Dr. Philippe Albouy
WORKING MEMORY

Dr. Lindsay Bodell
EATING DISORDERS

Dr. Elie Bou Assi
DIAGNOSING EPILEPSY

Dr. Vincent Breton-Provencher
LEARNING & DECISION-MAKING

Dr. Lindsay Cahill
HUNTINGTON'S DISEASE

Dr. Carlos Camara Lemarroy
MULTIPLE SCLEROSIS

Dr. Annie Ciernia
GUT-BRAIN INTERACTION

Dr. Michèle Desjardins
COGNITIVE DECLINE IN AGING

Dr. Catherine Duclos
SAFER ANESTHESIA

Dr. Emma Duerden
FETAL & NEONATAL BRAIN DEVELOPMENT

Dr. Alexandre Fisette
BRAIN NETWORKS & OBESITY

Dr. Federico Gaiti
BRAIN TUMOUR BIOLOGY

Dr. Rishi Ganesan
DELIRIUM IN CRITICALLY ILL CHILDREN

Dr. Jiami Guo
CELLULAR RESPONSE TO BRAIN INJURY

Dr. Karl Klein
GENE MUTATION & EPILEPSY

Dr. Julien Muffat
GENETICS OF BRAIN DISORDERS

Dr. Aislin Mushquash
ACCESSIBLE YOUTH MENTAL HEALTH HELP

Dr. Shaun Sanders
NEW TREATMENT FOR BRAIN CANCER

Dr. Ashlyn Swift-Gallant
SEX BIAS IN AUTISM SPECTRUM DISORDER

Dr. Christoph Zrenner
BRAIN STIMULATION FOR BRAIN DISORDERS

ONE IN THREE CANADIANS WILL SUFFER FROM BRAIN DISEASE. HERE ARE TWENTY CANADIANS ABOUT TO GIVE THEM HOPE.

THESE 20 BRAIN RESEARCHERS DARE TO DREAM BIG. WE DARE TO FUND THEM.

THE RISKIEST THING WE CAN DO IS TAKE ZERO RISKS.
Modern technology has given us mind-blowing new powers to research the brain. We need Canadian researchers with equally mind-blowing new theories to harness this power. That's why Brain Canada created the Future Leaders in Canadian Brain Research Program. Our 2021 winners have brilliant (sometimes radical) theories for conditions ranging from Alzheimer's to depression to MS. Under traditional Canadian funding models, these ambitious yet unproven ideas would not get the support they need to be explored. This program is truly changing the landscape of brain research, in Canada and around the globe.

FUNDING WHEN THEY NEED IT MOST.
Every year, our international review panel chooses 20 of Canada's most exciting projects from early-career brain researchers. Ideas with huge potential to advance our understanding of the brain and launch their careers. This program began in 2019 and it's already yielding exciting results.

BECAUSE EVERY LIFE IS TOUCHED BY BRAIN HEALTH.
When you combine brain disorders, mental illness and brain injuries, they form the largest cause of disability in Canada and the world. Yet, research into these issues is chronically under-funded. Our Future Leaders Program is an important step in doing better.

BE PART OF THE BRILLIANCE.
It's a truly exciting time for brain science. Want to stay on top of discoveries for diseases like Alzheimer's or MS? Want to be up to date on incredible technology like AI? Visit us at BrainCanada.ca

Dr. Philippe Albouy
Université Laval
Québec

FIGHTING MEMORY LOSS BY PUTTING WORKING MEMORY TO WORK.

Working memory is our ability to remember info and use it later. We need it for everything from reading to holding a conversation. Dr. Albouy is studying what happens in the brain when we store and replay memories. Understanding how working memory functions may provide clues to unlocking memories in those with cognitive decline.

"I hope that my research will have a positive impact on the lives of people affected by eating disorders."

Dr. Lindsay Bodell
Western University
Ontario

HUNTING THE BRAIN STRUCTURES BEHIND EATING DISORDERS IN ADOLESCENTS.

Eating disorders such as anorexia nervosa are serious mental health conditions, often thought to be caused by social pressures and body image concerns. But why do some adolescents develop eating disorders when others don't? Dr. Bodell theorizes there may be specific brain characteristics making them more sensitive to social feedback. Decoding this mystery can help us prevent and treat these conditions.

Dr. Elie Bou Assi
Université de Montréal
Québec

USING AI TO BETTER DIAGNOSE EPILEPSY.

One percent of the world's population has epilepsy. It's diagnosed with an electroencephalogram (EEG) which measures electrical impulses in the brain. Unfortunately, this method has some limitations, because it mainly relies on the visual identification of big spikes in electrical activity. Dr. Bou Assi wants to use artificial intelligence to detect far more subtle patterns in EEGs to make diagnosis faster and more reliable.

Dr. Vincent Breton-Provencher
Université Laval
Québec

STUDYING THE TWIN NEURO-TRANSMITTERS THAT IMPACT YOUR EVERY DECISION.

Dopamine, the "happy neurotransmitter", and norepinephrine, the "unexpected delight neurotransmitter", are incredibly powerful mood-altering compounds released by your brain. Dr. Breton-Provencher wants to understand how these brain signals work together to influence how we think and behave. These processes are important in our everyday healthy activities, but also in mental disorders such as ADHD, schizophrenia, and depression.

“Neuroscience is really starting to benefit from new technical advances in next generation sequencing and big data analysis.”

Dr. Lindsay Cahill
Memorial University
Newfoundland & Labrador

ON THE HUNT FOR A BETTER HUNTINGTON THERAPY.

Huntington disease strikes people in the prime of their lives, causing psychiatric, motor, and memory loss. It’s caused by a mutation of the huntingtin gene. There is a gene therapy treatment, but it suppresses both mutated and healthy genes. Dr. Cahill wants to see if a similar therapy that targets only the mutated copy would be a more effective strategy to treat patients.

Dr. Carlos Camara Lemarroy
University of Calgary
Alberta

TRICKING THE BRAIN TO CURE ITSELF OF MS.

Multiple sclerosis is caused by inflammation and loss of myelin, a protective structure that covers nerves. Current treatments can stop inflammation but can’t restore lost myelin. Dr. Camara Lemarroy’s team is working on a way to prompt a patient’s own body to produce myelin and repair itself. It’s safe, non-invasive and a potential paradigm shift in the treatment of MS.

Dr. Annie Ciernia
The University of British Columbia, British Columbia

CAN DIET IMPROVE A CHILD’S MENTAL HEALTH?

Children with inflammatory bowel disease are also commonly diagnosed with anxiety, depression, and cognitive impairment. Dr. Ciernia wants to understand this connection. How does inflammation in the gut translate to inflammation in the brain? Her findings could help positively affect a young child’s brain development and mental health through simple dietary changes.

Dr. Michèle Desjardins
Université Laval
Québec

AGING BRAINS: WHAT’S THE BLOODY PROBLEM?

The brain functions as a single system, but it’s made of many different types of brain cells, with millions of blood cells coursing through it. Knowing how all these cells connect and communicate is key to understanding cognition. Dr. Desjardins will study how these connections change as we age. Her discoveries could lead to better treatments for age-related cognitive decline.

Dr. Catherine Duclos
Hôpital du Sacré-Cœur-de-Montréal, Québec

THIS NEW ANESTHESIA COMES FROM A PAIR OF HEADPHONES.

For many medical procedures, patients are put to 'sleep' with general anesthesia. Surprisingly, there's a specific type of sound that could have a similar effect when properly synchronized with brain activity. Dr. Duclos wants to investigate what happens when we combine anesthesia with this auditory stimulus. Her research could change how surgeries are done and lead to safer anesthesia with fewer drugs.

Dr. Emma Duerden
Western University
Ontario

PROTECTING A BABY'S BRAIN BEFORE IT'S EVEN BORN.

Fetal growth restriction occurs when the placenta doesn't develop properly, depriving the fetus of oxygen. It's a leading cause of childhood disability. Right now, the only detection method is ultrasound, which can only detect severe cases. Dr. Duerden plans to use MRI technology for more sensitive scans that can read placental blood flow and the baby's brain function at the same time.

Dr. Alexandre Fisette
Université du Québec à Trois-Rivières, Québec

ARE VANISHING NEURONS MAKING US OBESE?

Obesity is now a global pandemic, and the cause could be more in our brains than our waistlines. Healthy brains have two balanced populations of neurons—ones that fuel appetite and ones that fuel satisfaction. Dr. Fisette discovered that over prolonged obesity, 'satisfaction neurons' disappear. Now he seeks to understand how and why this change happens.

"We are on the hunt for hidden molecular switches that trigger these largely incurable brain cancers."

Dr. Federico Gaiti
University Health Network
Ontario

TO TREAT BRAIN TUMOURS LIKE NEVER BEFORE, WE NEED TO DISSECT THEM LIKE NEVER BEFORE.

Glioblastoma is a highly aggressive brain tumour that's difficult to treat. Dr. Gaiti is tackling this problem with cutting-edge technology that takes snapshots of genetic alterations inside individual malignant cells. Lots of them. Characterizing these hundreds or thousands of brain cancer cells in this fine-grained way gives Dr. Gaiti a holistic understanding of what makes these tumours tick and, in turn, how we can target them more effectively.

“The brain makes us who we are, yet we understand so little about how a gooey mix of neurons works to produce such complex thoughts, emotions and behaviours.”

Dr. Rishi Ganesan
Western University
Ontario

SUPPORTING THE BRAIN HEALTH OF CRITICALLY ILL KIDS.

Around one third of children in intensive care experience delirium—changes in their awareness and attention that affect long-term brain health. Dr. Ganesan analyzes brain waves to identify changes in the child's brain before delirium to learn if we can predict its occurrence. This information could allow doctors to identify children at risk and prevent delirium or shorten its duration, thereby protecting children from long-term adverse effects.

Dr. Jiami Guo
University of Calgary
Alberta

TUNING THE BRAIN'S NATURAL ANTENNA NETWORK TO TREAT TRAUMA.

When a brain injury or disease happens, brain cells called astrocytes leap into action to help support optimal brain function. Dr. Guo is studying tiny threads on the surface of these astrocytes called 'cilia' that act as sensory antennae. Her research could lead to therapies that harness the potential of astrocytes to treat neurological trauma.

Dr. Karl Klein
University of Calgary
Alberta

TURNING EPILEPSY DEPTH ELECTRODES INTO BRAIN SAMPLE COLLECTORS.

Some epilepsy patients have electrodes implanted in their brain to determine if surgery is possible. Dr. Klein wants to understand the genetic cause of epilepsy by studying brain cells that are stuck to these electrodes when they're removed. This innovative collection method is easy on patients and his gene mutation research will help uncover the root cause of epilepsy.

Dr. Julien Muffat
The Hospital for Sick Children
Ontario

NEED A BRAIN TO RESEARCH? NOW YOU CAN GROW ONE.

Microglia are brain immune cells that affect the behaviour and function of surrounding brain cells. They're critical to brain health. Dr. Muffat grows clusters of brain cells and microglia together, creating 'brain avatars'. It's like studying real brains, for incredible new insights into how environmental changes and genetic mutations impact microglia and brain health.

"The amazing thing about science is that our findings have the potential to make a difference not just to one person but to many people."

Dr. Aislin Mushquash
Lakehead University
Ontario

YOUTH MENTAL HEALTH? MAYBE THERE'S AN APP FOR THAT.

So many young people suffer from mental health-related difficulties, but access to treatment is limited, especially in rural and remote areas. Dr. Mushquash and her team are studying the use of a mental health app called JoyPop in Northwestern Ontario to see how effective it is in improving emotion regulation skills among youth. This work could greatly improve access to critical care.

Dr. Shaun Sanders
University of Guelph
Ontario

THIS SNEAKY CANCER'S SURVIVAL TRICK MAY FINALLY BE ITS UNDOING.

Glioblastoma is a devastating brain cancer, with less than a 5% survival rate past 5 years. To grow quickly and resist treatments, this sneaky cancer exploits a protein (GRP78) that normal cells use for stress response. Dr. Sanders studies how glioblastoma expertly shuttles this protein around like no other cells can. If we can block this process, it could lead to a treatment breakthrough.

Dr. Ashlyn Swift-Gallant
Memorial University
Newfoundland & Labrador

WHAT PUTS BOYS AT GREATER RISK FOR AUTISM THAN GIRLS?

Boys are four times more likely than girls to develop autism, suggesting the biology of sex development is at work. Dr. Swift-Gallant is asking why by studying if Y-chromosome genes and/or sex hormone action in specific brain cells increases the risk of autism. Her findings will guide the development of preventative strategies and treatments for both boys and girls at risk.

Dr. Christoph Zrenner
The Centre for Addiction and Mental Health, Ontario

THE CURE FOR COOKIE-CUTTER BRAIN THERAPIES.

Stimulation of the brain is used to treat many neurological and psychiatric disorders. Unfortunately, the effectiveness is limited because every patient gets the same treatment even though every brain is different. Dr. Zrenner plans to map a patient's individual brain activity in real time to apply each stimulus at precisely the right moment. This could lead to a truly dramatic improvement of the effectiveness of this treatment method.

MANY THANKS TO OUR BRILLIANT, BRAINY PARTNERS.

This program has been made possible by the Canada Brain Research Fund (CBRF), an innovative arrangement between the Government of Canada (through Health Canada) and Brain Canada Foundation, and the Azrieli Foundation. The Future Leaders in Canadian Brain Research program has also been made possible thanks to support from the Alvin Segal Family Foundation, The Arrell Family Foundation, The Barry and Laurie Green Family Charitable Trust, and The Erika Legacy Foundation.

The brain is the most complex thing in the known universe. Our partners give us the resources and tools to research its mysteries and discover new cures. Join us on this all-important journey.

For more information or to donate, visit **braincanada.ca**

Fondation Brain Canada Foundation

Fondation Azrieli Foundation

Health Canada Santé Canada

ALVIN SEGAL FAMILY FOUNDATION

THE ARRELL FAMILY FOUNDATION

THE BARRY AND LAURIE GREEN FAMILY CHARITABLE TRUST

THE ERIKA LEGACY FOUNDATION

Registration number: 89105 2094 RR0001