mental health.

PROGRAMS

Policy and Neuroscience Society (PNS)

The Policy and Neuroscience Society is a group of graduate students providing public science communication and advocating for evidence based public policy. Our goal is to improve public scientific literacy by developing clear and accessible resources.

Research and Information Science Education (RISE)

RISE is a diverse group of student volunteers working towards the common goal of providing critical thinking and science education to children grades 6-8. The volunteers are classroom educators who go into classrooms to provide education sessions on science and research skills. The volunteers have bi-weekly meetings, and each educator does 4 classroom sessions.

Science Rendezvous

Science Rendezvous is a national family-oriented event that showcases the scientific research taking place across Canada hosted by the Faculty of Education at Queen's University. The event is free to the public and families can come to learn about research in science, technology, and engineering, talk to scientists about their work, and take part in fun experiments and activities.

Social Club

The Social Club is a unique program where volunteers come together to give back to the Kingston Community by engaging patients and residents at long-term care facilities (Providence Care Kingston) with various crafts and activities.

centre for neuroscience studies
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