

DJAVAD MOWAFAGHIAN CENTRE FOR BRAIN HEALTH

ADVANCING BRAIN HEALTH THROUGH RESEARCH AND CARE

YEAR IN REVIEW 2016/2017



A YEAR OF

growth &  
possibility



A MESSAGE FROM

**DR. BRIAN MACVICAR AND DR. JON STOESSL,**

CO-DIRECTORS OF THE DJAVAD MOWAFAGHIAN CENTRE FOR BRAIN HEALTH

We are celebrating not only the third year of the Djavad Mowafaghian Centre for Brain Health—2017 also marks the 20th anniversary since the Brain Research Centre was formed at the University of British Columbia. Our third year has grown upon this rich tradition of excellence with new and ground-breaking discoveries in brain research and treatment of brain disorders.

Our members' creativity, imagination and drive have distinguished the centre's third year. Collectively, our members received more than \$30 million in funding to support ongoing research initiatives. We are also impressed by new technologies developed in the centre, including Dr. Teresa Liu-Ambrose's Walk10Blocks mobile application and Dr. Martin McKeown's cognition-testing tablet games for Parkinson's patients.

Another highlight from the past year has included welcoming five new laboratories from the UBC Department of Psychology to the centre—each promising to bring unique insights to the centre's research and community engagement. We look forward to seeing even more opportunities for knowledge exchange and collaboration through these new additions.

We are proud that the Djavad Mowafaghian Centre for Brain Health is the home and opportunity for these game-changing projects and technologies, and innovative ways to improve patient care. And we are grateful for our community, including the donors whose support is dramatically changing the lives of families impacted by devastating illnesses. Once again, we thank you.

A handwritten signature in blue ink, appearing to read 'B MacVicar', with a long horizontal flourish extending to the right.

Dr. Brian MacVicar

A handwritten signature in blue ink, appearing to read 'A J Stoessl', with a long horizontal flourish extending to the right.

Dr. Jon Stoessl

# CENTRE OVERVIEW

In 2011, the University of British Columbia (UBC) made brain research its top health priority through the investment of substantial resources to build the Djavad Mowafaghian Centre for Brain Health (DMCBH). Opened in 2014, the original seed funding for this facility was a \$20M LEF CFI grant awarded in 2006. In addition to substantial infrastructure, DMCBH is supported by a strong faculty including a Canada Excellence Research Chair, 29 Canada Research Chairs, 14 endowed chairs and 7 donor-funded professorships.

The DMCBH facility is unique in Canada in that it integrates neurological and psychiatric patient clinics with clinical research teams under the same umbrella and space as the basic neuroscience research labs. Further, the DMCBH is currently installing a CFI-funded Human Brain Imaging Centre with a 3T MRI, neuroelectrophysiology lab and high throughput computing centre (\$6M) together with a state-of-the-art preclinical discovery unit (PDU, \$7M) for drug screening, preclinical testing and associated animal behaviour testing.



Dr. Kiran Soma



Dr. Liisa Galea



Dr. Jason Snyder



Dr. Stan Floresco



## A YEAR OF GROWTH

This past year the Djavad Mowafaghian Centre for Brain Health saw its remarkable growth continue and welcomed five new labs into the building. By bringing together experts from disciplines previously housed across campus and providing them with the opportunity to work in close proximity with one another, the centre is enabling unique and promising opportunities for breakthroughs and collaboration.

Researchers who have moved their labs to the Djavad Mowafaghian Centre for Brain Health include:

- **Dr. Catharine Winstanley**, who is working to better understand vulnerability to addiction disorders, particularly drug addiction and gambling disorders, with the aim of developing better therapeutics.
- **Dr. Kiran Soma**, whose research focuses on how hormones affect the brain, behaviour, and immune system.
- **Dr. Liisa Galea**, who is studying how sex hormones influence brain health and disease in women and men.
- **Dr. Jason Snyder**, who is researching the process by which new neurons grow inside the adult brain.
- **Dr. Stan Floresco**, whose research is helping determine how the brain solves certain types of problems, with a focus on brain dysfunction associated with psychiatric illness, including schizophrenia, depression, and addiction.

“We are always really keen to collaborate with clinical groups,” says Dr. Winstanley. “That’s one of the main reasons that the Djavad Mowafaghian Centre for Brain Health is such an exciting environment for me and my team.”



Dr. Catharine Winstanley

Dr. Janet F. Werker



Dr. Carles Vilariño-Güell



THE DJAVAD MOWAFAGHIAN CENTRE FOR BRAIN HEALTH IN NUMBERS

**6** Working Clinics **150** Active Researchers **1** Canada Excellence Research Chair **29** Canada Research Chairs **14** Endowed Research Chairs **7** Donor-Funded Professorships **\$30** Million Received in Brain-Research Funding **110** Enthusiastic Students

HOW BABIES LEARN LANGUAGES

The Djavad Mowafaghian Centre for Brain Health has become an internationally recognized hub for pioneering discoveries in developmental psychology. Under the leadership of Dr. Janet Werker, Professor of Psychology and Canada Research Chair in Psychology, researchers are striving to better understand the foundations of language learning in early infancy. Dr. Werker’s exciting discoveries point to new understandings of how babies learn languages that includes sounds, talking and other expressions of culture found in the home.

“I have been fascinated by language throughout my career, and have always wanted to understand how infants so rapidly acquire this incredibly complex system. Living in Canada, a country where many languages are spoken, and in Vancouver—where the majority of children now grow up with at least two languages in the home—made me want to understand whether and how language acquisition unfolds in a bilingual home.” - Dr. Janet F. Werker

A BREAKTHROUGH IN UNDERSTANDING MULTIPLE SCLEROSIS

Dr. Carles Vilariño-Güell, Assistant Professor of Medical Genetics and Canada Research Chair in Molecular Characterization of Neurological Diseases, and his team at the Djavad Mowafaghian Centre for Brain Health have proven that multiple sclerosis (MS)—a disease that disrupts communication between the brain and other parts of the body—can be caused by a single genetic mutation. Using state-of-the-art gene sequencing technology at the Djavad Mowafaghian Centre for Brain Health, researchers discovered this mutation in two families that had several members diagnosed with a rapidly progressive type of MS. This ground-breaking discovery erases any doubt that at least some forms of MS are inherited and suggests that people with a history of MS in their family should be checked long before symptoms appear. Results of this study have garnered international attention for the work being done in the Djavad Mowafaghian Centre for Brain Health.

## RECOGNIZING HIGH-QUALITY HEALTH INFORMATION ONLINE

Although Alzheimer disease is the most common form of dementia, there is still much uncertainty about what causes it and how to protect people from it. A common practice for many is to turn to the internet for health information. At the Djavad Mowafaghian Centre for Brain Health, Dr. Julie Robillard, Assistant Professor of Neurology, and her colleagues have developed QUEST, a simple six-question test that anyone can use to recognize high-quality information online. Her work is ensuring that older adults have access to the right information to support their health decision-making and that new technological innovations for the screening, diagnosis and treatment of dementia meet the highest ethical standards.

## BETTER CARE FOR THOSE WHO SUFFER FROM HUNTINGTON DISEASE

Since its opening, the Djavad Mowafaghian Centre for Brain Health has been home to the Centre for Huntington Disease, a unique clinic led by Dr. Lynn Raymond, Professor of Psychiatry. Dr. Raymond and her team are providing comprehensive care and support for individuals and their families affected by Huntington Disease, a brain disorder that causes uncontrolled movements, emotional problems and loss of thinking ability. Recently, Dr. Raymond helped spearhead a global research project examining the role of brain receptors in Huntington Disease, which could lead to better care for those who suffer from this illness.

## ENHANCING RECOVERY FROM STROKE, MS AND SPINAL CORD INJURIES

Dr. Lara Boyd, Associate Professor of Physical Therapy, Canada Research Chair in Neurobiology of Motor Learning and Director of the Brain Behaviour Lab in the Djavad Mowafaghian Centre for Brain Health, is working to understand changes in the brain to help thousands of people recover from stroke, MS and spinal cord injuries. Dr. Boyd's work is significant as it suggests that those who struggle with physical therapy during recovery from stroke, MS or spinal cord injuries may be improving how their brains function, which could vastly advance their long-term recuperation.



Dr. Julie Robillard



Dr. Lynn Raymond

# AN EXCITING HUB OF LEARNING FOR THE COMMUNITY

This past year, the Djavad Mowafaghian Centre for Brain Health maintained its strong commitment to communities—both locally and around the world. The centre served as a vital hub for brain health by serving thousands of patients, hosting special events and providing individuals with innovative tools to improve their health.

## CLINIC UPDATES: HELPING PATIENTS AND ADVANCING RESEARCH

In 2016 the clinics within the Djavad Mowafaghian Centre for Brain Health continued to provide patients with world-class healthcare and to enable scientists to make key advancements in brain health research. Highlights from this past year included:

- **The Canadian Longitudinal Study on Aging (CLSA)**, the most comprehensive study of aging in Canada, is identifying ways to improve health by better understanding the aging process. This massive project has recruited 50,000 participants across Canada, and the Djavad Mowafaghian Centre for Brain Health acts as the CLSA's home base in Vancouver. Last year marked an exciting milestone, as CLSA researchers followed up with more than 3,000 Metro Vancouver study participants. This essential work has helped researchers better understand the many complex factors that affect aging.
- **The Borgland Family Brain Tissue and DNA Bank**, a centralized resource for the collection, storage, and distribution of blood and tissue for research, is now operational at the Djavad Mowafaghian Centre for Brain Health. The biobank has been actively collecting samples from patients in the Movement Disorders Clinic and from Parkinson's patients throughout the centre. Later this year, the biobank will begin collecting specimens from patients in the MS and Alzheimer's clinics.
- **Dr. Haakon Nygaard** has been appointed to the role of Medical Manager of the Clinic for Alzheimer Disease and Related Disorders in the Djavad Mowafaghian Centre for Brain Health. The clinic remains the only facility of its kind in British Columbia, and provides assessment and support for more than 3,500 patients and their families each year. According to Dr. Nygaard, who joined the centre as a clinician-scientist in 2014, "It is a very exciting time to be involved in dementia research, with many novel therapeutic approaches being developed. The hope is that through close collaboration, more discoveries will reach our clinic, eventually benefiting the tens of thousands of patients in BC suffering from dementia."





## LELAINIA LLOYD: NMO OUTREACH “SAVED MY LIFE”

The Djavad Mowafaghian Centre for Brain Health often holds “patient days” to provide updates on its members’ latest research. For Lelainia Lloyd, stumbling upon a neuromyelitis optica (NMO) patient information day saved her life.

As she heard other NMO patients share their stories, she realized that she may have been misdiagnosed with MS. She quickly booked an appointment at the centre’s NMO Clinic and learned she had NMO—not MS—all along. Her doctor, Dr. Anthony Traboulsee, said she was lucky to still be alive.

With only 200 patients living with NMO in BC, many physicians have never heard of the disease—which explains why some people are misdiagnosed. The NMO Clinic and Research Program is working to change that. As Canada’s only program focused on NMO, it is a vital resource for families impacted by this devastating disease.

Lelainia knows the NMO Clinic and Research Program will continue to save lives. “Finding other people who know about this disease is like hitting a gold mine,” Lelainia says. “We’re lucky to have this centre of excellence at the Djavad Mowafaghian Centre for Brain Health.”

## LAETITIA SUMSION: MAKING PLANS FOR THE FUTURE

In May 2009, Laetitia Sumsion was diagnosed with relapsing-remitting MS—a disease that causes patients to have recurring relapses affecting their central nervous system. Newly married, thinking about the future was nearly impossible for Laetitia and her husband. “I couldn’t make plans because I didn’t know what life was going to be like in three months,” she says.

Dr. Anthony Traboulsee, Laetitia’s doctor at the Djavad Mowafaghian Centre for Brain Health, recommended she try the MS drug alemtuzumab. She hasn’t had a relapse since her first treatment in June 2012.

Life on alemtuzumab hasn’t always been smooth sailing for Laetitia. In 2016, she had to have a thyroidectomy after experiencing thyroid-related side-effects from the drug. Despite this, Laetitia says she would still do it all over again. After all, she says the stability afforded by taking the drug allowed her to have her son. Her mobility is as good as it was before her diagnosis, letting her hike, canoe and chase her dog and young son around her home—a life that was hard to imagine five years ago.

As a hub for scientific knowledge-sharing, the centre has hosted events where Laetitia has spoken about her alemtuzumab experience to experts from across Canada. Laetitia hopes that by sharing her story, she can give a face to the disease, and show the real impact medication can have. “I’m able to make plans for tomorrow,” Laetitia says. “It’s a great feeling.”

## HOSTING COMMUNITY EVENTS

The Djavad Mowafaghian Centre for Brain Health is a vibrant and visible part of communities throughout the Lower Mainland, due in large part to its many partnerships aimed at raising public awareness of brain research.

### **Greg Dunn: Art Meets Neuroscience**

The Djavad Mowafaghian Centre for Brain Health hosted a highly engaging public talk with Dr. Greg Dunn, a neuroscientist turned artist. The talk, attended by a diverse crowd that included researchers, students, and members of the public, focused on Dr. Dunn's revolutionary micro-etching of the human brain. His micro-etching is the world's most complex and detailed artistic piece of the brain and has inspired scientists and artists alike.

### **2016 Canadian Alzheimer's Disease Basic Research Symposium**

In October 2016, the Djavad Mowafaghian Centre for Brain Health hosted the Canadian Alzheimer's Disease Research Symposium. The event brought together many of Canada's leading brain research specialists for a weekend focused on finding a cure for Alzheimer's disease and related dementias. Researchers were given the opportunity to share their latest discoveries and breakthroughs in imaging and biomedical research, and the symposium provided a unique forum to stimulate important dialogue.

### **Engaging Children**

Over the past year, the Djavad Mowafaghian Centre for Brain Health hosted school groups from throughout the Lower Mainland at the request of educators and students. Key visits from 2016 included:

- Students from Lord Nelson Elementary school toured the new Borgland Family Brain Tissue and DNA Bank and learned about the inner workings of the brain from Dr. Lara Boyd, Dr. Brian MacVicar and Dr. Haakon Nygaard.
- A group of Grade 11 and 12 students from Southridge School visited several labs at the centre as part of their annual Leadership Experience Week.
- Students from UBC Continuing Studies' Future Leaders program attended a talk, hosted by Dr. Julie Robillard, Dr. Teresa Liu-Ambrose and Dr. Haakon Nygaard, about research happening in the centre.
- An enthusiastic group of high school students competing in the Canadian Open Mathematics Challenge visited Dr. Kurt Haas' lab for a presentation about watching brain circuits grow.
- Several students interested in careers in medicine attended an informative seminar hosted by several students on the Graduate Program in Neuroscience. The majority of those in attendance noted that the seminar increased their interest in medicine and hope to one day begin their careers in neuroscience and related fields.

Dr. Helen Tremlett



Dr. Ann Marie Craig



Dr. Teresa Liu-Ambrose





### **Public Outreach**

In 2016, researchers from the Djavad Mowafaghian Centre for Brain Health embarked on numerous outreach initiatives to engage the public. Highlights included:

- The Neural Constellations event at the planetarium, a public debate and discussion on neurodiversity with the UBC Debate Society.
- The Brain Health Fair, a free, one-day public event hosted in Vancouver this past year as part of the American Academy of Neurology annual meeting. Speakers included Drs Naznin Virji-Babul and Haakon Nygaard, and “Ask a Neurologist” booths featuring Dr. Jon Stoessl and clinicians at the Clinic for Alzheimer Disease and Related Disorders.
- Science World’s Meet a Scientist program, which helped to promote brain health and the importance of neuroscience research.
- The second annual movie screening and panel discussion featuring “Capturing Grace,” a documentary about Parkinson’s disease.

### **Neuroscience Extravaganza**

The Neuroscience Extravaganza, an annual poster event and competition for neuroscience trainees and postdoctoral fellows, returned to the Djavad Mowafaghian Centre for Brain Health in 2016. The fun-filled event of friendly competition was well-attended by many faculty, postdoctoral researchers and graduate students. The success of the event spoke to the commitment of the centre’s researchers and the enthusiasm of its students.

### **NMO Information Day**

The third annual Neuromyelitis Optica (NMO) Information Day took place at the Djavad Mowafaghian Centre for Brain Health in November 2016. NMO can often lead to loss of vision and spinal cord function for the thousands who suffer from this disease. The centre’s free public information day about NMO provided patients, family members, friends, caregivers and students with important information about diagnosis, symptoms and treatment options.



## BUILDING GLOBAL PARTNERSHIPS

The Djavad Mowafaghian Centre for Brain Health is strengthening research excellence by connecting leading researchers across the globe. This past year, two prominent projects benefitted from cross-border collaboration, enhancing the centre's reputation as a global leader in brain research.

### **Understanding Autism: A Collaboration Between Canada And Japan**

To better understand autism—a complex condition that affects families around the world—Dr. Ann Marie Craig, Dr. Yu Tian Wang and Dr. Tim Murphy from UBC have partnered with Dr. Tohru Yamamoto at Kagawa University in Japan. Working together, the team discovered that there may not be a one-size-fits all approach to treatment for symptoms of autism spectrum disorders, and potential therapies may need to be tailored to an individual's genome.

### **Helping Children Living with MS**

Dr. Helen Tremlett, Associate Professor of Neurology and Canada Research Chair in Neuroepidemiology and Multiple Sclerosis at the Djavad Mowafaghian Centre for Brain Health, is working in partnership with Dr. Emmanuelle Waubant from the University of California, San Francisco, to investigate the links between the types of bacteria found in the stomach and diseases like MS. Their exciting research is providing valuable insight into the possible causes of MS, with a view to identifying therapies to improve the health and wellness of children living with this condition.

## TECH SOLUTIONS: MOBILE APP PUTS PARKINSON'S DISEASE MONITORING IN PATIENTS' HANDS

Diseases of the brain are different from other diseases in that there just isn't the technology to monitor patients and paint a holistic picture of the way that symptoms differ over the course of a day, a week, or the months between clinic visits the way there is for diseases of the cardiovascular or respiratory systems.

In the Movement Disorders Clinic at the Djavad Mowafaghian Centre for Brain Health, neurologists and researchers are working on closing the technology gap to put quantitative assessment in patients' hands. The clinic, along with the Pacific Parkinson's Research Centre, has partnered with game designers at Conquer Mobile to develop a new app designed to engage patients through a series of short games.

"A typical appointment in the Movement Disorders Clinic lasts about an hour," explains Dr. Martin McKeown, neurologist and Director of the Pacific Parkinson's Research Centre. "That's not long enough for us to get a complete sense of how a person is doing throughout the day. It's also a place where people are outside their element - we're not getting people at their most relaxed, at their most comfortable."

In order to capture a better view of how a patient is responding to treatment and medication schedules, patients play games on their iPad or iPhone that test various measures of cognition.

Between appointments and from the comfort of their homes, patients will be able to play the games and their results will be tracked over time. Ultimately, the hope is that the results can be linked with individuals' clinic charts, so that at each appointment physicians can see how well medication and other treatments are working to manage disease progression and symptoms.

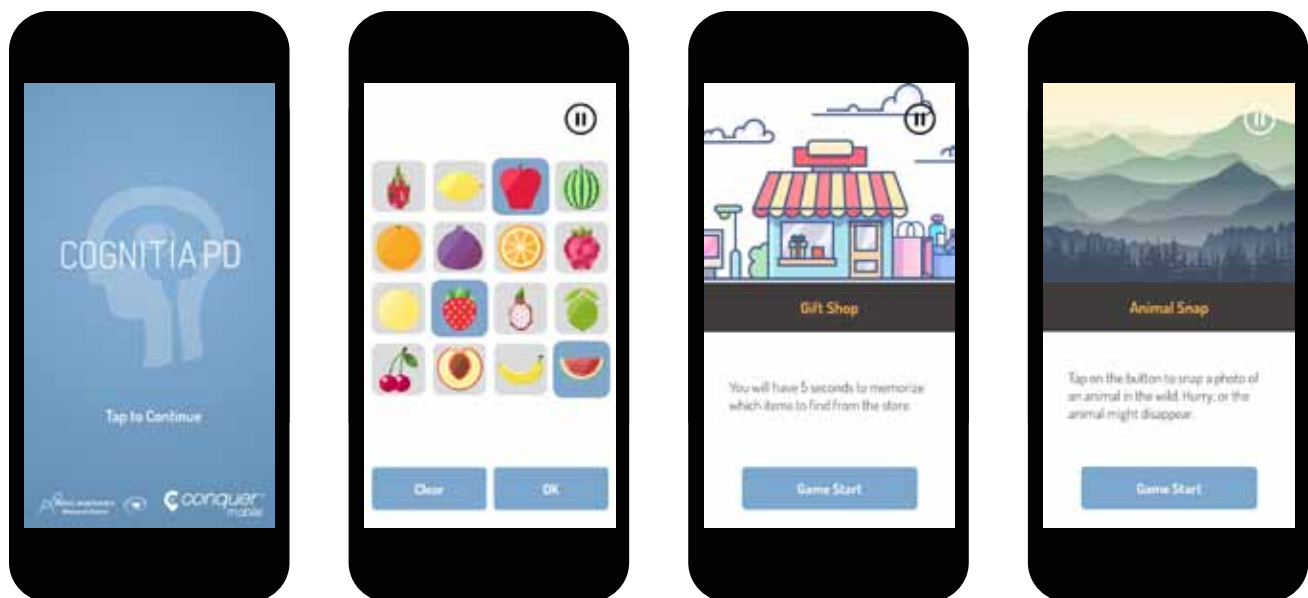
"It will provide a much clearer picture of how people are coping with the disease on a day-to-day basis," says Dr. McKeown. "The information we collect from these games will help us tailor treatment to individuals and provide better, more personalized care."

In addition to Movement Disorders clinic patients, the app will be available more generally. The results are anonymized, and people with Parkinson disease will be able to play the games and record their performance over time to share with their own physicians. Data recorded by this anonymized group will provide benchmarking data to compare with patient results and improve the game's usefulness over time.

Dr. McKeown and colleagues recently piloted an early version of the app at the 2016 World Parkinson Congress.

"We wanted to get feedback from patients, and to test their experience using the app in order to make sure we were on the right track," says Dr. McKeown. "What's unique about this app is that it's been designed entirely with people with Parkinson disease in mind by our own physicians and researchers. We relied on the expertise of people on the front lines of this disease."

To receive more information about the app, including how you can get notified once it is available from the App Store, visit [cognitiapd.com](http://cognitiapd.com).





# PREPARING OUR FUTURE LEADERS

This past year, the University surveyed alumni of the Graduate Program in Neuroscience and found that of those respondents who had completed a PhD, 95 per cent were employed in their field of interest and 30 per cent had academic roles.

Our graduates go on to pursue careers in academia, medicine, and industry, and the research training we provide positions them to take advantage of opportunities to explore and innovate in whatever they pursue. Our rate of success speaks to the quality of the training provided by our faculty and the supportive environment the neuroscience community at the University of British Columbia—and its hub, the Djavad Mowafaghian Centre for Brain Health—provides. We truly attract and retain the best and brightest students from across Canada and around the world, and our graduates go on to make a difference in the lives of those with injuries and disorders of the brain and their families.

The interdisciplinary approach of DMCBH empowers our students to seek bridges between basic science and clinical care. Our program is like no other, and we are training the future of neuroscience to be collaborative, inquisitive, and unrelenting in the pursuit of better brain health. We are immensely proud of the work they do here, and of what they will go on to achieve.

**Dr. Tim O'Connor, Director, Graduate Program in Neuroscience**  
at the Djavad Mowafaghian Centre for Brain Health

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## HIGHLIGHTS FROM THE GRADUATE PROGRAM IN NEUROSCIENCE

**110** students currently enrolled, including **70** master's and **40** PhD students. **33** per cent of students in the Program are international students. **70** per cent of students are supported by scholarship funding. The Faculty of Graduate Studies provides approximately **\$125,000** per year in the form of entrance scholarships and tuition awards for students accepted into the program.

## TANYA FENG

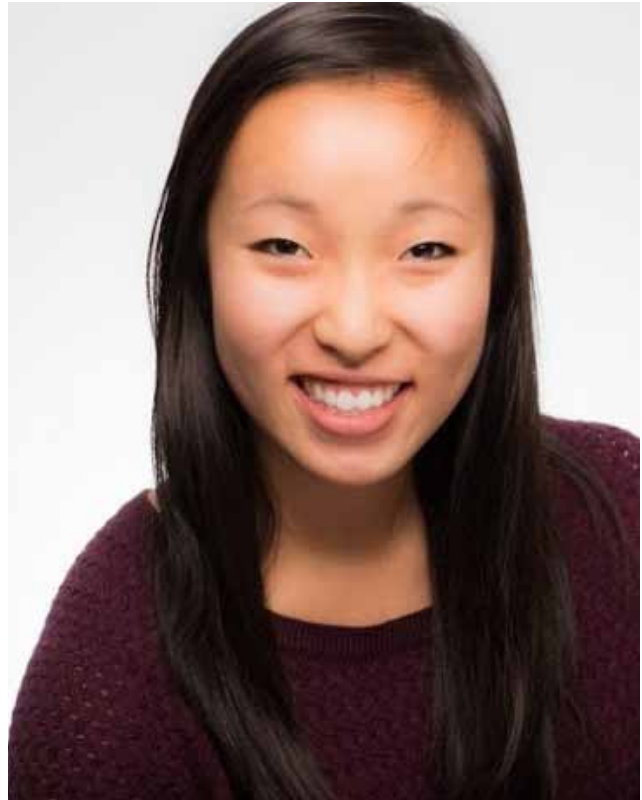
Tanya Feng is working toward an undergraduate degree in behavioural neuroscience, and her interest in the brain brought her to the Djavah Mowafaghian Centre for Brain Health (DMCBH) to work with Dr. Julie Robillard, a researcher with the National Core for Neuroethics, to better understand the relationship between neurodegenerative diseases, like Alzheimer disease, and the emerging technologies that will impact people with those conditions and their families.

“One of the exciting things about the research that I do with Dr. Robillard is that it parallels new scientific and medical advancements in real-time,” explains Feng.

“As our understanding of the brain is rapidly evolving and novel treatments for neurological conditions are being developed, there will undoubtedly be many new innovations that will warrant ethical investigation.”

It is from the intersection of ethics and neuroscience research that Tanya is looking toward her future, with a keen sense of the role of patients in improving research outcomes. This past year, Feng co-authored a paper with Dr. Robillard that looked at the types and quality of information about Alzheimer disease that people are looking for online.

“I believe it is crucial that clinicians and researchers alike understand what kind of information people are accessing, as this may have a potentially large impact on their health,” says Feng. “Understanding patients’ concerns and engaging them in clinical research is going to bridge the gap between researchers and patients.”



“In my lab, we are interested in evaluating and developing novel technologies for dementia, and so students like Tanya have opportunities to interact with researchers from a wide range of disciplines, but also technology developers, clinicians, members of the patient community, and members of the public,” says Dr. Robillard. “An immersive experience in multidisciplinary research can be extremely helpful when you are in the process of discovering what you’re passionate about and planning how to orient your career.”

Her time with Dr. Robillard has left a lasting impression, and Feng believes it was a pivotal time in her education. As she nears completion of her undergraduate degree, she’s considering a career in medicine.

“I hope I can work with patients and be able to integrate research into patient care,” says Feng. “Working with Dr. Robillard and immersing myself in research have catalyzed my passion. I’m looking forward to what comes next.”

## ALEX MCGIRR

Alex McGirr's work examines patients with mood disorders and animal models of depression in order to improve patient interventions. As he settles into research and clinical roles at the Djavad Mowafaghian Centre for Brain Health, he looks forward to building a career in translational medicine with mood disorders in mind. McGirr, who was recently awarded a Vanier Scholarship from the Canadian Institutes of Health Research, has a little more than a year left in his clinical residency in Psychiatry; he is also in the process of completing his PhD in Neuroscience.

"My main goal is to improve the quality of life of patients with mood disorders," says McGirr. "In particular, I would like to work towards understanding and addressing the residual symptoms that many patients experience after successful treatment of their depressive or manic episodes. Whether it's the cognitive, motivational, or sleep difficulties that patients continue to experience after clinical remission, it is clear that our current treatments can be improved on."

Working under the guidance of Dr. Tim Murphy, with support from Dr. Lakshmi Yatham, Dr. Raymond Lam and the Mood Disorders Centre, McGirr is working to position himself to be able to ask (and answer) research questions in the clinic.

"Working with patients gives research a lot of context," McGirr says. "I envision my research career as being heavily informed by my clinical work as it will guide my questions."

"As a psychiatrist embracing basic research, Alex McGirr will have the opportunity to leverage our understanding of brain circuitry to develop circuit-based treatments for depression," says Dr. Tim Murphy. "He is patient-centered, and he appreciates mental health needs and challenges in a Canadian context."



"McGirr demonstrates the important blend of scientific creativity, tenacity and rigor that characterizes a highly successful graduate student," says Dr. Raymond Lam. "He is clearly on a fast-track to an academic career as a clinician-scientist."

Vanier Canada Graduate Scholarships are given to doctoral students who demonstrate a high degree of academic excellence, research promise, and leadership potential. With the funding the scholarship provides, McGirr hopes to use animal models and cortical imaging to understand how different etiological pathways to depression result in both common and unique brain circuit changes. Then, by using conventional antidepressant treatments, characterize residual circuitry abnormalities to better understand the basis for residual symptoms.

"Alex is an incredibly bright and hardworking young researcher, and I have no doubt that he will be a national and international leader in the field of mood disorders," says Dr. Lakshmi Yatham. "He will make many important contributions to the field."

With such a collaborative approach to his work, McGirr looks forward to increasing his involvement in the neuroscience community over the coming year.

"I always envisioned building a career that balances clinical care and research - I want to be the person driving the implementation of novel ideas in the clinic," McGirr says. "It's been a long road, but that was always the goal!"



## BIMAL LAKHANI

Myelin, the fatty substance that surrounds the nerve fibres of the brain and spinal cord to speed up nerve conduction, is a necessary component of neuroplasticity, the mechanism by which the brain heals itself after injury and adapts to new skills and information. When myelin is damaged, the brain has a harder time sending and receiving signals, resulting in impaired movements and difficulty with motor skills. In Dr. Lara Boyd's Brain Behaviour Lab, researchers like post-doctoral fellow Dr. Bimal Lakhani are looking for ways to harness the brain's plasticity to heal patients after stroke.

Recent research from Dr. Boyd and Dr. Lakhani has demonstrated that myelin is neuroplastic, and as people practice a movement, myelin increases which in turn results in faster, more refined motions - the ability to move with more skill and finesse. When the brain is injured as a result of a stroke, myelin is damaged, making the effort of specific motions more challenging for some patients.

"We think that myelin is altered by experience," says Dr. Boyd. "This has huge implications for recovery from stroke, MS, and spinal cord injury."

"Animal models have shown us that myelin, which makes up a large part of the white matter in the central nervous system, can be specifically impaired after stroke," explains Dr. Lakhani. "We are currently about halfway through a longitudinal study that is examining the effects of intensive video game-playing using the stroke-affected arm on myelin plasticity to reduce impairment and restore function for those living with stroke."

An interesting finding from Dr. Lakhani's recent work is that task difficulty seems to matter - the more challenging the activity, the more the effort seems to contribute to changes in the brain.

"These changes are evident even in healthy brains, which presumably have plenty of myelin," says Dr. Boyd.

For Dr. Lakhani, who is in his third year of his post-doctoral fellowship at UBC, the focus has always been on attempting to improve the lives of those living with the effects of stroke, from improving overall mobility and balance and fall prevention to emphasizing use of the stroke-affected hand and arm to allow independent participation in activities of daily living.

"I have been most interested in understanding how we can exploit the plastic nature of the brain with new interventions, such as video game training," says Dr. Lakhani. "At UBC, I have had the opportunity to learn and incorporate several new techniques, such as neuroimaging and neurostimulation, into my research and plan to carry forward in my career by incorporating a broader understanding of the relationships between brain structure and function with behaviour after stroke."



## STAFF HIGHLIGHT

# DR. STUART CAIN

Why do some otherwise healthy people with epilepsy experience fatal seizures? New Taking Flight Award funding from Citizens United for Research in Epilepsy (CURE) will help Dr. Stuart Cain investigate sudden unexpected death in epilepsy (SUDEP) at the source.

SUDEP-related death is unusual, in that it occurs without warning and is not associated with any identifiable cause post-mortem. Researchers believe that severe seizures may be related to the cause of death, but do not yet know what causes only some seizures to be fatal.

Dr. Cain, a research associate in Dr. Terrance Snutch's lab, aims to build on current scientific theory that in some cases the region of the brain responsible for breathing and cardiac function becomes inactive during seizures, causing death. His team has developed a method to monitor the brain during SUDEP-like seizures in real-time.

The team will take a cross-disciplinary approach, examining SUDEP pathophysiology using in vivo imaging (MRI), traditional brain activity monitoring (EEG) combined with in vitro analyses of brain tissue using high-resolution microscopy and patch-clamp tools.

"Working with the UBC 7T-MRI facility, we've been able to observe in a model system that inactivity in the brain stem spreads throughout specific brain structures during SUDEP-related seizures," Dr. Cain explains. "In this project we will identify brain regions near the brainstem that are sensitive to the wave of inactivity in order to find ways to stop the fatal spread."

Beginning in January 2017, Dr. Cain's CURE-funded research builds on a technique his team originally refined to track brain swelling during migraines. There are similarities in the way that migraines and epilepsy affect the brain, and this study will bring together several areas of Dr. Cain's recent research building on work supported by the BC Epilepsy Society. His team's technique will make it possible to image the entire brain during seizures and see which regions are sensitive to the wave of inactivity.

"Once we're able to see how the brain's inactivity is perpetuated, then we can target the affected areas of the brain for experimental therapies," Dr. Cain explains. "Part of the project will address our work on an experimental drug that has demonstrated potential to extend the lifespan of our SUDEP model in preliminary experiments."

"Dr. Cain's CURE Taking Flight Award speaks to the fabulous progress and impact that he has made probing epilepsies at multiple levels," says Dr. Terrance Snutch. "This award will greatly aid the team's immediate goals in uncovering the underlying mechanisms of SUDEP."

Citizens United for Research in Epilepsy (CURE) is the leading nongovernmental agency fully committed to funding research in epilepsy. CURE Taking Flight Awards aim to promote young investigators and allow them to develop a research focus independent of their mentor(s).



# PARTNERSHIPS

The Djavad Mowafaghian Centre for Brain Health represents a partnership between Vancouver Coastal Health and the Faculty of Medicine at the University of British Columbia. The centre was made possible with a generous donation from the Djavad Mowafaghian Foundation, as well as contributions from other philanthropists and leaders, as well as those of the federal and provincial governments.



THE UNIVERSITY OF BRITISH COLUMBIA

The University of British Columbia is one of Canada's largest and most prestigious public research and teaching institutions and consistently ranks among the top 40 institutes in the world. It offers a range of innovative undergraduate, graduate and professional programs in the arts, sciences, medicine, law, commerce and other faculties. UBC has particular strengths in biotechnology, ranks in the top 10 universities in North America and number one in Canada for commercializing research, and for its patent activity in the life sciences. [www.ubc.ca](http://www.ubc.ca)



Vancouver Coastal Health provides a full range of health care services, ranging from hospital treatment to community-based residential, home health, mental health and public health services, to residents of Vancouver, North Vancouver, West Vancouver, Richmond, and in the coastal mountain communities. [www.vch.ca](http://www.vch.ca)



Vancouver Coastal Health Research Institute (VCHRI), a world leader in translational health research, is the research body of Vancouver Coastal Health Authority. VCHRI includes three of BC's largest academic and teaching health sciences centres - Vancouver General Hospital, UBC Hospital, and GF Strong Rehabilitation Centre - as well as many other hospitals and public health agencies across Vancouver Coastal Health. VCHRI is academically affiliated with UBC Faculty of Medicine and is one of Canada's top funded research centres receiving between \$80-100 million in research funding annually. Over 1500 personnel are engaged in a variety of research centres, programs and evolving research areas. [www.vchri.ca](http://www.vchri.ca)





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