

DJAVAD MOWAFAGHIAN CENTRE FOR BRAIN HEALTH

YEAR IN REVIEW 2020/2021

ADVANCING BRAIN HEALTH THROUGH RESEARCH AND CARE



LOOKING BACK AND PLANNING AHEAD:

A MESSAGE FROM THE DIRECTORS

Our first 18 months leading the Djavad Mowafaghian Centre for Brain Health were anything but traditional. The COVID-19 pandemic curtailed research and presented challenges no one was anticipating. Despite this, our community continued to produce high-quality research and delivered exceptional clinical care, of which we are incredibly proud.

A major milestone this past year was the development of the Centre's first Strategic Plan, which was created with input from the Djavad Mowafaghian Centre for Brain Health community. The Plan focuses on four strategic pillars—Research, Training, Local and Global Engagement and People and Places—with specific actions outlined to achieve success in each pillar.

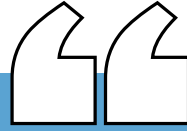
Part of the strategic planning process involved the creation of five Integrated Research Programs which reflect research strengths at UBC and encourage new collaborations moving forward. Several unique partnerships continue to be facilitated through initiatives such as the Centre's Kickstart Research Grant and Alzheimer's Disease Research Grant Competition, which have catalyzed new interdisciplinary connections between foundational and clinical scientists. Our Neuroscience Research Colloquium talks continued virtually despite the pandemic, and pivoted towards having more internal speakers, which in turn strengthened community building and helped to spark new collaborative ideas.

The Centre continues to have a strong focus on training the next generation of researchers. The creation of a new undergraduate program in neuroscience has officially been approved and curriculum development is underway, with an anticipated start date of 2022. There are also many learning

opportunities for trainees in the Graduate Program in Neuroscience, including weekly workshops hosted by the Dynamic Brain Circuits Cluster, where trainees drop in for support and feedback on their projects. These workshops moved online during the pandemic and expanded as a result, reaching trainees and faculty across Canada and beyond.

Many of our researchers have developed strong relationships with other teams both nationally and internationally. One example is the BC Brain Wellness Program led by Dr. Silke Cresswell, which offers unique programming to support healthy aging. This was initially intended to be a local program but has expanded, in large part because of its virtual platform, and now supports participants across the country. Another is Dr. Raymond Lam's leadership of the Advancing Mental Health Equity in a Post COVID-19 Asia-Pacific research cluster, which includes collaborators across the globe focused on equitable mental health.

Over the last year, we welcomed many new trainees and faculty members to our team and now have over 100 full and associate members including a wide array of clinicians and foundational researchers. As our neuroscience community continues to expand, we look forward to seeing all we can achieve together.



The Djavad Mowafaghian Centre for Brain Health is leading the charge in neuroscience research at UBC, across Canada and beyond. It has been a pleasure to watch the Centre expand over the past seven years, especially in the last year, as it continues to produce groundbreaking research and provide exemplary clinical care despite the challenges brought on by the pandemic. We are proud to house such a dedicated team of neuroscience faculty, staff and trainees here at UBC.

SANTA J. ONO

President and Vice-Chancellor,
University of British Columbia

Dr. Lynn Raymond

Director,
Djavad Mowafaghian Centre for Brain Health

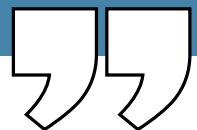
Dr. Shernaz Bamji

Associate Director,
Djavad Mowafaghian Centre for Brain Health

Over the past year, the Djavad Mowafaghian Centre for Brain Health has shown tremendous growth under the leadership of Drs. Lynn Raymond and Shernaz Bamji. The Centre has developed its first strategic plan which aligns well with the Faculty of Medicine's vision of "transforming health for everyone." I look forward to seeing the achievements the Centre will continue to make over the coming years, with respect to both research and patient care.

DR. DERMOT KELLEHER

Dean, Faculty of Medicine
and Vice-President, Health,
University of British Columbia



SNAPSHOT OF 2020-2021



\$48.5M
FUNDING



350
COLLABORATIONS
between members



6 **CLINICS**
16,624 telehealth visits
and 5,010 in-person

900+
PUBLICATIONS



100+
MEDIA MENTIONS

107 & 16



FULL MEMBERS

ASSOCIATE MEMBERS

spanning UBC, the University of Victoria and Simon Fraser University

150 +



TRAINEES

in the Neuroscience Graduate Program, comprised
of 40 MSc, 68 PhD and 70+ Postdoctoral Fellows

11



**DONOR FUNDED
RESEARCH CHAIRS
& PROFESSORSHIPS**

18

**CANADA
RESEARCH
CHAIRS**





CIERNIA

RESEARCH HIGHLIGHTS

The Centre's first strategic plan has four pillars: Research, Training, Local and Global Engagement and People and Places, which will guide its activities over the next four years and beyond. In 2020, our researchers continued to produce incredible foundational and clinical research.

USING OPEN SCIENCE TO BETTER UNDERSTAND THE BRAIN

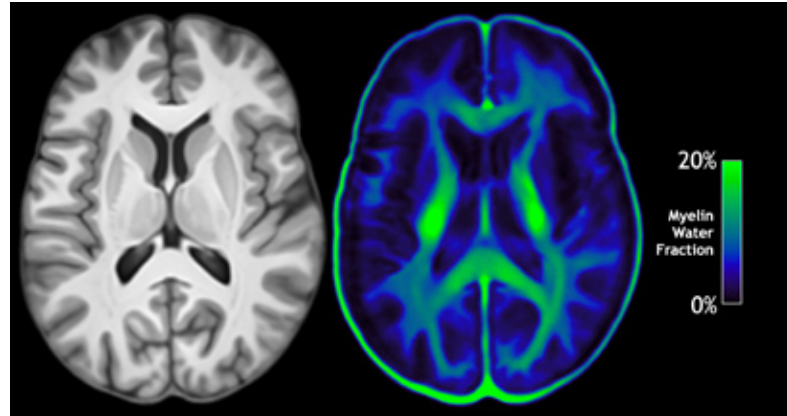
Microglia are the immune cells of the brain and are thought to play an important role in many brain-based diseases and disorders. There has been a lot of research on these cells over the past decade with respect to how their genes are regulated in different disease states, but the data comes from different labs and is spread out across multiple papers and websites. This makes it challenging to draw conclusions across studies without having to manually compare genes. This was the motivation behind Dr. Annie Ciernia and her team developing a database of over 160 previously published microglia and brain disorder-relevant genes. It allows anyone who is interested to upload their genes of interest into the database to better understand how specific microglial genes might be impacted in different disorders. By using the principles of open science, Dr. Ciernia's work will help researchers better understand the role microglia play in neurodevelopmental disorders.

THE IMPLICATIONS OF FEELING STRESSED

There is a long-standing notion that a bit of stress helps people perform better, whether it be taking exams in school or having tight deadlines in the workplace. But new research from Dr. Adele Diamond's lab suggests this might be the wrong approach. Her team found even very mild stress harmed most people's executive functions, which are mental skills such as self-control, focused attention, working memory and problem solving. For most people, minimizing stress will help them perform to the best of their abilities, a finding that is especially important during a global pandemic when many people may be feeling more stressed than usual.

THE ROLE OF DIET AND THE MICROBIOME IN PARKINSON'S DISEASE

Researchers in Dr. Silke Cresswell's lab have made great strides in understanding Parkinson's disease. A study in collaboration with researcher Dr. Brett Finlay found a strong correlation between following the MIND and Mediterranean diets and later onset of Parkinson's disease. With a lack of medications to prevent or delay Parkinson's disease, this research suggests nutrition could potentially delay onset of the disease. Dr. Cresswell's team has also looked at the microbiome—an array of microorganisms including bacteria, parasites, viruses and fungi—to better understand its role in Parkinson's. Recent work suggests microbiome composition could play a role in gastrointestinal issues, such as constipation, that often appear before a person is diagnosed with the disease.



Healthy human brain structure (left) and myelin content (right).
(Photo courtesy of the Kolind lab.)

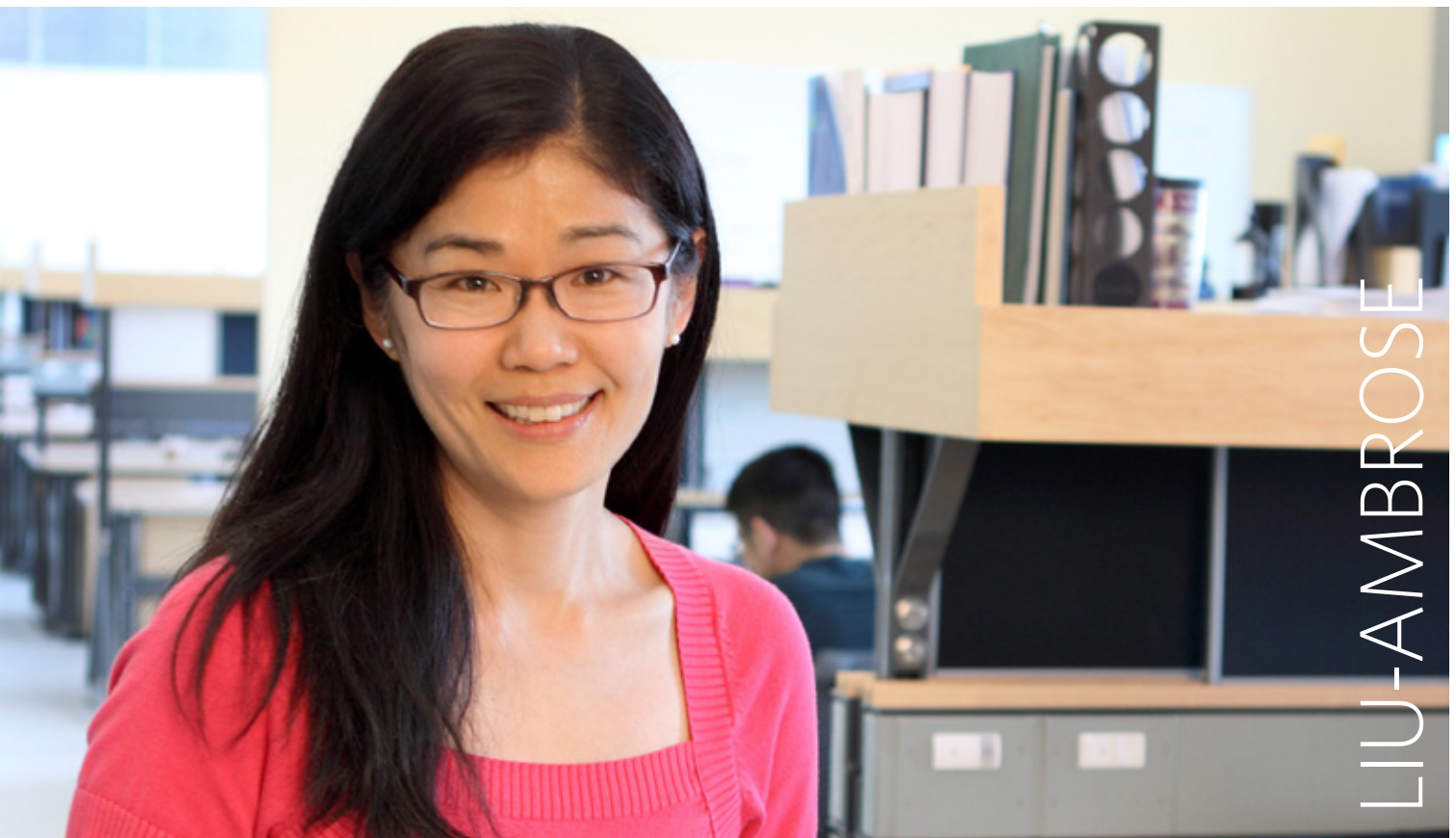
ADVANCING MULTIPLE SCLEROSIS RESEARCH

The Centre is home to an impressive Multiple Sclerosis (MS) research program, with many teams studying this degenerative brain disorder using innovative tools and techniques. Dr. Helen Tremlett's laboratory continues to advance understanding of the MS prodrome, which refers to early symptoms that occur before classical onset of the disease. Her recent work suggests people with MS are more likely to experience fatigue, sleep disorders, anemia and pain in the five years before they develop the first clinically recognized signs of the disorder. Research by Dr. Shannon Kolind's team used myelin water imaging and discovered that more myelin damage correlated with lower cognitive scores in people living with MS. This is one of the first studies to suggest myelin might play a role in the cognitive impairment that is often seen in this disease.

COLLABORATION AIDS UNDERSTANDING OF ALZHEIMER'S DISEASE

Clinical researcher Dr. Haakon Nygaard and foundational researcher Dr. Brian MacVicar have teamed up to better understand Alzheimer's disease. The duo is looking at the processes that lead to oxidative stress, an imbalance of pro-oxidants and antioxidants associated with cell damage that is a hallmark of Alzheimer's disease. The aim of their research is to look for ways of reducing oxidative stress to protect brain nerve cells from dying in Alzheimer's patients. This project is being supported by a \$3 million gift from the McArthur, Aune and Copland families.

EXPERT TAKEAWAYS FROM THE COVID-19 PANDEMIC



DR. TERESA LIU-AMBROSE ON

How the pandemic has impacted our brain:

The pandemic has affected our brain in many ways, including our mood and memory. People say they can't remember events as well anymore, or that one day blends into the next. This is partly because we're better able to remember events tied to our senses, such as smell and emotions. It is also harder to think clearly when we are in constant stress or anxiety. For many of us, the pandemic meant staying at home, reducing our social interactions, and not engaging in activities that we normally enjoy and are important to our wellbeing. These changes can impact our thinking abilities, and contribute to the feeling of being in a brain fog. We also know that the pandemic has impacted the mental health of many Canadians. Evidence shows that poor mental health is associated with reduced cognitive abilities. Those who have contracted the COVID-19 virus may also be at a greater risk for cognitive and mood outcomes because of the possible direct effect of COVID-19 infection on the brain.

With colleagues from the Canadian Longitudinal Study on Aging, my team is studying the intermediate and long-term impacts of the COVID-19 pandemic and the COVID-19 virus on the brain and cognition. Using data collected prior to, during, and after the COVID-19 pandemic by the Canadian Longitudinal Study on Aging, we aim to assess the impact of the pandemic on cognitive trajectories and outcomes. To better understand the impact of the COVID-19 virus on the brain and cognition, we are comparing brain structure, brain function, and cognitive performance of adults with COVID-19 to those who tested negative or had no symptoms. Early evidence is showing that silent strokes might be caused by the virus, which in turn could lead to a higher risk of developing dementia.

Dr. Teresa Liu-Ambrose is Director of the Aging, Mobility and Cognitive Health Lab at UBC.



DR. LIISA GALEA ON

What the pandemic has taught us about the importance of studying sex and gender in science:

Since the early days of the pandemic, there were clues that sex and gender mattered for COVID-19 outcomes, with research suggesting that men were more likely to die from the virus than women. This could be because there are more ACE2 receptors in males which leads to a greater antibody response. More recently, we have seen that vaccine uptake in British Columbia is different based on sex, and we know that pregnant people were left out of clinical trials which leaves many questions unanswered. If we pay more attention to sex and gender-based analyses and women's health questions, we'd be further ahead in our treatments and solutions for COVID-19. Scientists and members of the public shouldn't be afraid of sex and gender differences; rather, we should embrace the variability and richness of information it provides us and harness it to address health challenges like the pandemic.

Dr. Galea is a sex and gender champion and leader of the Women's Health Research Cluster at UBC.

DR. JUDY ILLES ON

The ethics of vaccine certifications:

We should be looking at vaccine certifications as a matter of public health, not using the term passport which refers to government-issued documents for travelling between countries. In other words, we should be thinking about certifications in the same way we do for other diseases, such as how children are required to have certain vaccinations before attending school. The main concern is we need to keep people safe. Good public health messaging is vital. While a person has the personal right to oppose a vaccine, society holds the responsibility to protect the most people. With that said, systems that accommodate people who can't receive vaccines, either because of health issues or challenges with access, are ethically imperative.

Dr. Judy Illes is a UBC Distinguished University Scholar and the Director of Neuroethics Canada.



RESEARCH AWARDS



Alzheimer's Disease Research Grant Competition

For the second year in a row, the Centre has catalyzed new collaborations between foundational and clinical researchers through its Alzheimer's Disease Research Grant Competition. Four teams of researchers received this award, with each project focused on a unique aspect of Alzheimer's disease. One project is being led by Dr. Fidel Vila-Rodriguez, who has partnered with Drs. Haakon Nygaard, Robin Hsiung, Sherri Hayden and Alex Levit to look at repetitive transcranial magnetic stimulation (rTMS) as a potential way of enhancing memory in patients with a form of mild cognitive impairment that often progresses to Alzheimer's disease.

WINNERS:

- Drs. Fidel Vila-Rodriguez, Haakon Nygaard, Robin Hsiung, Sherri Hayden and Alex Levit
- Drs. Liisa Galea, Annie Ciernia, Cheryl Wellington, Jonathan Epp, Staci Bilbo and Lisa Saksida
- Drs. Brian MacVicar and Haakon Nygaard
- Drs. Tim Murphy and Mark Cembrowski

Kickstart Research Grants

This funding initiative was launched by the Centre in 2019 to kickstart new projects which have the potential to generate preliminary data for future grant applications and funding opportunities. This year, five teams of researchers were awarded Kickstart Research Grants, including Drs. Kamyar Keramatian, Erin Michalak and Lakshmi Yatham, who will conduct a pilot study on a recently developed telehealth-based group program for people at high risk for bipolar disorder. The results will determine whether the program is feasible to implement on a wider scale, with the hope of reducing stigma and improving access to support for people at-risk for bipolar disorder.

WINNERS:

- Drs. Kamyar Keramatian, Erin Michalak and Lakshmi Yatham
- Drs. Ipek Oruc, Robin Hsiung, Ozgur Yilmaz and Sonia Yeung
- Drs. Anthony Phillips and Terrance Snutch
- Drs. Daniela Palombo, Jodie Gawryluk and Christopher Madan
- Drs. Catharine Winstanley and Tao Huan



Photos by Paul Joseph/UBC Brand and Marketing.

Djavad Mowafaghian Centre for Brain Health Trainee Awards

Many trainees received Djavad Mowafaghian Centre for Brain Health Endowment and General awards to support their research. Each award is supporting a unique project, which range in scope from better understanding stroke, to looking at potential Alzheimer's treatments.

WINNERS:

Alyssa Ash | PhD student

Yanyang Bai | PhD student

Isabel Bestard Lorigados | PhD student

Dr. Emily Button | Postdoctoral fellow

Ariana Cahn | MSc student

Matthew Cook | MSc student

Ronan Denyer | PhD student

Adam Doelman | PhD student

Dr. Jill Dosso | Postdoctoral fellow

Sarah Erwin | MSc student

Tony Fong | PhD student

Yang Ge | PhD student

Pankaj Gupta | PhD student

Dr. Axel Guskjolen | Postdoctoral fellow

Dr. Travis Hodges | Postdoctoral fellow

Kelly Hrelija | PhD student

Katelyn Hudak | MSc student

Poljanka Johnson | MSc student

Alireza Kamyabi | MSc student

Adrienne Kinman | MSc student

Shruti Kochhar | PhD student

Melanie Lysenko-Martin | PhD student

Maya Nesbit | PhD student

Dr. Jennifer Richard | Postdoctoral fellow

Anne-Sophie Sack | PhD student

Kaitlin Sullivan | PhD student

Dr. Melissa Woodward | Postdoctoral fellow

Shunya Yagi | PhD student

TRAINING THE NEXT GENERATION OF RESEARCHERS

An important part of the work done at the Centre is providing leadership and opportunities to train the next generation of neuroscience researchers.



UPDATE FROM THE GRADUATE PROGRAM IN NEUROSCIENCE

The pandemic presented unique challenges to the Graduate Program in Neuroscience (GPN), with restrictions impacting research for many trainees. Despite this, trainees found a way to thrive, and I speak on behalf of the entire program when I express how proud we are of the progress these individuals have made over the past year.

Their perseverance is evident by the more than \$1M in funding GPN students have been awarded in the last year. Most recently, 15 students were awarded Djavad Mowafaghian Centre for Brain Health 2021 Endowment Awards, with projects spanning from stroke to mental health to spinal cord injury. We also saw two cohorts of trainees graduate, many of whom have gone on to postdoctoral fellowships and others to successful careers.

Even with the difficulties associated with the pandemic, our students continue to amaze us with their highly impactful and ground breaking research.

Another exciting update is the approval of an undergraduate program in neuroscience at UBC. Trainees in the GPN have been advocating for this for many years, and the new program is set to launch in the fall of 2022. We look forward to having even more neuroscience students on campus next year!

The future is bright for the next generation of neuroscience researchers, with over 100 students and more than 70 postdoctoral fellows making up the GPN. Trainees in the GPN have demonstrated their resilience and as we slowly return to a new normal, we look forward to welcoming trainees back to campus for the eventual resumption of in-person talks, journal clubs and social gatherings.

Dr. Tim O'Connor

Interim Director, Graduate Program in Neuroscience

TRAINEE PROFILES

Dr. Emma Morton | Postdoctoral Fellow

Dr. Emma Morton first became interested in bipolar disorder as a young student studying emotion, when she realized this mental health disorder wasn't well understood.

"This illness has a fluctuating course, so people living with bipolar disorder are sometimes viewed as not needing as much support as other areas of mental health, which isn't true," says Dr. Morton. "In other words, they sometimes drop into this 'missing middle.'"

For the past seven years, Dr. Morton has dedicated her research to bipolar disorder. She started by trying to better understand the definition and measurement of quality of life (QoL) in people with bipolar disorder for her PhD project. In 2015, Dr. Morton visited Canada from Australia to



participate in a series of Collaborative Research Team to Study Psychosocial Issues in Bipolar Disorder (CREST.BD) community knowledge translation events. This is when she first met Dr. Erin Michalak, a researcher at the Djavad Mowafaghian Centre for Brain Health who leads the CREST.BD team.

“I was thrilled by the type of work Dr. Michalak and her team were doing,” says Dr. Morton. “They were involved in research but also dedicated to getting the results of that research into the hands of community members and it felt like a great environment to be a part of.”

In 2019, Dr. Morton received a fellowship from the Marshall Scholars and Fellows Program in Mental Health, an award provided through the Institute of Mental Health and UBC’s Department of Psychiatry. Shortly after winning this award, she moved to Vancouver where she joined Dr. Michalak’s team as a postdoctoral fellow and started developing an app called PolarUs, intended to help people living with bipolar disorder self-manage their symptoms and improve their wellbeing.

In 2021, Dr. Morton was awarded a Banting Postdoctoral Fellowship from CIHR to continue working on this app, which builds on more than a decade’s worth of research from the CREST.BD team. PolarUs will act as a pocket navigator, where people living with bipolar disorder can track how they’re feeling and identify areas they might need support with. For example, if someone notices they’re struggling with sleep and want to improve their self-management of this domain, the app will provide strategies on how to get a better night’s rest.

“Emma’s early work on our PolarUs app project has been simply stellar,” says Dr. Michalak. “I’ll often be in a development meeting with her, and end up thinking, ‘I wish I had thought of that!’ She has significantly advanced the quality and reach of our science.”

Outside of the lab, Dr. Morton enjoys drawing and writing, and has picked up a few pandemic hobbies including roller skating and crocheting. She also enjoys exploring BC and especially loves to hike.

Shunya Yagi | PhD student

Shunya Yagi has a personal tie to the research he’s doing for his PhD. Fifteen years ago, his grandfather was diagnosed with dementia, and he remembers the doctors explaining how there were still a lot of unknowns when it came to the disorder. This made Yagi wonder what the mechanisms were in the brain that caused people with dementia to lose their memory.

Yagi began researching different labs who focused on the foundational science behind learning and memory and came across Djavad Mowafaghian Centre for Brain Health researcher Dr. Liisa Galea. He applied to be part of her lab and in 2013 was accepted as a Master’s student.



Today, Yagi continues his research in the Galea lab as a PhD student. His work is focused on understanding sex differences on adult neurogenesis—the process where new neurons form in the brain—and hippocampus-based cognition in animal models.

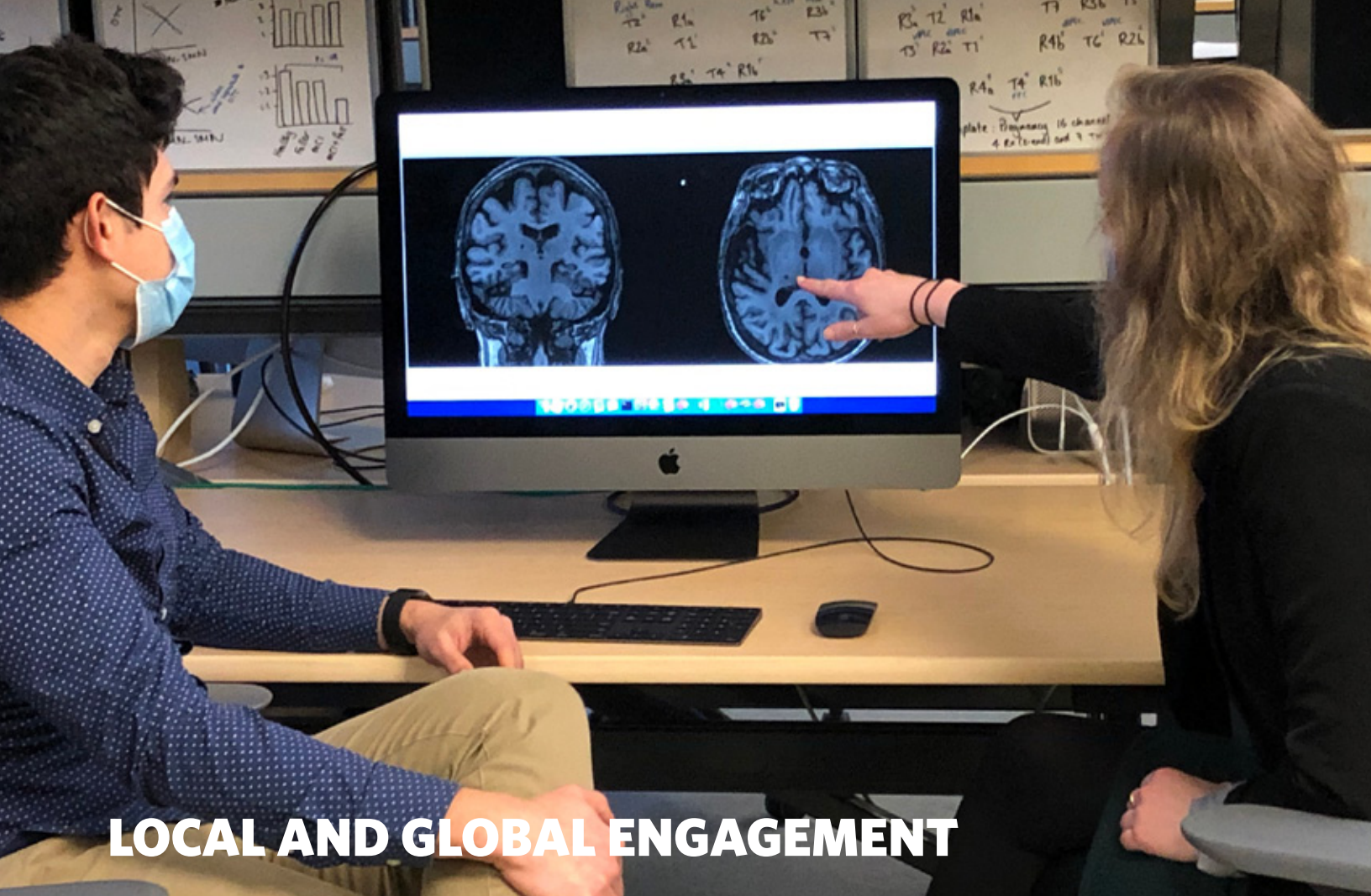
“My research will help to better understand why sex differences exist in certain brain-based diseases such as Alzheimer’s, schizophrenia and depression,” says Yagi. “Foundational research like the kind I’m doing can lead to a better understanding of the function of these sex differences and how they might be related to the pathology of different disorders.”

To date, a lot of neuroscience research has been done primarily on male subjects, which can mean a lost opportunity on discovering important distinctions. For example, some research has shown that males tend to exhibit more severe symptoms of schizophrenia, and women are more at risk over their lifetime of developing Alzheimer’s disease.

“We know there are sex and gender differences in the number of people and severity of symptoms in many neurological disorders,” says Dr. Galea. “Unfortunately, not much work is done in this area. Shunya’s PhD work is fundamental to adding to the discourse of why sex and gender matter in neuroscience.”

In a study published in 2020 as part of Yagi’s PhD project, he found a difference in the regulation of neurogenesis in the hippocampus between male and female animal models. Dye was injected into cells to see the trajectory and maturation rate of adult-born neurons over the course of three weeks. While new neurons reached the same level of maturation at the end of a three-week period in both males and females, males got to this end point much faster. Males also had a different trajectory, with an early and fast uptake, followed by a rapid decline in new neurons. Females, on the other hand, had a more “slow and steady” approach to neurogenesis.

Yagi is originally from Oguchi, Japan. Outside of the lab, he enjoys playing soccer and spending time with his two young sons.



LOCAL AND GLOBAL ENGAGEMENT

Through education, research and community outreach programs, the Centre continues to foster collaborative and reciprocal relationships to enhance its impact on brain health both locally and abroad.

BUILDING COMMUNITY DURING COVID-19

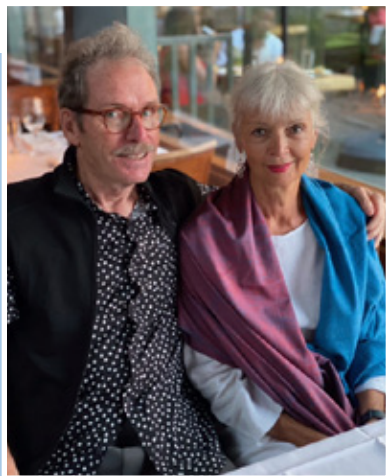
The pandemic presented many challenges over the past year, including the elimination of in-person events and lectures. Despite this, the Centre hosted several well-attended virtual events which brought people together and helped maintain a sense of community through difficult times.

- In November 2020, the Centre co-hosted a virtual screening and panel to discuss the documentary film “Picture a Scientist,” which chronicles the rise of researchers who are writing a new chapter for women scientists and provides new perspectives on how to make science more diverse and equitable. Over 100 people attended to hear from panelists which included Drs. Shernaz Bamji and Liisa Galea.
- In April 2021, Djavad Mowafaghian Centre for Brain Health researcher and sex and gender champion Dr. Liisa Galea led the event Sex Cells!, which highlighted the importance of considering sex and gender when conducting inclusive research. Dr. Galea previously co-hosted a similar workshop and this second iteration was brought back by popular demand.
- In collaboration with the BC Brain Wellness Program, the Centre hosted a World Brain Day celebration on July 22, 2021, where over 200 participants from across Canada learned about the research process and how basic science gets translated into our everyday lives.
- The Dynamic Brain Circuits Cluster used the pandemic to their advantage, by expanding the scope of Databinge, a weekly data science forum where trainees and faculty present active research problems and present it to others to troubleshoot issues with data or code, or to

bounce ideas off of colleagues. This was previously done in person but pivoted online and has now reached even more people, acting as a space where questions can be asked and answered 24/7.

→ The Neuroscience Research Colloquium (NRC) is a pinnacle of the neuroscience community at UBC, where world renowned neuroscientists give talks throughout the academic year. When the pandemic struck, the Centre managed to pivot and continue the series virtually, using it as an opportunity to highlight some of the amazing work happening right within its own community.

“We have so many incredibly talented scientists right on our own doorstep, but it can be challenging to know what everyone is working on since we’re spread over quite a few different units,” says Dr. Catharine Winstanley, who led the NRC this year. “This was a wonderful opportunity to highlight some of the teams and areas of strength we have here at UBC, and for all of us to learn more about each other’s research and find new ways to connect and collaborate.”



THE BC BRAIN WELLNESS PROGRAM

For Jackson Mooney, the BC Brain Wellness Program has been life changing.

Fifteen years ago, he was diagnosed with dystonia, a movement disorder that causes involuntary muscle contractions, which greatly affected his ability to move his neck and head. Over time, Jackson lost the ability to do many of the activities he loved, including biking, playing golf and running. He also found his cognition was suffering and he was losing his ability to multitask.

In 2014, Jackson and his wife Mady moved to Vancouver where he was referred to Dr. Silke Cresswell, a neurologist at the Djavad Mowafaghian Centre for Brain Health. By the time 2019 rolled around, Dr. Cresswell asked Jackson if he’d like to participate in a new program launching at the Centre called the BC Brain Wellness Program.

The Program is designed to provide complementary support for people who access the clinics at the Centre with the goal of promoting wellness and healthy aging. Jackson agreed, excited at the prospect of trying something new.

Today, at the age of 74, Jackson participates in multiple classes per week including aerobics, yoga and mindfulness. Over the last two years, he’s seen great improvement in both his balance and cognition which he attributes to the Program. He’s now able to ride his bike and go on long walks and has started to seriously consider picking up a golf club for the first time in nearly a decade.

“I am someone who has always loved to exercise, so being able to be active again thanks to the BC Brain Wellness Program is an amazing feeling,” says Jackson. “The program is doing a lot of good and is most definitely a game changer!”

The BC Brain Wellness Program was spearheaded by Drs. Silke Cresswell and Jack Taunton. Today, the program offers over 25 classes and has reached over 1100 participants. When the pandemic hit, the program quickly pivoted online and continues to offer classes virtually.

“It’s amazing to see participants like Jackson have such success after joining our program,” says Dr. Cresswell. “This is exactly what we set out to do when we launched two years ago—make a difference in people’s lives by providing them with the opportunity to participate in wellness activities at no cost.”

For Jackson, the program has also become a family affair. His wife Mady is an art therapist who now teaches the class “Art from the Heart,” which is focused on using visual art to express emotions.

FAMILIES GUIDE MENTAL HEALTH RESEARCH

Over the course of the pandemic, more young people than ever have been seeking mental health support, which has been especially challenging with restrictions changing the ways services are accessed.

Many organizations have found ways to adapt and are looking towards new models of service in the future. An important part of doing this successfully is making sure programs, services and research projects are designed and evaluated with the needs of young people and families in mind.

A new project based out of UBC is looking to do just this. A Youth Research Advisory Panel and a Family Research Advisory panel have been established, comprised of youth and family across British Columbia with lived experience of mental health and substance use.

Djavad Mowafaghian Centre for Brain Health researchers Drs. Erin Michalak and Fidel Vila-Rodriguez are co-leading the project. Dr. Michalak says throughout the pandemic, funding opportunities for mental health research have



LAM



MURPHY



WERKER



GALEA

come up fast and furious, but this can sometimes mean knowledge gaps and research priorities aren't being properly identified.

"Authentic engagement with knowledge users and people with lived experience in research is extremely challenging as mental health research is evolving so quickly and yet effective engagement with these groups is more important than ever," she says. "We hope these panels will provide an innovative way to support genuine patient-oriented research."

The advisory panel works together to guide and translate research on youth mental health and substance use, by representing the voice of families and youth who have experienced this firsthand. In this way, they play an important role in ensuring researchers are asking the right questions and approaching these issues in a way that matters to people living with mental health and substance use challenges.

RESEARCH CLUSTERS SPUR LOCAL AND GLOBAL COLLABORATIONS

Four Research Excellence Clusters at UBC are being led by Djavad Mowafaghian Centre for Brain Health researchers. Each cluster received new or continued funding in 2020 and plays an important role in promoting collaborations and partnerships both across UBC and the entire globe.

The **Dynamic Brain Circuits in Health and Disease Research Excellence Cluster** is led by Dr. Tim Murphy, which seeks to determine the mechanisms behind normal and dysfunctional brain circuits across illnesses and injury. This cluster has received funding since 2015, and has a strong focus on embracing modern data-driven methodologies, with an emphasis on training the next generation of researchers.

The **Language Sciences Initiative** is co-led by Dr. Janet Werker, and aims to shape the future of research in the field of language studies. It does so by researching many areas of language including children's development of language, speech recovery after stroke and exploring ways of revitalizing and maintaining Indigenous languages.

The **Advancing Mental Health Equity in a Post-COVID-19 Asia-Pacific** cluster is led by Dr. Raymond Lam. This is an emerging cluster which brings together researchers from around the world to develop innovative approaches to advancing best practices for equitable mental health, including via the use of digital technologies.

The **Women's Health Research Cluster** is led by Dr. Liisa Galea and is focused on discovering how sex and gender play a role in health outcomes. The cluster is working towards creating a future where women can live equitably healthy lives by catalyzing impactful research on women's health.

IN THE NEWS

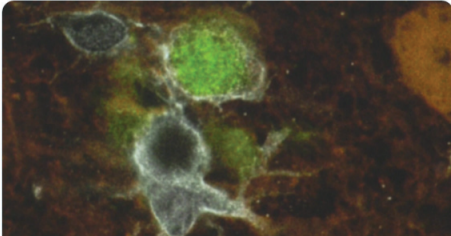
OUR RESEARCHERS MAKING HEADLINES ON TWITTER



UBC Medicine @UBCmedicine

Brain cells are being grown in a lab to try and better understand the progression of Alzheimer's, and hopefully pave the way for new treatments.

Watch: Dr. Haakon Nygaard spoke to @CTVVancouver to explain this unique approach.



UBC lab-created brain cells hold new hope for understanding mechanics of Alzh... There's promising new research at UBC that could give new hope to the hundreds of thousands of Canadians living with Alzheimer's. bc.ctvnews.ca

UBC Medicine @UBCmedicine

Dr. Janice Eng (@UBC_PT) spoke with @globalnews recently about how she adapted her innovative program for virtual care during the pandemic.

Watch: bit.ly/3DjtHh



Djavad Mowafaghian Centre for Brain Health @DMCBrainHealth

The latest issue of @BIVnews features our very own Dr. Sriram Subramaniam of @cryoem_UBC! Check out the story (pages 24-26) on how his team is working to accelerate the process of viral-focused drug development. ow.ly/N1Ye50CqJDL



Djavad Mowafaghian Centre for Brain Health @DMCBrainHealth

"Investment in research and innovation has huge implications for who will be most prepared for global crises... We urgently need to make larger investments in domestic research."

Check out this oped in @VancouverSun by @LiisaGalea and @lisasaksida!



Liisa Galea and Lisa Saksida: Fund science for a healthier and safer future vancouver.sun.com

Djavad Mowafaghian Centre for Brain Health @DMCBrainHealth

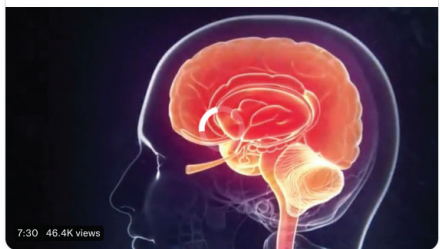
DMCBH researcher Dr. Teresa Liu-Ambrose spoke with Global News about her latest research on how #Covid_19 impacts the brain @UBCmedicine @UBC_CogMobLab

You can also read about her research here: bit.ly/3oRJVx

Globalnews.ca @globalnews · Dec 12, 2020
New evidence is emerging that the coronavirus could lead to debilitating neurological symptoms – even in those who only had mild COVID-19 illness.

@DFriesenGlobal spoke with scientists searching for answers.

Read more: globalnews.ca/news/7512143/c...



UBC Media Relations @ubcnews

Dr. Neil Cashman, professor at @UBCmedicine, was quoted about his research on whether the fatal wildlife disease in Alberta and Saskatchewan could infect humans. via @globalnews

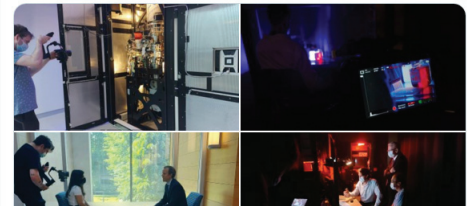


Deadly wildlife disease might threaten humans, new Canadian research suggest... Chronic wasting disease, which affects animals such as deer, caribou, moose and elk by attacking nervous systems with universally fatal results. globalnews.ca

UBC Faculty of Medicine - Educational Technology @ubcmdivid

PT 2 of our #behindthescenes shots from our exciting new project showcasing the amazing research happening at @DMCBrainHealth.

#ubcmdivid
#research
#medicine



Djavad Mowafaghian Centre for Brain Health @DMCBrainHealth

It turns out even a little bit of stress might not be so good for us. Important research by @DrAdeleDiamond and her team! Hear Dr. Diamond discuss her latest work and provide tips on how to de-stress on @AllPointsWestBC

ow.ly/GUQy50CQwMz

@UBCmedicine @ubcnews



It turns out, even a little bit of stress isn't good for you. UBC researcher explain... Almost everyone is under stress right now. And it turns out, the old idea that a little bit of stress might make you perform better, is wrong. All Points West host... cbc.ca

UBC Psychology @UBCPsych

.@LiisaGalea from our Behavioural Neuroendocrinology Lab & @dr_cindy_b, both mothers themselves, comment on the reality of cognitions post-pregnancy, from positive changes to ones that may seem scary, and the plasticity of our brains. via @nytimes



'Mommy Brain' Is Real
How to deal with forgetfulness, and embrace your mind's new 'superpowers.' nytimes.com

PEOPLE AND PLACES

The Centre is an inclusive environment which supports people in reaching their highest potential, and offers many facilities to encourage innovative and collaborative work.

FACULTY PROFILE:

DR. MANU MADHAV



Dr. Manu Madhav wanted to be a scientist ever since he was a child. When it was time to choose an undergraduate program, he decided to go into engineering and developed an interest in robotics. In 2008, he moved from India to do a Master's in Mechanical Engineering at Johns Hopkins University, followed by a PhD in the same field.

It was during his PhD project that Dr. Madhav started to take a keen interest in neuroscience. He was working with fish to learn how certain species interact with each other by using electricity as a medium of social communication, a concept rooted in neuroscience.

By the time he finished his postdoctoral fellowship, Dr. Madhav decided he would combine his passion for robotics with his interest in neuroscience to explore neural navigation. He joined UBC in January 2021, as a core member of the Djavad Mowafaghian Centre for Brain Health and faculty member in the School of Biomedical Engineering. Over the last several months, he has been busy establishing his own laboratory.

"It's been a very positive experience so far, everyone here at the Centre has been so supportive and many great people have taken an interest in joining my lab," he says.

Dr. Madhav's lab will focus on understanding neural navigation in animal models and humans. The overarching question his team will try to answer is how sensory inputs are combined in the brains of animals to create a spatial map and whether the task or goal the animal has (such as finding food using specific sensory cues) influences how they construct this map. His research will also look to determine exactly how this map is being used to navigate or complete tasks.

Answering these questions will help scientists better understand Alzheimer's disease. The same regions of the brain responsible for navigation and mapping in humans are also responsible for retention of memory and forming new memories, which are among the first regions to be affected by dementia.

"My hope is by better understanding how we navigate, we can also understand how early stages of neurodegeneration affect our brain," says Dr. Madhav. "We also create maps in our mind when there's a problem and trace a path to find a solution. By studying neural navigation in animal models, we can better understand higher levels of cognition."

While his lab continues to expand, Dr. Madhav has also been taking the opportunity to enjoy his first time living in Canada.

"I love hiking and the outdoors, so Vancouver has been a great place for me to settle into," he says. "I'm really looking forward to the next few months when my lab will start generating its first data!"

STAFF PROFILE:

FAEZEH KHARAZYAN

Faezeh Kharazyan is a research assistant with the Borgland Brain Tissue and DNA Bank (the Biobank) located in the Djavad Mowafaghian Centre for Brain Health. The Biobank opened its doors in 2015 and Kharazyan joined the team in February 2018.

The Biobank acts as a resource for collection, storage and distribution of biospecimens which researchers use to better understand brain-based diseases and disorders such as Multiple Sclerosis, Parkinson's disease and Alzheimer's disease. As a research assistant, Kharazyan is responsible for the day-to-day operation of the biobank, which includes maintaining the biospecimen inventory and databases, assisting with research ethics renewal and amendment documents, and maintaining the Biobank laboratories' supplies and reagents inventory.



"It's exciting to be part of brain research and I can't think of a better way to support scientific progress and development in medicine than being involved with the Biobank," says Kharazyan. "My favourite part of my job is being able to do a variety of tasks and being surrounded by competent and ambitious researchers and health professionals with whom I can exchange ideas and experience."

Prior to moving to Vancouver, Kharazyan spent time in many places around the world. She grew up in Iran as a professional equestrian rider and did her undergraduate degree in Equine Sciences, quickly developing a passion for genetics. She then moved to Dublin where she first worked in a laboratory that researched the effect of exercise on gene expression in horses, and later at a developmental neurogenetics laboratory. She eventually moved to Nova Scotia and received her Master's degree in evolutionary genetics at Dalhousie University, where she discovered three virus species and developed the most accurate diagnostic genome marker for a genus of viruses. She then moved to Vancouver and joined UBC.

"Faezeh is a highly engaged member of the Borgland Biobank," says Biobank manager Dr. Seti Boroomand. "She is always enthusiastic about learning and is very reliable. I am very grateful to have her on my team."

Outside of work, Kharazyan still enjoys horseback riding and while she used to enter national competitions, she now rides mostly for fun. She also does gothic and copperplate calligraphy, a hobby she first picked up in Iran with her mother.

FACILITY HIGHLIGHTS

Cryo-Electron Microscopy Facility

The cryo-electron microscopy (cryo-EM) facility housed at the Djavad Mowafaghian Centre for Brain Health is led by Dr. Sriram Subramaniam and his lab. Cryo-EM is a powerful imaging technique that uses microscopes, some of them up to 13 feet tall, to take pictures at near atomic resolution. The pictures are taken after samples have been cooled to cryogenic temperatures, meaning temperatures -150°C or below, and are used to generate 3D structures of important biological molecules.

Over the course of the pandemic, Dr. Subramaniam and his team have made important discoveries pertaining to the SARS-CoV-2 virus using the cryo-EM facility at the Centre. The SARS-CoV-2 virus is so small—100,000 times smaller than the size of a pinhead—that it would be undetectable under a regular microscope. Dr. Subramaniam's team was the first in the world to use cryo-EM to generate 3D structures at near-atomic resolution of spike proteins carrying the key mutation in the alpha variant B.1.1.7. They have determined cryo-EM structures for most of the newly emerging variants including the delta and kappa variants.

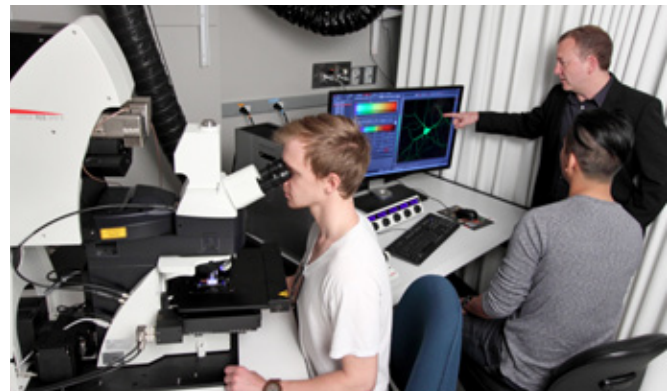


They are also attempting to understand the effects of these mutations on antibody evasion, and are carrying out studies that are aimed at being able to better predict whether these viruses can be neutralized by immune responses elicited by existing vaccines.

NeuroImaging and NeuroComputation Centre

The NeuroImaging and NeuroComputation Centre (NINC) is led by Djavad Mowafaghian Centre for Brain Health members Drs. Tim Murphy and Kurt Haas, and managed by Jeff LeDue. The NINC provides support to the neuroscience community by making the most of advanced microscopy and imaging systems, as well as high performance computing infrastructure. Since opening in 2015, the NINC has become home to seven imaging systems, eight high-end workstations, an HPC compute cluster and a makerspace supporting more than 200 people. This has provided a significant boost to the research community by bringing labs together around common technologies and data analysis strategies enabling many successful funding proposals.

The NINC is set to expand as it hosts Dr. Tim Murphy's Canada Foundation for Innovation Fund 2020 project called iMAP: in-vivo Mesoscale Assessment of the neuroProjectome. iMAP is an open science project that will bring cutting edge imaging techniques to the Centre while quadrupling its high-performance computing infrastructure. The NINC also serves as the physical site for the UBC VPRI funded Dynamic Brain Circuits Research Excellence Cluster. Its resources are used for cluster activities such as code demos and workshops including UBC Tissue Clearing and Expansion 2021 and DeepLabCut.



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, in addition to 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, ranking 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



Vancouver Coastal Health (VCH) is responsible for the delivery of \$4.1 billion in community, hospital and long-term care services to more than one million people in communities including Richmond, Vancouver, the North Shore, Sunshine Coast, Sea to Sky corridor, Powell River, Bella Bella and Bella Coola. VCH also provides specialized care and services for people throughout BC and is the province's hub of health care education and research. www.vch.ca



Vancouver Coastal Health Research Institute (VCHRI) is the research body of the Vancouver Coastal Health and a world leader in translational health research. VCHRI is academically affiliated with UBC Faculty of Medicine and 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 other hospitals and public health agencies across Vancouver Coastal Health. As one of Canada's top funded research institutes, VCHRI receives over \$100 million in research funding annually to support health research and discoveries with direct health, economic and social impact on British Columbians. www.vchri.ca



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