

Krembil
Relentless.



From Promise to Progress

2020 Annual Report



The Krembil Research Institute (Krembil) is the research arm of the Toronto Western Hospital (TWH) and one of the seven research institutes at the University Health Network (UHN). Krembil’s research programs focus on the brain, the eye and arthritis. Its laboratories are located at the Krembil Discovery Tower and at TWH’s Main, McLaughlin and Fell Pavilions. Prior to November 13, 2015, Krembil was known as the Toronto Western Research Institute.

We acknowledge the land we are meeting on is the traditional territory of many nations including the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee and the Wendat peoples and is now home to many diverse First Nations, Inuit and Métis. We also acknowledge that Toronto is covered by Treaty 13 with the Mississaugas of the Credit. We remember and honour the legacy of the peoples who have been here before us and all who work to make the promise and the challenge of Truth and Reconciliation real. We are grateful to have the opportunity to live and work on this land.

Krembil is committed to championing inclusion, diversity, equality, equity and accessibility in the learning, work and service environments. We believe that our differences enrich our ability to develop creative and innovative approaches to deliver exemplary patient care, research and education.

About the cover: photos of patients and their family members who have been a part of groundbreaking research within the fields of neuroscience, arthritis and vision sciences. The novel treatments and protocols developed at Krembil have significantly improved their quality of life. Photographs are courtesy of Tim Fraser.

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From Promise to Progress

I recently met with a patient who asked me, “Will COVID-19 derail your work in Alzheimer’s disease?”

A thought-provoking question, indeed, and one that is on the minds of many as we navigate the biggest global health crisis of our generation.

My answer, in no uncertain terms: “No, we are not giving up. We will never give up.”

Alzheimer’s disease and the many chronic illnesses affecting our loved ones and our communities are not going away, and so we, the 700-strong team of innovative, dedicated and passionate scientists and clinicians at Krembil, are not going away either.

In fact, this pandemic has strengthened our resolve to push harder and delve further into the unknown, to find the answers that we desperately need right now.

COVID-19 has put science in the spotlight.

This is an extraordinary time in our history, but it is also a pivotal moment for science. The world is watching, knowing that when we ask the right questions, the answers can save lives.

That is why Krembil has continued to attract top talent from all over the world and why we will continue to recruit the best of the best. Krembil is unique in that scientists work together with clinicians, creating a synergistic, team-based approach to modern medicine and research, which can only serve to push us further, faster in making new discoveries.

In these pages, you will read about the incredible and important work being done right now in our laboratories and clinics.

The current pandemic may have forced us to pivot, but we have never taken our foot off the gas when it comes to pursuing new treatments for diseases of the bones, joints, the eyes and the brain.

With each COVID-19 study Krembil scientists help conduct we are learning more about the potentially severe effects that this virus has on the brain, including an increase in the number and severity of strokes, and the interplay between inflammation and immune response. The significant neurological effects also have long-term implications for people living with chronic illnesses, especially the elderly, who are among the most vulnerable members of our community. This is all very relevant to what we do at Krembil.

True science is about persistence and resilience. Mostly though, it is about overcoming fear and replacing it with curiosity. It is curiosity that can move mountains and help us find cures.

Over the past year, we have all experienced history in the making. In this new and tumultuous environment, donor support is more important than ever.

With your encouragement, we will continue to address not only the effects of COVID-19, but also the diseases of the brain, eyes, bones and joints that are central to our mandate at Krembil. With your help, we will push our groundbreaking research from promise to progress.

So, to my patients and to all future patients, I say, “Don’t give up hope on us, because we will never give up on you.”

Thank you.



Donald F. Weaver, MD, PhD, FRCPC, FCAHS

Director, Krembil Research Institute

University Health Network



Uncovering a Hidden Risk

Obstructive sleep apnea causes breathing to stop and start during sleep. It is associated with a higher risk of death, cardiac disease and cognitive impairment.

Dr. Frances Chung (pictured below) and her team discovered that the risk of postoperative heart-related complications was twice as high in patients with severe obstructive sleep apnea compared to those without sleep apnea.

These results may help improve surgical outcomes for patients with sleep apnea. Dr. Chung suggests, “If patients have symptoms of sleep apnea, perhaps the condition should be treated before undergoing major surgery.”

Chan MTV, et al. JAMA. 2019 May. doi: 10.1001/jama.2019.4783.

Dr. Frances Chung, Clinician Investigator.



Leaving a Mark on the Brain

Repeated concussions in former athletes linked to high levels of tau protein.

Athletes with a history of repeated concussions are at an increased risk of developing a neurodegenerative condition known as chronic traumatic encephalopathy (CTE), which impairs mental function and memory and can cause behavioural changes.

“We do not fully understand how CTE develops or why it occurs in some people with multiple concussions but not others. Diagnosing the condition is also a challenge because many of its symptoms overlap with those of other neurodegenerative diseases, such as Alzheimer disease,” says Dr. Carmela Tartaglia.

To begin addressing these knowledge gaps, Dr. Tartaglia and her team measured the levels of total tau and beta-amyloid proteins in the cerebrospinal fluid of 22 former professional athletes who sustained multiple concussions during their careers. The researchers also assessed the athletes’ brain structure and brain function.

When the team compared tau levels in the former professional athletes with those of healthy individuals with no history of concussions, two groups emerged: one group had levels of tau that were comparable to healthy individuals, and a second group had significantly higher levels of tau. The athletes with higher tau levels displayed impairments in their mental function and changes in their brain structure, both of which are indicative of neurodegeneration.

“Our findings suggest that high tau levels could be a sign of neurodegeneration in individuals who have sustained multiple concussions,” says Dr. Tartaglia.

“Detecting evidence of neurodegeneration is the first step towards being able to provide a treatment.”

Taghdiri F, et al. Neurology. 2019 Jun . doi: 10.1212/WNL.0000000000007608.

Detecting evidence of neurodegeneration is the first step towards being able to provide a treatment.

Dr. Carmela Tartaglia, Clinician Investigator



The Missing Piece

Research uncovers clues into how brain networks develop

A study suggests that a protein known as VLK plays an important role in brain development. The findings were published in the prestigious journal *Nature Chemical Biology*.

The adult brain consists of 86 billion nerve cells known as neurons, which are highly interconnected and form intricate networks. The activity of these networks underpins all of the brain's functions and processes. Currently, it is not clear how neurons connect with one another to build these brain networks.

"We found several scientific clues suggesting that the VLK protein, which was discovered only recently, might be involved in this process," explains Dr. Philippe Monnier, who led the study.

VLK is a protein secreted by neurons into their environment. It can add phosphate chemical groups to other proteins and alter their function.

The researchers studied the effect of VLK on the growth and development of the network of neurons that connect the eyes to the tectum—a brain region that processes visual information. They found that VLK attached phosphates to proteins on the surface of growing neurons.

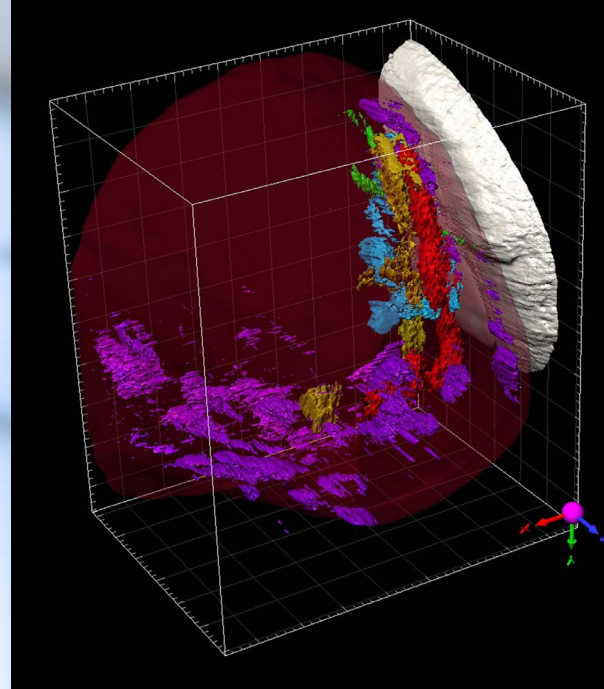
Using sophisticated software to produce three-dimensional surface renderings of the tectum (pictured above, right), the team discovered that the pattern of the phosphates on the surface of the neuron controlled the direction of growth, enabling it to form connections to other neurons.

"Our findings show that VLK modifies proteins that guide neuron growth and connectivity, and likely has profound effects on brain development, function and disease," says Dr. Monnier.

Harada H, et al. *Nat Chem Biol*. 2019 Aug 26. doi: 10.1038/s41589-019-0345-z.

Our findings show [...] profound effects on brain development, function and disease.

Dr. Philippe Monnier (left), Senior Scientist. Photo by Tim Fraser.
Dr. Hidekiyo Harada, postdoctoral fellow.



Meeting Patients Eye-to-Eye on Therapy

Dry eye disease is a condition that can interfere with vision and cause itchy and inflamed eyes. The disease affects up to 25% of eye clinic patients.

A promising treatment involves the use of a tear-replacement fluid known as 'autologous serum tears'. This fluid is prepared using a patient's own blood plasma and contains many beneficial factors.

Despite this promise, few studies exist that assess patient satisfaction with the therapy. To address this, Clinician Investigators Drs. Clara Chan, David Rootman and Allan Slomovic enrolled 100 patients with dry eye disease to complete a survey that integrated, validated and standardized approaches. The results revealed high patient satisfaction with the therapy, which significantly reduced dry eye symptoms. "Our findings provide new support for the use of autologous serum tears to treat this condition," says Dr. Chan.

Kreimeier M, et al. *The Ocular Surface*. 2019 Oct;17(4)doi: 10.1016/j.jtos.2019.07.003.



Dr. Clara Chan, Clinician Investigator.

Finding the Root Cause

New immune cell identified in those with spinal arthritis

A study led by Dr. Robert Inman reveals key differences between immune cells in the joints of healthy individuals and those with a form of arthritis known as ankylosing spondylitis.

The study was initiated to shed light on why new treatments are providing mixed results. “We have made great strides in understanding the underlying cause of this form of arthritis, which affects the joints in the spine. Specifically, we have found that the immune system in the gut may drive the disease. However, new therapies that target the cross talk between the gut and inflamed spinal joints have failed to improve symptoms in all patients,” says Dr. Inman.

“

We have made great strides in understanding the underlying cause of this form of arthritis. . .

”

With the aim of refining treatment approaches, Zoya Qaiyum in Dr. Inman’s lab studied the proteins on the surface of immune cells—known as integrins—in affected joints. These proteins direct immune cells as they move between different tissues.

When comparing immune cells in healthy individuals with those in individuals with ankylosing spondylitis, Ms. Qaiyum found heightened levels of an immune cell, known as a CD8+ T cell, in individuals with arthritis. Furthermore, these cells have a unique combination of different integrins on their surface.

“Interestingly, some of these integrins are also found on immune cells in the gut. This suggests that the CD8+ T cells that we identified may be involved in the cross talk between the gut and the spine,” says Dr. Inman.

Future research will establish the role of this unique cell population in disease with the aim of fine-tuning immune-based therapies and maximizing the benefit to patients.

Qaiyum Z, et al. 2019 Nov. doi: 10.1136/annrheum-dis-2019-215349.



Laura Passalent, Clinician Investigator.

Diagnosing arthritis faster

A study led by Laura Passalent examined whether an alternative model of care involving physiotherapists could help accelerate the detection of spondyloarthritis for those living with back pain.

The researchers found that the physiotherapists’ diagnoses agreed with those provided by the rheumatologists up to 80% of the time—the same level of agreement seen among rheumatologists themselves.

“Our study suggests that, with suitable training, physiotherapists could expand their role to help reduce bottlenecks in the healthcare system and improve access to care for individuals with spondyloarthritis,” says Ms. Passalent.

Passalent L, et al. J Rheumatol. 2019 May 1. doi: 10.3899/jrheum.180787



Dr. Robert Inman, Senior Scientist.

Drs. Patrick Nicholson and Timo Krings – When evaluating images taken of patients with severe forms of COVID-19, Dr. Patrick Nicholson, Dr. Laila Alshafei, and Dr. Timo Krings from the Division of Neuroradiology identified brain CT and MRI patterns indicative of bleeding. Their findings, later published in the *American Journal of Neuroradiology*, showed that various pathways, including low levels of blood oxygen, inflammation and increased clotting of the blood induced by the virus, were the likely sources of the observed brain bleeds. Dr. Nicholson is now involved in a Canada-wide study looking at neurological outcomes in patients with COVID-19. “We hope these findings will help to prevent the potentially catastrophic outcomes of COVID-19, as it is becoming increasingly clear that the virus is not only a lung disease but affects every organ, including the brain,” says Dr. Nicholson.

Dr. Sowmya Viswanathan – Acute Respiratory Distress Syndrome (ARDS) is the severe respiratory failure that causes death in many COVID-19 patients. Krembil Scientist Dr. Sowmya Viswanathan will soon test a unique technology used to enhance bone marrow-derived mesenchymal stromal cells (MSCs) in a pre-clinical model with ARDS. MSCs are thought to reduce inflammation and suppress immune responses. Dr. Viswanathan wants to understand if these enhanced bone marrow-derived MSCs will fare better than normal MSCs in patients with this acute respiratory failure. MSCs are currently in clinical trials globally to see if they can reduce mortality caused by ARDS in COVID-19 patients. The hope is that this proprietary technology may reduce the dose and/or increase the efficacy of MSCs in COVID-19 patients.

COVID-19

Dr. Sindhu Johnson – As with many people living with underlying health conditions, those with rheumatic diseases, such as osteoarthritis, scleroderma, ankylosing spondylitis and lupus, may have poor outcomes as a result of acquiring COVID-19. Dr. Sindhu Johnson, a Krembil Clinician Scientist and Director of the Scleroderma Program at UHN, has taken on a new role as regional lead for the COVID-19 Global Rheumatology Alliance patient registry to try to change that. The registry was created to help the global rheumatology community to address this issue as well as curate relevant information and disseminate it to doctors and patients during this pandemic, with a goal of advancing care for patients living with rheumatic diseases. The group has already published early findings from their COVID-19 research, including the fact that the use of steroids in people with rheumatological diseases, who have a COVID-19 infection, was associated with an increase in hospitalizations. The study also found that older age and comorbidities are the primary drivers of admissions for people with rheumatological diseases. “The relationship between rheumatic disease, immunosuppressive medications and COVID-19 infection is raising important questions,” says Dr. Johnson.

Dr. Mojgan Hodaie – One of the most pervasive and mysterious symptoms of COVID-19 is a loss of the sense of smell, also known as ‘anosmia.’ Dr. Mojgan Hodaie, a neurosurgeon and Krembil Scientist, has expertise into research on the trigeminal nerve. Her research program is shedding light on the role of this nerve in the transmission of pain, as well as other types of sensory phenomena, including the sense of smell. As a result of her unique expertise, Dr. Hodaie has developed a test that is able to identify which nerves may be involved in anosmia. Her research project involves testing the sense of smell in patients with COVID-19 to better understand the pattern of anosmia. Her research project involves testing the sense of smell in patients with COVID-19 to better understand the pattern of anosmia. “Advances in this field can lead to easier methods of testing the long and short-term impact of COVID-19 on the brain,” says Dr. Hodaie. “This proposal will help us understand to what degree COVID-19 interacts with brain structures and which pathways it might use to enter the central nervous system.”

Dr. Michael Tymianski – Dr. Michael Tymianski – Krembil Senior Scientist Dr. Michael Tymianski and his team are currently conducting research to aid in the development of therapeutics that can reduce the level of infectivity and virulence of COVID-19 by blocking certain protein-protein interactions. Research has shown that such protein interactions may be responsible for the severity of illness a person experiences. Dr. Tymianski’s team is using a peptide synthesizer, purchased through generous donor support, to rapidly generate new therapeutic agents. The equipment reduces the wait time per sample to 24 hours, down from six weeks. This research builds on Dr. Tymianski’s two decades of work developing a drug called nerinetide, which has shown promise in slowing the damage caused by acute ischemic strokes. “We believe that we can develop a compound that interferes with SARS-CoV-2 virus in a manner similar to the way our stroke drug interferes with stroke progression, that may be a treatment for people infected with the SARS-CoV-2 virus,” explains Dr. Tymianski.

Dr. Donald Weaver – While studying novel approaches to brain inflammation and inflammatory conditions in the body, Krembil Director Dr. Donald Weaver, a neurologist and a medicinal chemist, recognized that a well-known diuretic called furosemide could be a potential therapeutic for COVID-19. Dr. Weaver’s team identified that furosemide has the ability to reduce the deadly levels of inflammation—known as the ‘cytokine storm’—seen in many patients with acute respiratory failure due to COVID-19. This study will recruit hospitalized patients across Canada for a double-blind, placebo-controlled, randomized clinical trial to establish the safety and efficacy of inhaled furosemide as a treatment for acute respiratory failure caused by COVID-19.

Research

Dr. Michael G. Fehlings – It is estimated that over 350,000 inpatient surgeries and more than one million outpatient procedures are conducted each year in Ontario’s hospitals. Due to the COVID-19 pandemic, many surgical procedures have been postponed or put on hold. With funding from the De Gasperis Foundation, Dr. Fehlings, a neurosurgeon and Krembil Senior Scientist, is leading a multi-hospital study to examine the effect that the virus has had on patient backlog. The study is also looking at how the healthcare system can work to limit this impact in the future. Using real-time data from Toronto’s academic hospitals as well as provincial data from the Institute for Clinical Evaluative Sciences (ICES) database, Dr. Fehlings’ research will serve to develop approaches to assist with the reallocation of resources, enhance safety protocols, ensure equitability in patient care, and identify current and pre-existing discrepancies in the health system. “Our work has highlighted the importance of ramping up surgical care for spinal patients, in particular those with non-traumatic spinal cord injury from degenerative disease and other causes.”

Dr. Elizabeth Wilcox – Community-acquired pneumonia (CAP) from infection is a leading cause of death globally, with approximately three million deaths recorded in 2016. Hospital admissions due to CAP are often associated with a substantial risk of mortality. Krembil Clinician Investigator and critical care physician Dr. Elizabeth Wilcox is part of a global network of experts, hospitals and research institutions called REMAP-CAP, with over 200 sites in 19 countries. REMAP-CAP uses an innovative and adaptable trial design and was created nearly a decade ago to study new ways of reducing mortality rates, increasing efficiencies in ICUs and improving patient outcomes around the world. REMAP-CAP was designed to be able to scale in the event of a pandemic, such as COVID-19. “The platform trial model of REMAP-CAP mimics the array of decisions made in real clinical practice while allowing for the evaluation of these different treatments simultaneously,” says Dr. Wilcox.



Science in the 6ix

From L to R: Jimmy Qiu, The Techna Institute; Dr. Nicole Woods, The Institute for Education Research; Dr. Taufik Valiante, Krembil Brain Institute; Dr. Stephanie Protze, McEwen Stem Cell Institute; Dr. Bastien Moineau, The KITE Research Institute; Dr. Beate Sander, Toronto General Hospital Research Institute; Dr. Shane Harding, Princess Margaret Cancer Centre

The inaugural 'Science in the 6ix: Spotlight on UHN Research' event, hosted by Krembil in the fall of 2019, provided a unique opportunity for nearly 200 members of the public, media and donors to meet and be inspired by a new generation of UHN's trailblazing scientists.

CBC's Mary Ito served as Master of Ceremonies and André Picard, health columnist with The Globe and Mail, delivered a keynote on why science needs to be a priority on the political agenda. "The best way to promote your work is by doing good science," he told the audience.

TED talk-style presentations by seven UHN scientists followed.

Jimmy Qiu (The Techna Institute) combines traditional medical imaging with new technologies to help surgeons and medical teams in the operating room with agility and precision.

Dr. Nicole Woods (The Institute for Education Research) is interested in how restructuring medical school curricula may improve patient outcomes.

Dr. Taufik Valiante (Krembil Brain Institute) is developing a device that can be implanted in the brain to stop seizures.

Dr. Stephanie Protze (McEwen Stem Cell Institute), is using pluripotent stem cells to develop a biological alternative to electronic pacemakers.

Dr. Bastien Moineau (The KITE Research Institute) is developing smart clothing using functional electronic stimulation.

Dr. Beate Sander (Toronto General Hospital Research Institute) uses modelling to analyze the economic impact of infectious disease outbreaks.

Dr. Shane Harding (Princess Margaret Cancer Centre) is studying the combination of immunotherapy and radiation therapy as a more effective treatment for cancer patients.

The Future of Alzheimer's and Dementia

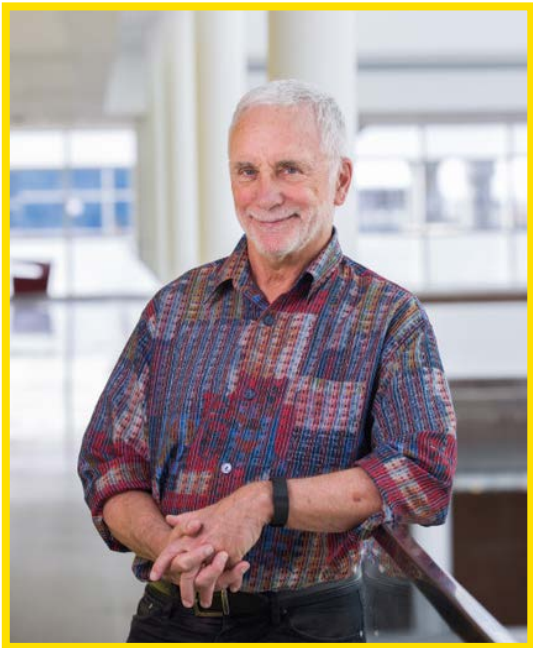
On World Alzheimer's Day, Krembil Brain Institute, together with the Alzheimer Society of Canada, hosted a free virtual event called 'The Future of Alzheimer's and Dementia.'

More than 500,000 Canadians are currently living with dementia and Alzheimer's disease; by 2031, that number is expected to double. The goal of this event was to put a spotlight on this urgent problem, to engage and inform the public, and to communicate the progress being made in research.

Following opening remarks from Dr. Kevin Smith, UHN's President and CEO, viewers learned about the experience of Leonard and Naome Howe, who are currently living with dementia. "I want to share my story because I want to help others," Leonard said in a video.

Science broadcaster and author Jay Ingram gave a short keynote, followed by a panel discussion and Q&A with experts, including Dr. Donald Weaver, neurologist and Co-Director of UHN Krembil Brain Institute; Dr. Saskia Sivananthan, Chief Research and Knowledge Translation Officer with the Alzheimer Society of Canada; and Dr. Andrea Iaboni, Geriatric Psychiatrist and Clinician Scientist at The KITE Research Institute.

"Getting this conversation going, that's why we brought you together tonight," said Dr. Weaver. "Dementia, and Alzheimer's disease in particular, is becoming a global health threat that we cannot afford to ignore."



Jay Ingram,
Science broadcaster and author of
'The End of Memory'



Dr. Donald Weaver



Dr. Saskia Sivananthan



Dr. Andrea Iaboni



Leonard and Naome Howe

Krembil Research Day

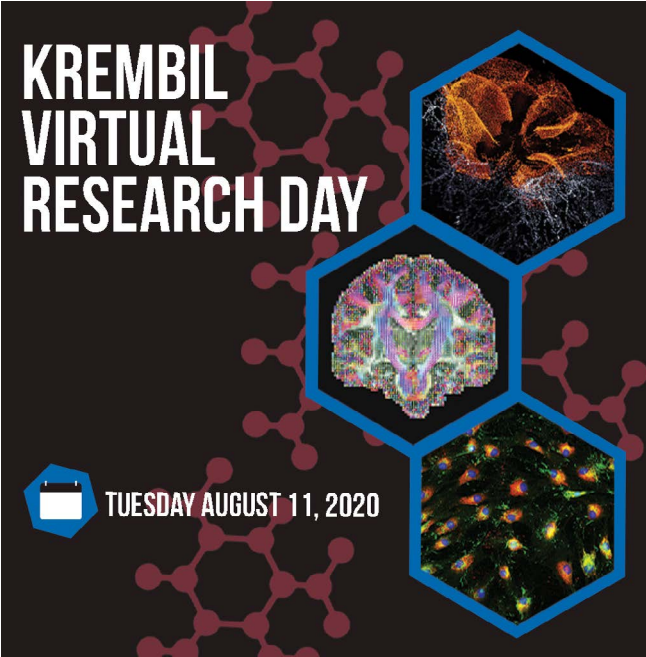
Krembil's annual Research Day went virtual this year, with investigators, trainees and staff celebrating the research achievements of their colleagues from the comfort of their home or office.

"We are living through history," said Dr. Brad Wouters, UHN's Executive Vice President of Science and Research, in his opening remarks. "With you future scientists looking for answers, I know we are in good hands."

Krembil Director Dr. Donald Weaver followed, with an inspiring message on the role of science today. "Science is a human activity that takes fear and transforms it into curiosity. And it is this curiosity that will lead to a cure."

Dr. Mary Pat McAndrews, Chair of the Trainee Affairs Committee, moderated eight oral presentations from Krembil's three research pillars: brain and spine, bone and joint, and eye.

Attendees were also treated to a video showcasing the rich history of research and mentorship at the former Toronto Western Research Institute and Krembil. Past trainees shared memories and lessons learned along their journey.



Worldwide Computational Neuroscience Conference

When Krembil postdoctoral researcher Dr. Scott Rich and a small group of colleagues decided to design the first-ever virtual Canadian Computational Neuroscience Spotlight (CCNS) symposium in June 2020, they never imagined the response.



"We had 400 people from all over the world!" says Scott. "It exceeded all of our expectations."

From trainee-focused talks and access to world-class speakers, to virtual meet-ups and poster presentations, the distanced format led to an abundance of lively discussion and debate.

"Computational neuroscience is still an emerging field, but a lot of the work we do has a direct impact on patient-facing medical problems, such as neuromodulatory devices for epilepsy, or new treatments for dementia," says Dr. Rich. "Krembil's interdisciplinary team and approach are extremely unique."

An Eye For Discovery

Dr. Karun Singh joins Krembil as a Senior Scientist

In June 2020, the Krembil research community welcomed Dr. Karun Singh as a Senior Scientist. Dr. Singh has extensive expertise in neuroscience and stem cell biology. Through his research, he has made strong contributions to our understanding of neurodevelopmental disorders (NDDs). He received the Canadian Association for Neuroscience's 2018 Young Investigator Award for identifying two novel risk genes for NDDs: TAOK2 in autism and OTUD7A in 15q13.3 microdeletion syndrome.

Through collaborations and scientific exchanges, he will help Krembil's vision researchers model human diseases using patient samples. Developing more humanized models of disease can lead to new insights into disease mechanisms. "I am very excited to be part of Krembil's large neuroscience community, where basic and clinical science are so highly integrated. I look forward to establishing

new projects and collaborations—particularly with the vision and neurodegenerative disease groups—to mutually expand and enrich our research programs," says Dr. Singh.

Dr. Singh's recruitment was made possible by the generous support of Donald K. Johnson and the late Anna McCowan-Johnson through the Toronto General & Western Hospital Foundation.



Brain Gain in Neurophysiology

Dr. Luka Milosevic, biomedical engineer, returns to UHN

In September 2020, former UHN trainee Dr. Luka Milosevic joined the Krembil Research Institute as a Scientist. Dr. Milosevic is a biomedical engineer, researcher and intraoperative neurophysiologist.

Dr. Milosevic's research has provided his field with a deeper understanding of how electrical impulses that are generated during deep brain stimulation (DBS) regulate brain activity.

Most notably, he found that DBS can induce long-lasting changes to brain activity that persist after stimulation.

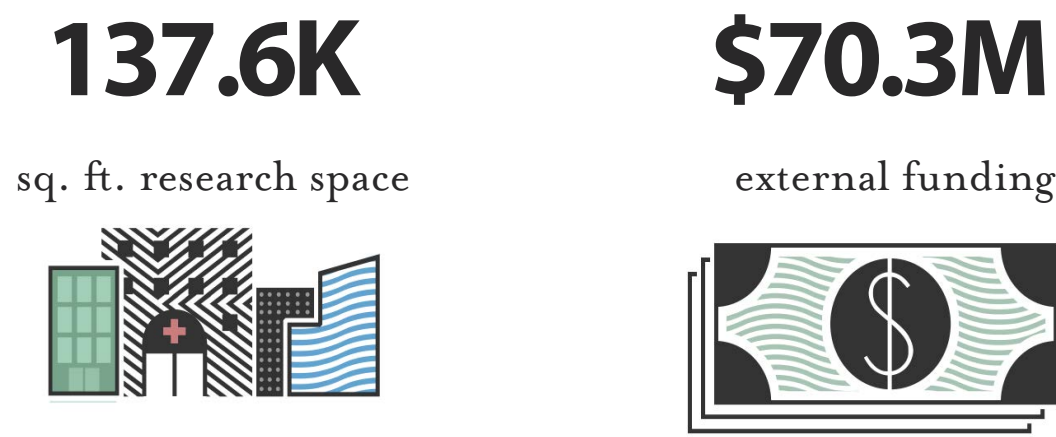
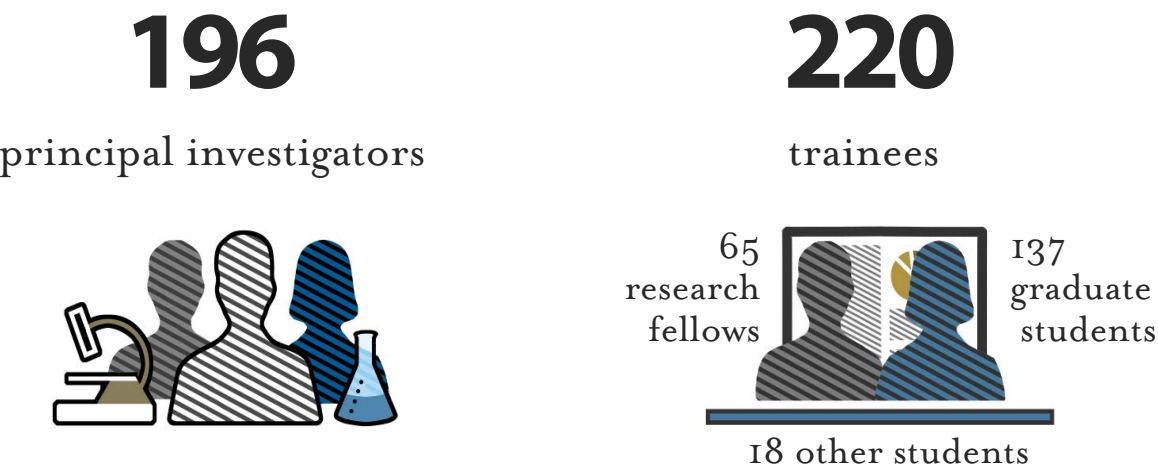
His team will leverage the access to intracranial human brain recordings in order to gain a deeper understanding of physiological processes underlying disorders of the nervous system, with the aim of developing therapeutic brain stimulation approaches. Dr. Milosevic also has a clinical role monitoring patients' brain activity during surgeries to guide the placement of DBS devices.

"I'm looking forward to collaborating with the incredibly talented scientists at Krembil and contributing positively to the lives of individuals living with neurological conditions," says Dr. Milosevic.

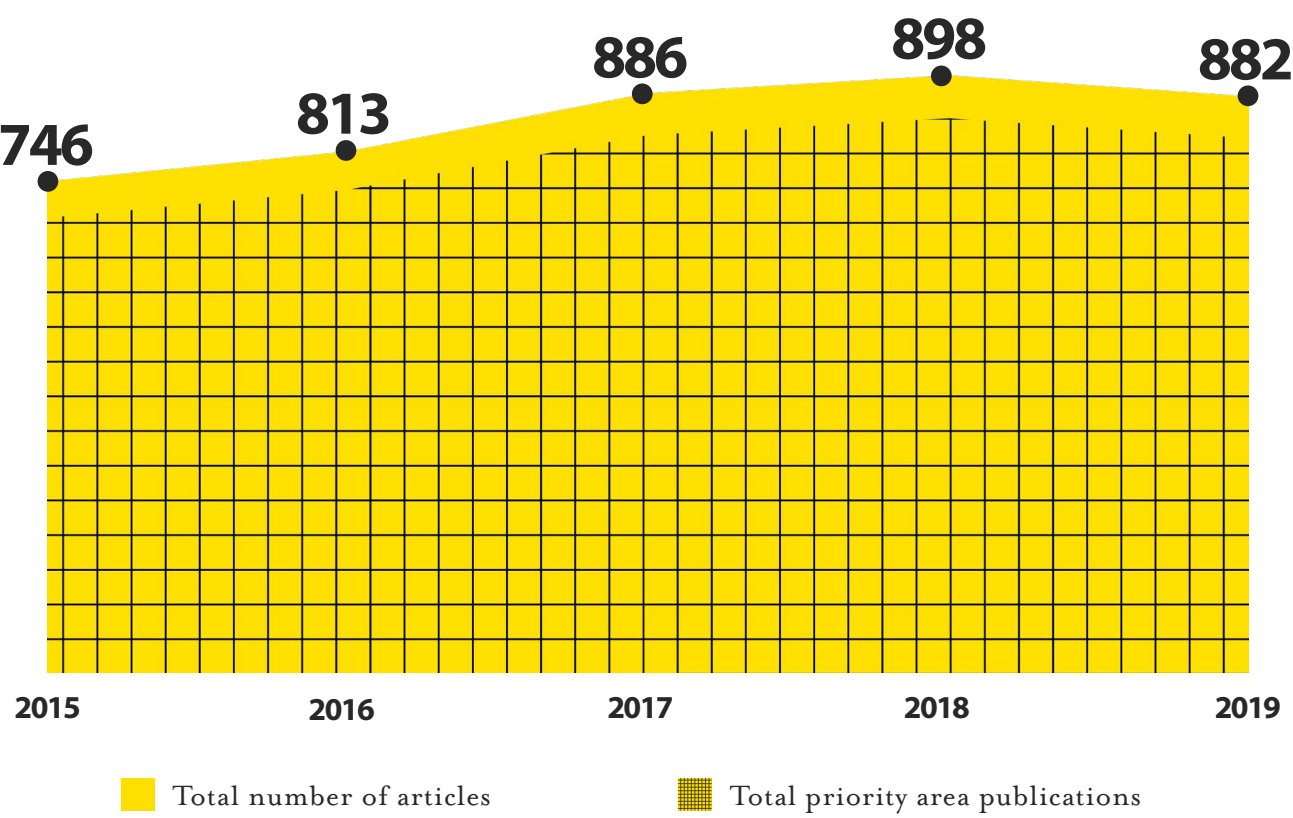


CytoFLEX LX is a flow cytometer that enables single cell analysis, which aids in identifying biological function and potential therapeutic targets.

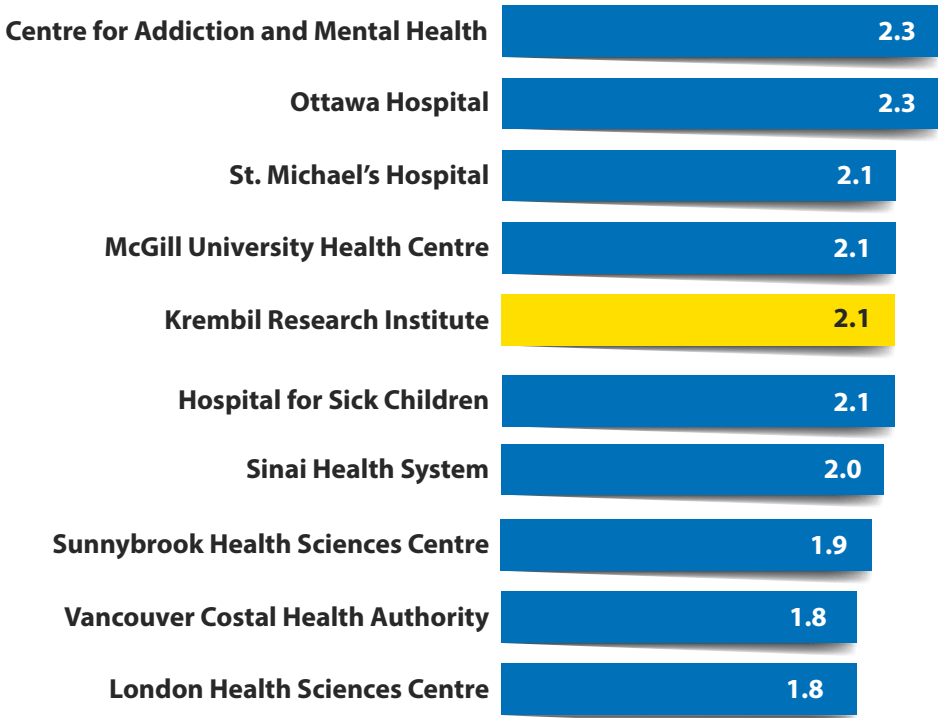
Krembil by the Numbers



Research Articles

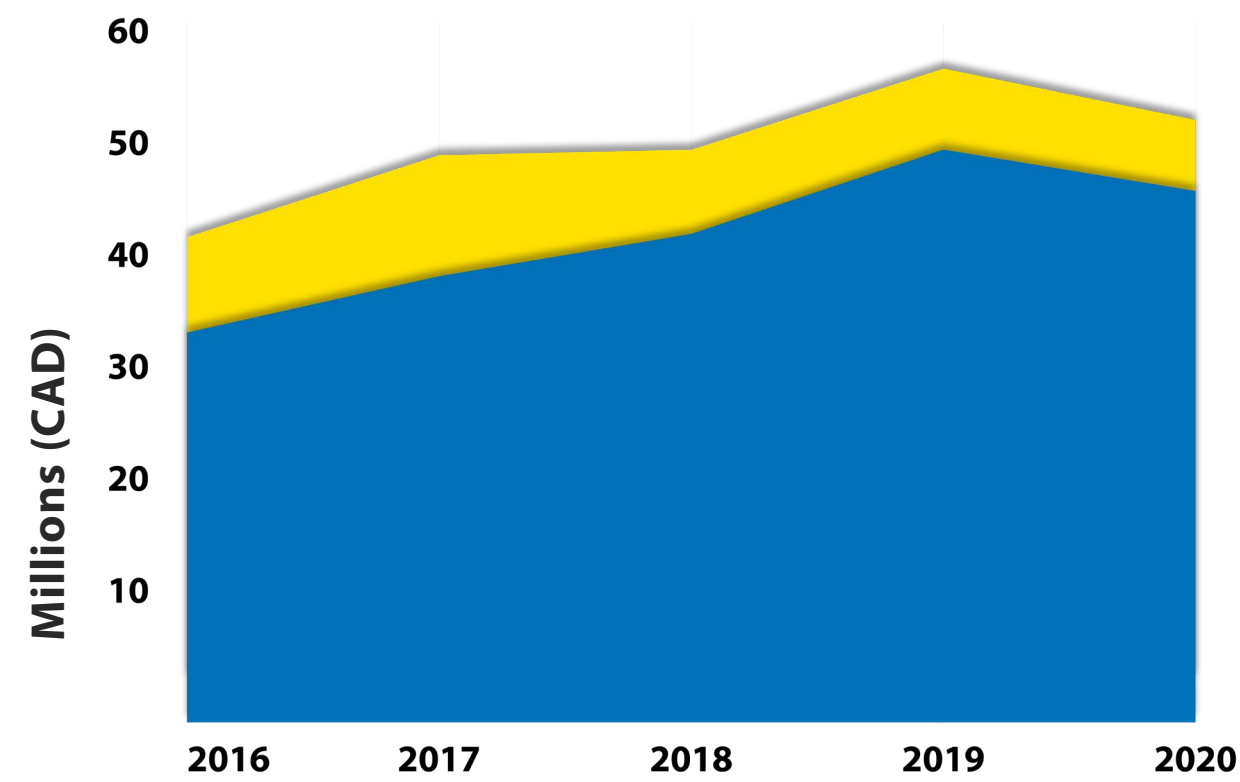


Citation Impact



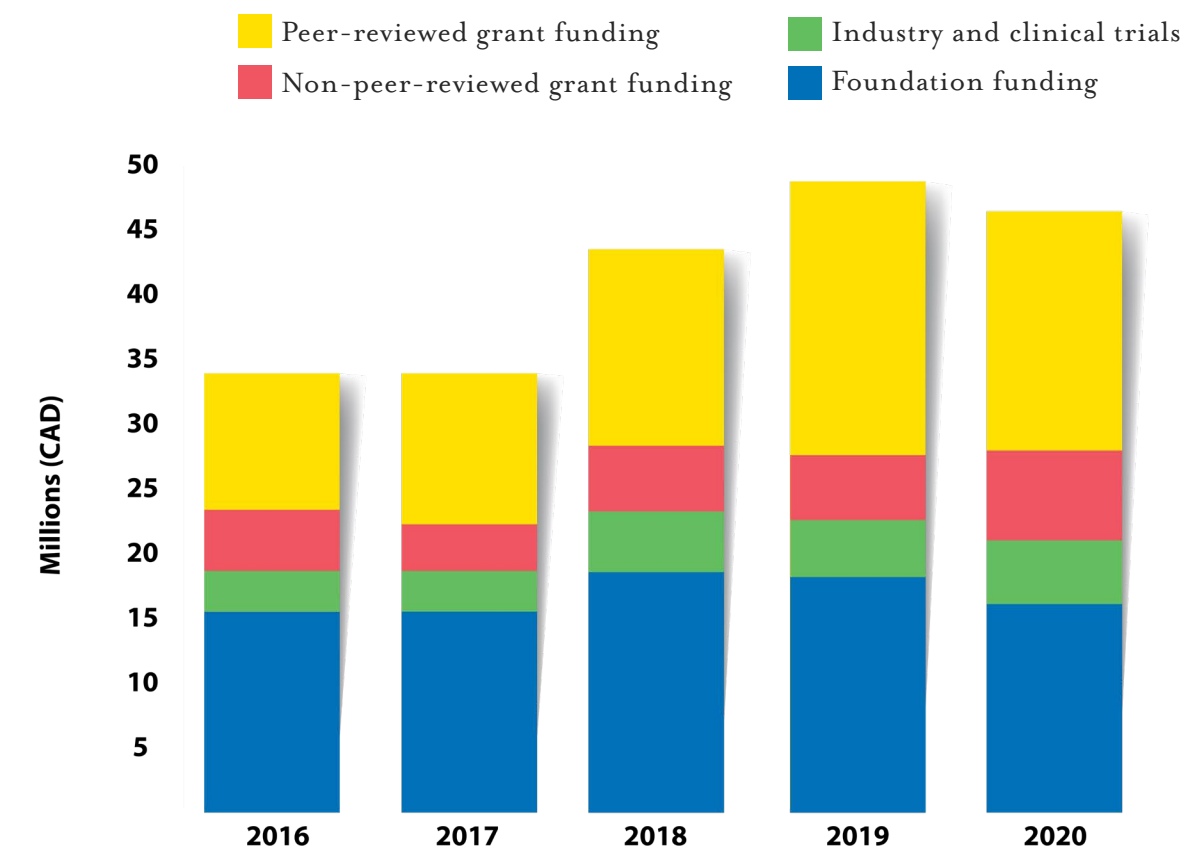
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Research Funding Trends

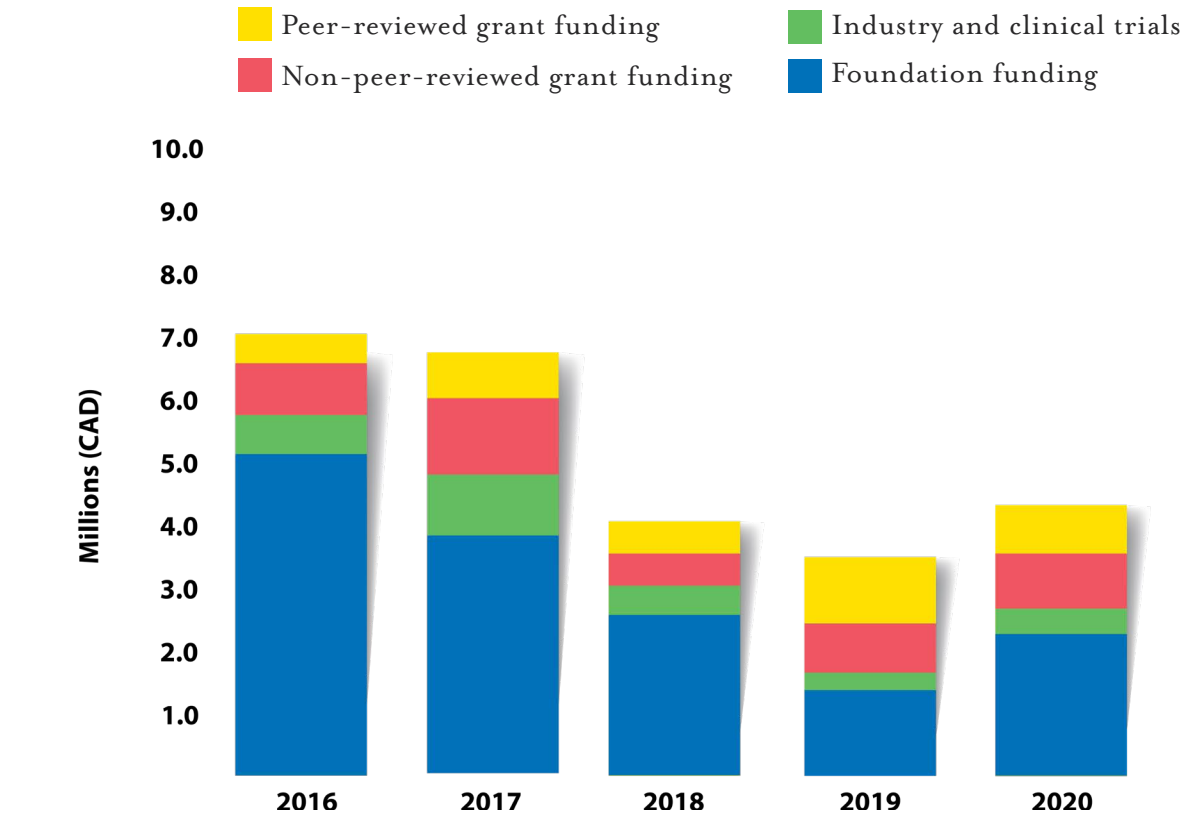


- Contribution of appointed researchers
- Contribution of aligned researchers

Appointed Researcher Funding



Aligned Researcher Funding



Awards & Distinctions

Cathy Barr
Labatt Family Chair in Depression Biology in Children

Arthur Bookman, Dafna Gladman, Robert Inman, Murray Urowitz
CRA Master Award 2020, Canadian Rheumatology Association

Karen Davis
Distinguished Career Award, Canadian Pain Society

Alfonso Fasano
Chair in Neuromodulation and Multidisciplinary Care

Michael G. Fehlings
Ryman Prize, Ryman Foundation
Vilhelm Magnus Medal, Norwegian Neurosurgical Society
Recognition Award, AO Spine International

Paul Fortin
Distinguished Investigator Award, Canadian Rheumatology Association

Susan Fox
Division Director of Neurology, Department of Medicine, Sinai Health System and University Health Network

Monique A.M. Gignac
Addie Thomas Service Award from the Arthritis Rheumatology Professionals, American College of Rheumatology

Nigil Haroon
Diamond Jubilee Oration and Distinguished Alumnus Award, Trivandrum Medical College

Mohit Kapoor
Tier I Canada Research Chair in the Mechanisms of Joint Degeneration

Sidney Kennedy
Fellow, Royal Society of Canada

Gabor Kovacs
Franz Burda Award, International Association of Parkinsonism and Related Disorders

Anthony Lang
The Dean's Lifetime Achievement Award for Global Impact, University of Toronto Faculty of Medicine

Andres Lozano
Appointed as Editor-in-Chief of Stereotactic and Functional Neurosurgery

Anthony Perruccio
Distinguished Scholar Award, American College of Rheumatology Association of Rheumatology Professionals

Antonio Strafella
Director, Parkinson Canada Board

Valerie Wallace
Tier I Canada Research Chair in Retina Regeneration

Gelareh Zadeh
Dan Family Chair, Division of Neurosurgery, University of Toronto



Dr. Vitor Pereira using a robotic arm to navigate a micro-catheter in order to place a stent and coils during an aneurysm procedure.

Krembil Researchers

Appointed Researchers

Emeritus Scientist

Charles Tator

Senior Scientist

Elizabeth Badley
Cathy Barr
Jonathan Brothchie
Peter Carlen
Robert Chen
Aileen Davis
Karen Davis
Jonathan Downar
James Eubanks
Michael Fehlings
Dafna Gladman
William Hutchison
Robert Inman
Igor Jurisica
Mohit Kapoor
Sidney Kennedy
Lakshmi Kotra
Gabor Kovacs
Anthony Lang
Andres Lozano
Nizar Mahomed
Rosemary Martino
Mary Pat McAndrews
David Mikulis
Philippe Monnier
Michael Reber
Jeremy Sivak
Frances Skinner
Antonio Strafella
Shuzo Sugita
Michael Tymianski
Murray Urowitz
Valerie Wallace
Donald Weaver
Joan Wither

Scientists

Nigil Haroon
Mojgan Hodaie
Lorraine Kalia
Suneil Kalia
Armand Keating
Milad Lankarany
Anthony Perruccio
Ivan Radovanovic
Taufik Valiante
Sowmya Viswanathan
Liang Zhang

Affiliate Scientists

Vinod Chandran
Graham Collingridge
Moshe Eizenman
Brenda Gallie
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