Twenty Brilliant Canadians And Twenty Reasons Why The World Is Watching Them So Closely.

MS
Reaching remote patients

STROKE
Gaining movement again

PARKINSON'S
Clearing the FoG

AUTISM
Finding the root cause in stem cells

BIPOLAR DISORDER
Learning where it happens

CHILDHOOD BRAIN CANCER
Detecting earlier, treating better

ISOLATION-INDUCED ANXIETY
Helping kids deal with lockdowns

MENTAL HEALTH
Updates from the front lines

ALZHEIMER'S
Boosting the brain's natural defences

Canada Has Rapidly Become One of the Top 5 Brain Research Countries in the World. **Our Secret?** Brain Canada Bets on Our Brilliant Early-Career Scientists, and Their Bold Explorations.

The human brain is the last great mystery of human health. So incredibly powerful. So dazzlingly complex. We won't solve these mysteries by thinking small. Meet the next generation of scientists who dare to think big.

Overcoming timid thinking
Canada's emerging brain researchers are starting their careers just as technology is giving them the tools to explore the deepest secrets of the brain. It's time to dream big with groundbreaking theories. Their work could unlock cures for anything from depression to Alzheimer's to brain injuries.

Unfortunately, much of Canadian brain research is trapped in a catch-22 funding model. You can't get funding without research data, but fledgling scientists can't provide the data without funding. Even top-ranked early-career researchers struggle for that first grant.

Believing in our best
Every year, we ask an independent and international review panel to choose 20 of the most exciting projects from Canadian early-career neuroscientists. Visionary ideas with huge potential to advance our understanding of the brain. Two years in, the Future Leaders in Canadian Brain Research Program is already yielding exciting results.

Because every life is touched by brain health
Brain disorders, mental illness, and brain injuries. Together they're the biggest cause of disability in Canada and the world. They devastate families and cost our nation billions. We can and must do better.

Brain Canada and our partners are leading the way
We bring bright minds together. We embrace an ambitiously comprehensive "One-brain" philosophy which seeks to understand the brain as a single interconnected system. We strategically combine public and private funds to support our most promising home-grown theories. Our strategy has made us a leading nation in brain research.

Join us on this mind-blowing journey
Miraculous brain discoveries are being made daily. It's the most exciting and promising moment in history. Read on, and follow our advancements at **BrainCanada.ca**

Dr. Nader_Ghasemlou
Queen's University Ontario

Flipping the off button on chronic pain

Circadian rhythms control just about every bodily system. Including, possibly, untreatable chronic pain. Nader Ghasemlou wants to know how and why.

Nader's prime suspects are microglia, immune-like brain cells regulated by these rhythms. By finding ways to regulate circadian rhythms in these cells, he strives to identify the on/off switch not just for neuropathic pain, but also for neurological disorders from autism and Alzheimer's to MS.

"I had the hunch that there were signals in the cells that were causing MS pain to get worse at different times of day. This is the first major grant we've gotten specifically looking at the role of these circadian rhythms."

Dr. Nader Ghasemlou

Dr. Simon_Chen
University of Ottawa Ontario

Relearning to move after a stroke

Stroke or injury can destroy motor memories as basic as brushing our teeth and getting dressed. Can they be recovered?

Simon Chen believes they can. Simon is exploring how our brain creates and stores motor memories at the molecular level. If we can understand that, says Simon, we can begin to understand how to build new ones — and rebuild shattered lives.

"If we figure out how the brain learns to form motor movements in the first place, maybe we can reinitiate the brain with the same pattern after a stroke."

Dr. Simon Chen

Dr. George_Ibrahim
Hospital for Sick Children Ontario

Bringing focus to kids with epilepsy

We don't know why kids with epilepsy lose mental focus. But doctors believe the anterior cingulate cortex is implicated.

That's why George Ibrahim monitors brain disruptions in that region, while kids with epilepsy take on mental tasks. He's building new knowledge about attention, memory and language. And building hope for breakthrough therapies that improve young lives touched with epilepsy.

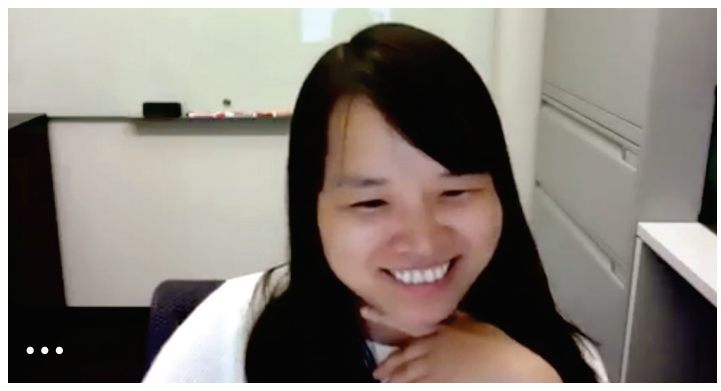
Dr. Shannon_Kolind
University of British Columbia BC

Rolling out mobile MRI for MS patients

Canada has one of the highest rates of multiple sclerosis in the world. And it's especially tough on those in small communities, which lack MRI — an expensive but essential tool for diagnosing and managing the disease.

Shannon Kolind has a world-first solution, a truck-mounted MRI that brings MS diagnosis to the people. Now more Canadians with MS can have better access to the best medical tools.

Dr. Yun_Li
Hospital for Sick Children Ontario



Discovering a new piece in the autism puzzle

Autism affects 1 in 66 Canadian families, and yet it remains mysterious. Now, Yun Li may have found a clue in the developing cerebral cortex, whose specialized stem cells help babies' brains grow and develop.

According to Yun, these same beneficial stem cells may also be vulnerable to abnormal growth and may trigger autism in some kids. That's a transformative discovery. One that could help to someday stop or even prevent the disease.

"With this funding, we'll be able to recruit new members to join the team to really look at this new idea, a new angle of understanding the origin of autism."

Dr. Yun Li

Dr. Benoit_Laurent
University of Sherbrooke Quebec

Giving aging brains new life

The cerebrospinal fluid surrounding our brain doesn't just cushion and keep it healthy. The fluid also helps to repair age-related damage… except when it can't anymore.

Benoit Laurent has discovered why the fluid stops doing its job. So researchers now have a far better target for developing medicines that help aging brains work better and longer.

Dr. Luka_Milosevic
University Health Network Ontario

Clearing the FoG from Canadians with Parkinson's

Using implanted electrodes, doctors can reduce some symptoms of Parkinson's. All except for "freezing of gait" (FoG), which makes it hard to walk and can lead to dangerous falls.

In order to clear the FoG, Luka Milosevic is deploying a new kind of electric stimulation, better attuned to FoG's distinctive signature. This could be a major stride (pun intended) in taming a disease that robs more than 100,000 Canadians of normal life and dignity.

"I get to press a button, and the patient (with Parkinson's) hears a beep, and then they see their tremor stop. And they say "Oh, my God!" It's so, so rewarding."

Dr. Luka Milosevic

Dr. Derya_Sargin
University of Calgary Alberta

Pandemic isolation is hard and hardest on growing brains

Humans are social animals. Which means our young brains don't fully develop if we're isolated. Prolonged isolation can even lead to social anxiety disorder, or SAD, later in life.

Derya Sargin has discovered a group of brain cells that may be implicated in this disorder. She's targeting these cells to find ways of reducing SAD. Better yet, says Derya, if you want healthy social development in kids, a little play goes a long way.

Dr. Sue-Ann_Mok
University of Alberta Alberta

Reversing Alzheimer's. Defensive proteins may hold the key

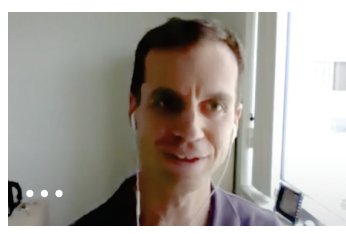
We know little about Alzheimer's. But we do know that a major telltale signature is when protein clumps start forming in the brain. Our brains have special chaperone molecules that normally prevent these clumps from forming. So why not in brains with Alzheimer's?

Sue-Ann Mok may have an answer. She's identified a chaperone, DNAJA2, that seems to be a key player in our brain's defences against this all-too-common disease. This amazing molecule could someday be harnessed to prevent and possibly even reverse the effects of Alzheimer's.

"It's a catch 22, trying to get funds, or just get people to believe in what you know is a really good hunch. Brain Canada helped us overcome that hesitancy, so we can do that great next new thing that no one's doing yet."

Dr. Sun-Ann Mok

Dr. Greg_Silasi
University of Ottawa Ontario

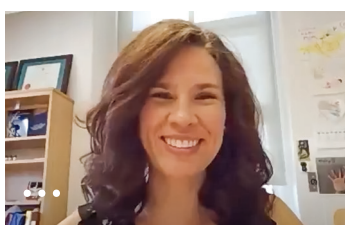


Helping babies bounce back from neonatal stroke

While strokes at birth are rare, they happen often enough to be the biggest cause of cerebral palsy and other disabilities. It's a devastating outcome. But, according to Greg Silasi, there's hope in the brain's awesome capacity to reorganize and self-repair.

Greg is using novel brain stimulation tools to maximize the young brain's recovery from stroke. Strengthening the brain's "wiring" to weakened limbs. And using pulses of light to build a better brain/body map that'll help guide future brain explorers.

Dr. Chantelle_Sephton
Université Laval Quebec



Battling mutant proteins to reverse ALS

Some 1,000 Canadians are diagnosed with ALS (or Lou Gehrig's disease) each year. With the same number dying of the disorder. There is no cure for ALS. But Chantelle Sephton is working to find its causes and therapeutic targets for treating this chronic killer.

Recent findings show that a genetically mutated protein that normally maintains the health of our motor neurons may be involved. Chantelle is testing ways to repair the mutated protein and reverse ALS. In global terms, that's huge.

"I like to look for aspects of science and research that that are new, and could open new avenues to understanding ALS."

Dr. Chantelle Sephton

"This will be a major step forward in the study of Epilepsy. It's an amazing opportunity, to be able to test these ideas through Brain Canada's Future Leaders grant."

Dr. Julia Kam

Dr. Julia_Kam
University of Calgary Alberta

Putting epilepsy in the crosshairs

Childhood epilepsy can be hard to treat. Some seizures are resistant to medication and even electrode stimulation. For these young patients, the best option is often to surgically remove part of the brain. Obviously, this is major surgery and you want to remove as little as possible. Precise targeting is key.

Kam is partnering with brain surgeons and neurologists. Together, they take a deep look into the brain as it switches between internal and external thoughts. This novel dream team is zeroing in on the exact origin points of seizures.

Dr. Trevor_Steve
University of Alberta Alberta

Mapping the mysteries of Alzheimer's

MRI scans show that the hippocampus — or memory centre — is the first brain region Alzheimer's attacks. Except that, we just don't know enough about this hard-to-study region.

Trevor Steve is using a novel method to map the hippocampus's curved contours, for more precise mapping than ever before. And, in the future, for more precise diagnoses, knowledge and therapies.

"We want to identify which patients with mild memory issues will go on to develop Alzheimer's. The basic idea behind the grant was to develop new techniques without extracting cerebral fluid or exposing them repeatedly to PET scanning radiation."

Dr. Trevor Steve

Dr. Wilten_Nicola
University of Calgary Alberta

The "how" of memories, brains and brain disorders

How we file away short-term memory (what we had at breakfast) and long-term memory (what we sang in grade school) is deeply mysterious. It's believed we form short-term memories in the hippocampus, and move them to the neocortex during sleep. But if so, how?

Wilten Nicola is chasing that elusive "how" answer. He's unravelling the mechanisms of memory. Not just to advance knowledge, but to also advance treatments for brain disorders that reside in the hippocampus, such as epilepsy and schizophrenia.

Dr. Bratislav_Misic
McGill University Quebec

Building virtual brains to study real brain diseases

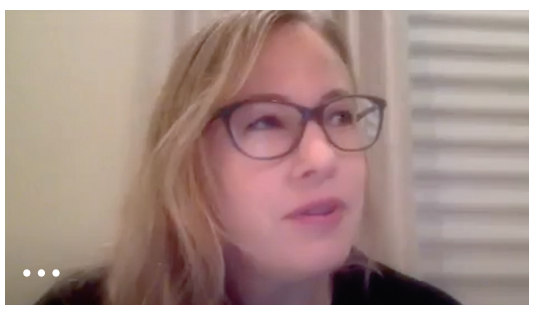
Our brains are dazzlingly complex structures. But Bratislav Misic believes we can use computer modelling to grow virtual brains, ones that are built to work almost like the real thing.

His creations have two exciting possibilities. First, run test simulations of major diseases (like Parkinson's and schizophrenia) on virtual brains to understand how they impact real ones. And second, use these bio-mimicking artificial networks to create AI with a higher IQ.

"My project is interdisciplinary to the point where it wouldn't fit into traditional funding mechanisms. So to get support from Brain Canada to do this, it's fantastic."

Dr. Bratislav Misic

Dr. Tamara_Vanderwal
University of British Columbia BC



Seeing inside a child's complex brain

Functional MRI (fMRI), enhanced by a new approach called hyperalignment, could become a top diagnostic tool for childhood-onset schizophrenia and obsessive-compulsive disorders. The problem is, kids have trouble staying still for a longer brain scan.

So Tamara's lab now plays movies inside the scanner. This not only helps kids stay still, it also stimulates the brain, revealing a more "real-life" picture of the active brain.

Dr. Galen_Wright
University of Manitoba Manitoba

Easing the heartbreak of Rett syndrome

There is no cure for Rett syndrome. Nor for the heartbreak that afflicts families that care for children with the disease. We simply don't know enough...yet.

Using cutting-edge technologies, Galen Wright is advancing the world's understanding of the disease. He believes the brain's DNA-repair mechanisms are implicated — mechanisms critical not just to beating Rett syndrome, but also beating dozens of other brain diseases.

Dr. Anne_Wheeler
Hospital for Sick Children Ontario

A head start on reversing the impacts of concussion

Concussion in a child is especially worrisome, as it can hinder brain development and have a lifelong impact.

Anne Wheeler's ingenious hypothesis for why this happens? Concussions trigger premature brain maturation. Wheeler has found novel ways to mine databases of MRI brain scans that relate these maturing brain cells. This new tracking method could yield better ways to heal childhood concussion.

Dr. Jasmin_Lalonde
University of Guelph Ontario

Fresh clues to solving the riddle of bipolar

One in 50 Canadians has bipolar disorder, a hard-to-treat condition that cuts off potential and stunts lives.

Now, Jasmin Lalonde is giving Canadians with bipolar fresh hope. His idea? In those with bipolar, the hippocampus may have difficulty forming new neurons. That's huge. Knowing how and where bipolar takes root is a giant step toward treating many heartbreaking disorders of the hippocampus — not just bipolar.

"If these malfunctioning cells are influencing the circuit of the hippocampus, we can try treating them with new compounds or refined strategies. That would be a step forward for bipolar disorder."

Dr. Jasmin Lalonde

Dr. Vijay_Ramaswamy
Hospital for Sick Children Ontario

Treating the unthinkable, brain cancer in kids

Treatment for medulloblastoma is nearly as harrowing as the disease: surgery followed by radiation and chemo. Just 60% of affected kids survive this journey — often with lifelong disabilities.

Vijay Ramaswamy is changing the odds. By helping to identify and understand several forms of medulloblastoma: some easier to treat than others. This way, doctors can prioritize therapy. And create less-toxic, personalized treatments that save even more lives.

"The goal here is to not just cure kids of brain cancer, it's to cure them and let them grow up normal."

Dr. Vijay Ramaswamy

Partners Are Like Synapses. **Brilliant When We Fire Together.**

This Project has been made possible with the financial support of Health Canada, through the Canada Brain Research Fund, an innovative partnership between the Government of Canada (through Health Canada) and Brain Canada, 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, and the Arrell Family Foundation.

There are still so many mysteries to be solved, so many discoveries to be made, so many illnesses to cure. Join us on this thrilling exploration!

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

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Fondation Azrieli Foundation

THE ALVIN SEGAL FAMILY FOUNDATION

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