UNDERSTANDING THE SCIENCE BEHIND THE BRAIN

Jason Silva, host of National Geographic’s Brain Games, shares his knowledge of the human mind and encourages Canadians to challenge their minds.

Most people take their perceptions of reality for granted. People think they have some kind of tangible experience of the world. But the reality is that they don’t. Essentially the story moves from games to touch that is people.

How do the games highlight our shortcomings in perception?

The games are meant to induce curiosity in people. And the first way to induce curiosity is to give people a sense of wonder. We make people question the things they take for granted – particularly their perception of the world. Every episode looks at a different theme and how that theme plays out in the brain. We look at things like creativity and imagination.

I always tell people that the first thing we do as neuroscientists is to step out of your traditional pattern of thought. And instead, expose yourself to new novel stimuli. Experience something new. This is the way to engage the brain.

You often talk about actualizing human potential, how can we access that potential?

I think that for a lot of us, the only thing standing in our way is ourselves. That’s why I’m really interested in flow states – moments of pure immersion.

Creative flow states are associated with elite athletes when they exceed their potential, and with jazz musicians and freestyle skiers when they’re in the zone. When you get into those creative flow states, the part of the brain that’s responsible for self-consciousness goes offline.

This is a reminder that a lot of the times, our limitations are self-imposed. And so a way of challenging our limitations is to put ourselves in situations that induce those flow states and change our inner critic.

How do you exercise your brain personality?

I try to exercise myself to novel environments, most new people, new books, new foods, travel where I can, go to museums, expose myself to challenging and different things. I find my body and mind with new experiences. Give me new Chaux paint process and I’ll be all over it. Of which the one that gets me out of bed.

What are you interested in understanding the science behind the brain?

I think knowledge is addictive. Humans get a kick of dopamine in the brain whenever we’re exposed to novel stimuli. It’s why human beings are such adventurous creatures. We have an insatiable urge to understand, to question, to deconstruct what is fascinating. And I really feel that I wake up in the morning and I want to find something new or different that will get me excited.

I suppose that’s where my interest comes from. So as long as I’m growing, I’m not ending. As long as I’m expanding my horizons, I’m not diminishing them.

What is the goal behind your MS Visionaries initiative?

MS Visionaries, created by Helen Hayes with Yahoo Health, is a campaign that celebrates passionate innovative visionary individuals who are working to make people living with MS feel better. Theirs is trying to help and alleviate some of the difficulties associated with MS out of the kindness of their hearts. Making the campaign is meant to be a celebration of those who are finding their creativity and efforts in helping others who are facing certain difficulties. I think the work with MS is a celebration of the human spirit and human capacity to overcome boundaries.
Landmark study of brain conditions in Canada sets stage for research to action

JOYE GORDON
CHIEF, NEUROLOGICAL HEALTH IN CANADA
PARKINSON SOCIETY CANADA

The brain allows us to think, move, talk, feel, smell, hear, and see. It connects to our heart and tells it to beat. It connects to our arms and legs and tells them how and when to move, but if those connections are not working well, it’s a problem.

Alzheimer’s disease, cerebral palsy, epilepsy, multiple sclerosis, Parkinson’s disease are all a few of the more than 1.2 million identified brain conditions. Brain conditions affect individuals of all ages, and in some cases, younger than three. Canadians live with at least one of these conditions.

The brain is the most critical organ in the body, but the brain’s potential is not understood.

As the lifespan of Canadians increases, so does the incidence of age-related brain diseases. More than 15 percent of Canadians 65 and older are living with cognitive impairment including dementia, and this epidemic is expected to double in the next 20 years. The current economic burden of neurodegenerative diseases (Parkinson, Alzheimer’s, and dementia) has been estimated at $210 billion per year in Canada and mental health disorders, which already affect one in three Canadians, are the pre-eminent Canadian health challenge of the 21st century.

The good news is that our understanding of the brain, in health and disease, is accelerating, thanks to research. Many percent of what we know about the brain was discovered by breakthroughs by someone for examplecombining different methodologies to produce a more holistic view of the brain.

How can we continue to advance our understanding of the brain? One way is through the Canadian Brain Health Index (CBHI), a comprehensive interactive look at the health of the brain.

The CBHI is a research initiative that aims to improve our understanding of the brain by collecting and curating data from various sources around the world. It includes information on brain health and disease, as well as data on lifestyle factors that may impact brain health.

The CBHI uses a variety of tools and methodologies to collect and analyze data, including surveys, questionnaires, and biological samples. It also incorporates data from other sources, such as medical records and health registries.

The CBHI is designed to be flexible and scalable, allowing it to adapt to new research priorities and incorporate new data sources as they become available. It is also open to collaboration with other researchers and organizations, making it a valuable resource for the brain research community.

The CBHI is currently being developed and will be launched in 2023. It is expected to be available to researchers, clinicians, and the public for use in advancing our understanding of brain health and disease.

The CBHI is a collaborative effort involving researchers from multiple disciplines across Canada, including neuroscientists, epidemiologists, and public health experts. It is being funded by a combination of government and private sector sources.

The CBHI has the potential to revolutionize our understanding of the brain by providing a comprehensive, real-time view of brain health and disease on a national and global scale. It will enable researchers to identify new risk factors and develop new treatments for brain conditions, ultimately improving outcomes for patients.
Innovations in Parkinson's therapy

Parkinson's is a most widely known as a neurodegenerative disorder that leads to uncontrollable shaking and tremors, while treatments have helped those living with the disease, treating the symptoms with new drug therapies may offer some hope. The Parkinson's Society of Canada estimates that up to 50,000 people in the country will be living with the disease, double the number cited 10 years ago. One of the reasons for the increase in Canada's aging population, since Parkinson's usually begins between the ages of 50 and 60 percent of patients are under 60, this is a unique condition called Young-onset Parkinson's.

Hard to diagnose

There is currently no cure, despite ongoing research and development, and the onset of the disease is still not fully understood because it is so difficult to diagnose early. What is known is that it is caused by dying neurons in the region of the brain that controls movement. This makes symptoms, or "OFF episodes", generally unpredictable, says Anthony Ginovian, President and CEO at Cynapsus Therapeutics Inc.

"It is a serious rigidity where it's almost like a complete immobilization. Patients end up having to stand, sit, lay down or be somewhere near a wall, making it extremely difficult to be able to move or talk or do things they normally do," says Ginovian. "We've had patients tell us of not being able to drive, go shopping, or even able to work because of these episodes. The real danger is the threat of freezing up, falling, and hitting their head or breaking a hip."

Unpredictable "OFF" episodes

OFF episodes are triggered by a lack of dopamine in the brain and can be broken down into two types. The most common among them is morning akinesia, where patients awake with symptoms after having no treatment overnight. The initial morning dose to offset that tends to take 30-120 minutes to kick in, which makes it the most difficult to treat, he says. Other episodes that can prove problematic are when treatment wears off, and the unpredictable OFF fluctuations that can occur at any time during the day or night cycle. These fluctuations besides being particularly important to note because Parkinson's patients will eventually suffer from all of them, and their effects can be residual, leading to anxiety, depression, and a sense of loss of control.

The Parkinson's Society of Canada projects that up to 200,000 people in the country will be living with the disease, double the number cited 10 years ago.
ALTERNATIVE TREATMENTS FOR EPILEPSY: A LIFE RESTORED

Over 100,000 Ontarians are currently living with epilepsy. Daily seizures keep many from living the life they want to live, and too few are aware of the potential relief surgery can provide.

W

illiam Goodwin was diagnosed with epilepsy at 10 years old, though he had already been exhibiting mild seizures for years. Over the next decade, his condition would prove non-responsive to medication and his seizures would grow steadily worse in the pivotal years, while he was a student. As his second child was born, he was having five to seven violent seizures each day. He had been entirely taken over by the disease. Whitby had long been told that she was unlikely to be a good candidate for epilepsy surgery, but she failed to be so. That was when she went to the Krembil Neuroscience Centre at Toronto Western Hospital for an evaluation at their Epilepsy Monitoring Unit.

“My quality of life was just zero”

Epilepsy defined itself, Whitby says, “I couldn’t go anywhere on my own. I was a wheelchair. I couldn’t even lift my child. I was at the hospital so often that the doctors said I never went back to the doctors. My quality of life was just zero.” The possibility of surgical treatment was a ray of hope for her, a chance to bring some sense of normality back into her life.

The Epilepsy Monitoring Unit was able to localize Whitby’s neurological condition to a specific region of her brain, it turned out to be a rare variety of the disease and the location in the brain presented some surgical challenges, but the surgical team told Whitby that an operation was possible.

One Ontarian in a hundred is living with epilepsy. About one percent of all Ontarians have epilepsy and about 30 percent of those will find that, like Whitby, their condition does not respond to medication. That’s tens of thousands of people in this province alone suffering through persistent seizures on a daily basis. Dr. Talita Villante, Neurosurgeon and Co-Director of Krembil’s Epilepsy Program, sees a type of surgical treatment called epilepsy surgery for people with drug-resistant epilepsy.

A new strategy of epilepsy care

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Developing strategies of epilepsy care

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DEVELOPING

THE MOST PROMISING DRUG THAT PROTECTS THE BRAIN FROM STROKE DAMAGE

LEADING THE WORLD

IN THE USE OF DEEP BRAIN STIMULATION FOR ALZHEIMER’S DISEASE AND DRUG-RESISTANT DEPRESSION

EVALUATING

NEW DRUGS TO TREAT PARKINSON’S DISEASE

EXPANDING

THE USE OF STEM CELLS TO REPAIR SPINAL CORDS

Our worldwide leadership in diseases of the brain could not be achieved without the support of our generous donors. Please help The Brain Cascades Campaign or Krembil Neuroscience Centre to continue groundbreaking research on the brain.

To make a life-changing donation or for more information, visit braincascades.ca or call 416-605-5300

Krembil Neuroscience Centre
Toronto General & Western Hospital Foundation

ONTARIO SCIENCE CENTRE

The Centre for Science and Technology Education

Can you provide more information on the surgical treatment for epilepsy called “epilepsy surgery”? Epilepsy surgery, also known as epilepsy focal surgery, is a neurosurgical procedure aimed at reducing the frequency and severity of seizures in patients with drug-resistant epilepsy. It is particularly effective for patients with focal seizures, where the abnormal electrical activity is concentrated in a specific region of the brain. The surgery involves the removal of the epileptogenic zone, which is the area of the brain where seizures originate. This is determined through pre-surgical evaluations, such as video-electroencephalography (EEG) and functional magnetic resonance imaging (fMRI), which help to localize the seizure focus. The goal of epilepsy surgery is to provide seizure control and improve quality of life for patients. It is important to note that surgery is not a one-size-fits-all solution and is typically considered for patients who have not responded adequately to medication. The decision to proceed with surgery is made after thorough evaluation by a team of experts, including neurologists, neuropsychologists, radiologists, and neurosurgeons. The procedure itself is performed under general anesthesia and involves the use of advanced imaging technologies to guide the surgical incision. After surgery, patients undergo a recovery period to allow the brain to heal, followed by post-surgical care and monitoring to assess the effectiveness of the procedure. It is crucial for patients to follow up regularly with their healthcare team to ensure continued benefit from the surgery. The success rate of epilepsy surgery varies depending on factors such as the type and extent of the surgery, the patient’s age, and the duration of epilepsy. Overall, epilepsy surgery represents a hope for patients who have not found relief from medication and are looking for a more effective treatment option to improve their quality of life.
When facing a disease like multiple sclerosis, you are your own best advocate

Mother of two takes charge of her disease, does her research, and plays an active role in her treatment.

The pens and needles started in her right hand, Carole MacLean was a 2½-year-old toddler, working in a high-store job as an IT team lead. Within four days she lost functionality in her hand; she couldn’t even pick up a pen, but then she gradually returned to normal, like the slightest mess never happened.

Nearly two years later, she had another attack, and received a diagnosis: multiple sclerosis (MS).

“I was terrified,” she recalls. “I thought I had a couple of years to live. It was a death sentence. That’s what I thought.”

Understanding MS

She threw herself into learning everything she could about MS. The more she read, the more she realized: “This is not a death sentence. This disease is manageable. You can live a long life.”

MacLean has the most common variation of the disease—relapsing-remitting MS—which is characterized by attacks, followed by remission. The danger is the disease might deteriorate into secondary-progressive MS and increasing disability, which happens in about half of people within 10 to 20 years, according to the MS Society of Canada.

Early detection

According to the blog by Dr. Karen Lee at RUSH University, there is, however, a silver lining for people with progressive MS as well as relapsing-remitting MS—early treatment. Research suggests that there is growing evidence showing that treating MS as early as possible can have significant impact in long-term treatment response, quality of life, and disease progression in people with MS.

Ten years have passed for MacLean and you can’t tell she has MS. People don’t see the tubes and needles. She doesn’t limp. “I don’t look like I have MS. My life is relatively normal,” says MacLean. She lives in Wainwright, Alta., with her husband and two daughters, who she had after her first MS attack. She does yoga and attends an MS support group. For 10 years, she has been a member. She says she has lived in Toronto, where she studied, and now in her new Toronto home.

Finding the right drug

The first MS drug she tried made her anxious. The second required daily injections. Terrible side effects.

So, she’s still doing well. “It wasn’t an option.”

When a new oral treatment option was coming to the Canadian market, she knew that was the drug she wanted. She says studies showed it reduced relapses and the severity of attacks by approximately 50 percent.

“This research is changing so fast. You need to be your own advocate,” MacLean said.

She bought her research to her neurologist and he agreed. “He said, ‘How do you know so much?’ I said, ‘Because I do my research.’”

Carlo experienced mild side effects like flushing and nausea, which vanished after two months, and she has been happily on the drug ever since.

“I’m an advocate for new MS patients is that they do their own research on legitimate websites. ‘In doing that, you become less scared,’” says MacLean.

Caring deeply, changing lives.

Through cutting-edge science and medicine, Biogen Idec discovers, develops, and delivers innovative therapies for the treatment of relapsing forms of MS.

TIPS

For maintaining your brain health

Eat a well-balanced diet

A balanced diet includes a good supply of omega-3 fatty acids from fish and lean meats, and lower amounts of saturated fats, as well as fruits and vegetables rich in antioxidants, vitamins, and minerals. The sum of your diet, rather than individual foods or nutrients, is important for maintaining brain health.

Manage your stress

The more stress your brain works under, the more stress the brain develops with stress. The primary goals of brain health are to reduce stress, and the preferential sections, which is responsible for our ability to multitask.

Get enough sleep

Sleep is necessary for the brain functions and helps you learn new information. The short-term, sleep deprivation causes memory problems, impaired immune system function, attention deficit and over-balloonization. Chronic sleep deprivation is associated with an increased risk of heart disease, type 2 diabetes, and obesity.

Take your brain for a walk

In addition to being good for your heart, waistline, and muscles, exercise is good for your brain. Did you know that people who exercise regularly are less likely to develop dementia or Alzheimer’s disease? And 20 percent lower than not being active?

Train your brain

Strengthen your brain by doing regular mental exercises. Benefits of brain training are seen in people of all ages.

Visit biogenidec.ca or call 1-866-359-2502.
A new innovative approach for funding research is aimed at accelerating the development of safe and effective breakthrough treatments for neurodegenerative diseases and could aid the aging population. This new approach to funding essential research is currently being explored by a growing number of Canadians, while the impact of this economic stimulus on Canada's future neurodegenerative research appears to be significant.

New approach to funding essential research

There are currently no cures for diseases such as Alzheimer’s, Parkinson’s and amyotrophic lateral sclerosis (ALS), and treatments do not slow or stop the progression of these conditions once they are established. In 2011, approximately 500,000 Canadians were directly impacted by these conditions, either as patients or caregivers. In a generation, this number is estimated to grow to nine million Canadians, while the economic impact of these diseases on Canada is estimated to grow from $2.5 billion in 2011 to $40 billion by 2030.

By supporting high-risk, high-reward research projects, a funding Canadian funding agency is addressing one of the critical issues in the field and is spurring progress.

The one model we are inspired by is the world’s most scientific advisory board. In that regard, our approach, built around rigorous scientific research and a creative, dynamic operating model, will allow us to further develop research that needs to be done now, and be done more quickly,” explains W. Galen Weston, Chairman and President of The Weston Family Foundation, which launched the Weston Brain Institute, a granting agency directly supporting Canada’s neuroscientists.

We are determined to be the catalyst in a translational research effort capable of combating brain diseases.

Bringing the valley of death

Three main phases of research are needed to develop a new treatment: basic research, translational research and clinical trials. Basic research is relatively well-funded and, at its core, is the spectrum of the scientific, large bio-tech and pharmaceutical companies resource multi-ethnic clinical trials. Translational research, too, is understood a situation that it is often referred to as the “valley of death” or “valley of despair.” To our view, the most promising key breakthroughs in translational research are critical to finding solutions to this problem. Current research, however, is not sufficient and needs more of the most promising key breakthroughs to be implemented.

The Weston Family Foundation, which launched the Weston Brain Institute, a granting agency directly supporting Canada’s neuroscientists, is determined to be the catalyst in a translational research effort capable of combating brain diseases. “We are determined to be the catalyst in a translational research effort capable of combating brain diseases,” Dr. Julian Higdon, Director of the Weston Brain Institute, said.

The Weston Brain Institute is in a unique position to leverage the expertise and knowledge of world-renowned scientists and clinicians, and to accelerate the path to the discovery of new treatments.

Epilepsy affects 1 in Canadians

...it most often strikes in adolescence, resulting in a lifelong battle against seizures and in some cases death. Help find a solution. Donate to epilepsy research at www.ewep.ca.

KalGene Pharmaceuticals committed to developing a disease modifying therapy for Alzheimer’s

The National Research Council of Canada (NRC) and KalGene Pharmaceuticals are co-developing a novel therapeutic approach against Alzheimer’s disease. KalGene is collaborating with the Institute for Imaging Technology Commercialization (CIMETEC) and the Montreal Neurological Institute to access the most advanced diagnostic tools.

“Withdrawing this new Canadian-developed Alzheimer’s therapy with the best imaging technology available will be an exciting development for clinicians who must manage this disease today without effective treatments,” said neurologist at McGill University, Dr. George Maclure. We are committed to co-developing new treatments with NRC against diseases that have traditionally been difficult to treat,” said Dr. Yvonhan Duhaime, CEO. “This multi-disciplinary collaboration brings new treatments that can change people’s lives with Alzheimer’s.”

For additional information on KalGene’s efforts to develop new treatments for Alzheimer’s disease, please contact nathan@kalgene.com.
ALZHEIMER’S IN CANADA

Starting in January, thousands of Canadians participate in the annual Walk for Memories in communities across Canada to raise funds for local Alzheimer Societies in your area and services, January into Alzheimer Awareness Month.

“Isn’t there an urgent need to recognize that we need to invest a major amount of money into dementia research?”

Moving forward

Despite chronic under-investment in Alzheimer’s disease research, collaboration between researchers and clinicians throughout the world has led to many groundbreaking discoveries in the study of dementia. Many of these discoveries are happening here in Canada.

"Canadian companies are making many discoveries in developing treatments for Alzheimer’s disease. Let’s hope people will listen to us about what we need to do, the faster we can find a cure,"

Emphasizing the need to research Alzheimer’s disease through new and innovative treatments, the need to more accurately diagnose and treat Alzheimer’s disease.

With the help of so many people in so many ways, I’m sure we’ll find a cure.

Bridging the gap between mental health and epilepsy

In 2016, the United States Food and Drug Administration (FDA) approved an antiseizure medication that reduces the risk of suicidal behavior and suicidal ideation in adults with major depressive disorder (MDD). This approval was based on results from two randomized, double-blind, placebo-controlled trials that assessed the efficacy and safety of the medication in reducing suicidal ideation and behavior in adults with MDD. The trials were conducted in collaboration with the National Institute of Mental Health (NIMH) and the National Institute of Neurological Disorders and Stroke (NINDS). The medication is a selective serotonin reuptake inhibitor (SSRI) called citalopram, which is known to increase the availability of serotonin in the brain, thereby reducing the risk of suicidal behavior and suicidal ideation in adults with MDD.

The new research has implications for the treatment of anxiety disorders and depression, which are often comorbid with epilepsy. In particular, the findings suggest that the development of new medications for the treatment of these conditions may be facilitated by the use of novel methodologies, such as pharmacogenomics and personalized medicine.

In addition, the research highlights the importance of collaboration between different disciplines, such as psychiatry, neurology, and psychology, in order to advance the understanding of the underlying mechanisms of these disorders and to develop effective treatment strategies. It also underscores the importance of considering the heterogeneity of the patient population in the design and implementation of clinical trials, in order to ensure the safety and efficacy of new treatments for these conditions.

In conclusion, the research presents a promising new approach to the treatment of anxiety disorders and depression in adults with MDD, and highlights the importance of collaboration between different disciplines in order to advance the understanding and treatment of these conditions. The findings also have important implications for the development of new treatments for epilepsy, and emphasize the need for continued research in this area.

Eun-Joo Kim

Bridging the Gap Between Mental Health and Epilepsy
Living with multiple sclerosis without fear

In 2004, Christine received news that she had multiple sclerosis with a disease course further complicated by optic neuritis, a disease that affects an estimated 150,000 Canadians.

Signs and symptoms

The symptoms are very scary from person to person and they can range from energy fatigue, difficulty in walking, tremors, memory, distractibility, impaired vision or a loss of fine motor skills.

One day, Christine woke up and was unable to see out of her left eye. She called her doctor, who could be a sign of MS. “I didn’t like that sound at all,” she recalls. “My first thought was, oh no, I’m going to lose my vision.”

Then a few years later, at the beginning of a ski trip, she felt the world went numb. It was weak and lacked strength. Christine was unable to leave her hotel.

After this second incident, Christine, who was about to leave for her vacation, was told she couldn’t go. She was able to complete a diagnosis of re-igniting MS, the most common of the four types, following a Magnetic Resonance Imaging (MRI) test that revealed unusual activity in the brain.

She was told she had relapsing remitting MS.

A manageable condition

The more she learned about MS, the more she realized that it was a manageable disease, one that could be modified with healthy lifestyle changes.

Christine went on to try the therapy of her own face with time. I’m doing what I want to do. I’m happy.”

WILFRED SCHUMACHER
EDI@WILFRED.COM

Former Canadian boxing champion talks about her battle with multiple sclerosis

When Lara was first crowned a world champion in 2002, she had no way of knowing that one day she would have to withstand the ring and that her opponent would be multiple sclerosis.

Growing up, Lara had always been an athlete, always searching for the most perfect little things. In the beginning, she was one of the first. She won’t ever be a bodybuilder, but she was able to train for long enough to be a true fighting champion. She has used her training and her training to be here. She trained hard for 10 years, from when I was four and I loved it,” says Lara, now 31. “It didn’t look like the time was always easy, but it was worth it.”

An unexpected diagnosis

Although only diagnosed with MS in June 2016, Lara was experiencing various symptoms in a short period of time in 2010 due to the stresses of her job. She was unable to walk, had trouble with everyday activities, and was unable to control her body. She was told she had MS.

In 2016, Lara was in the hospital for four weeks for tests. She was told she had MS.

At that time, Lara was 25 and had just finished training for her third world championship. She had been training for 10 years, from when I was four and I loved it,” says Lara, now 31. “It didn’t look like the time was always easy, but it was worth it.”

The way I fight is by being a clinical trial for a drug that sounds like the most promising of my “big gun” options, and by constantly adapting, trying different angles and accepting things I’d rather not.”

In those years, I would go through periods of a couple of months where I experienced numbness in my whole body. Sometimes, I would go through periods of a couple of months where I experienced numbness in my whole body. Sometimes, I would experience numbness in my whole body. Sometimes, I would experience numbness in my whole body. Sometimes, I would experience numbness in my whole body.

I have found that when I’m in the ring, I’m a lot more focused. I’m able to think more clearly and I’m able to think more clearly.

The way I fight is by being a clinical trial for a drug that sounds like the most promising of my “big gun” options, and by constantly adapting, trying different angles and accepting things I’d rather not.”

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