IN IT TOGETHER

University Health Network

2018 Research Report

Research Snapshot

Researchers	1,020
Appointed Researchers	468
Non-Appointed Researchers	552
Research Space	971,794 sq. ft.
Funding	$383,083,710
Trainees	834
Fellows	305
Graduate Students	529
Staff	1,707
Institute Staff	1,449
Research Support Staff	258
Publications	3,519

University Health Network (UHN) is a research hospital affiliated with the University of Toronto and a member of the Toronto Academic Health Science Network (TAHSN). UHN comprises the Michener Institute for Education at UHN and four hospitals: the Princess Margaret Cancer Centre (PM Cancer Centre), Toronto General Hospital (TG), Toronto Rehab (TR) and Toronto Western Hospital (TW). It has five research institutes: Krembil Research Institute (Krembil), PM Cancer Centre, Techna Institute for the Advancement of Technology for Health (Techna), Toronto General Hospital Research Institute (TGHRI) and Toronto Rehabilitation Institute (TRI). Research is supported in part by UHN's foundations: The Princess Margaret Cancer Foundation (PMCF), the Toronto General & Western Hospital Foundation (TGWHF) and the Toronto Rehab Foundation (TRF). The scope of research and complexity of cases at UHN have made it a national and international source for discovery, education and patient care.

On the cover: The hanging origami shapes feature icons representing various disciplines and skills in research and medicine. The two-dimensional shadow cast by these shapes—'UHN'—symbolizes how diverse skills and disciplines come together at UHN to advance health research and innovation.

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Going Far Together

Helping people recover from a stroke. Decoding the genetic mutations that lead to cancer. Developing new tools that use artificial intelligence to diagnose disease.

These are just a few of the paths on which UHN's scientists, trainees and staff are focused with intense curiosity and dedication. Their paths, however, do not exist in isolation; rather, they are set within UHN's research ecosystem, and are aligned by a driving mission to improve health through discovery and innovation. This common goal allows UHN to accelerate research into clinical impact at a much more tangible level.

In other words: at UHN, we aren't just in it—we're ***in it together***.

Together, we dive deep—with research experts that span a large continuum from fundamental biology to clinical care and health systems. We create progress within distinct realms of health research as teams, providing an unprecedented opportunity to tackle challenges and achieve impact beyond that possible by any one individual. We build on each other's work to reveal novel molecular processes that can alter the course of cancer treatment; describe how certain classes of immune cells may help prevent heart disease; or map out the exact features of the environment that contribute to falls in older adults. Our united efforts accelerate generating information that will ultimately improve health outcomes and quality of life.

Together, we also reach across programs and institutes—sharing cross-cutting knowledge and finding new ways of applying similar solutions to solve broader issues that span multiple disciplines. We bring researchers, engineers, physicians, mathematicians and computer scientists together to develop new solutions for Parkinson disease, depression and epilepsy. We enable cardiovascular researchers to work with neurosurgeons to identify DNA mutations that lead to malformed blood vessels in the brain. Along with our clinical and education counterparts, we are able to analyze issues at multiple angles and find holistic answers for real-world problems.

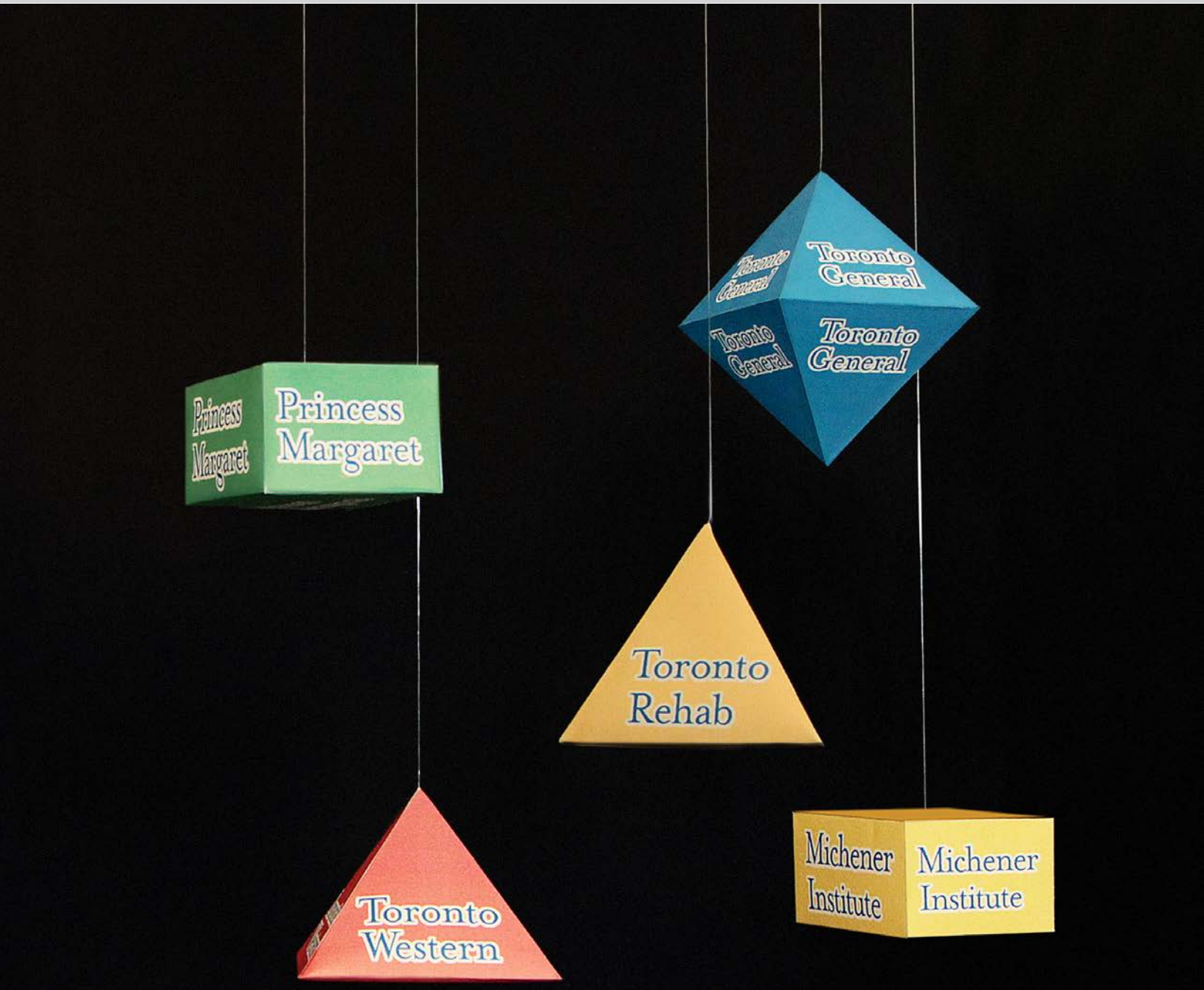
Together, with our local, national and international partners, we bring new solutions to light. Our three foundations—*The Princess Margaret Cancer Foundation*, the *Toronto General & Western Hospital Foundation* and the *Toronto Rehab Foundation*—provide the invaluable support needed to perform the most cutting-edge research. Our academic partners from across the street and around the globe bring new expertise and diverse insights. Finally, our private sector and government partners help us to apply our findings, whether it's a tool to better deliver radiation therapy or a new approach to make the health care system more cost effective, to communities worldwide.

An old proverb says, "If you want to go fast, go alone. If you want to go far, go together." We hope you enjoy this year's selection of research highlights that demonstrate how—together—we're all committed to doing just that.

(Left) Dr. Kevin Smith, President and Chief Executive Officer (CEO). (Middle) Dr. Brad Wouters, Executive Vice President (EVP), Science and Research. (Right) Dr. Charlie Chan, past President and CEO (until May 22, 2018); past EVP, Clinical Programs, Quality and Safety (until October 31, 2018).

UHN IS HOME TO GREAT PLACES

Four academic hospitals, an education institute and five research institutes that work together to enable our researchers to make discoveries, create technologies and gain valuable insights to improve health



TORONTO GENERAL HOSPITAL RESEARCH INSTITUTE

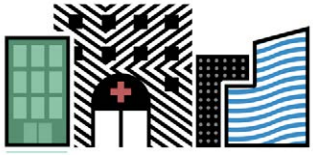
355
researchers

243
trainees

98 research fellows

145 graduate students

183.4K
sq. ft. research space



$80.1M
external funding

1,432
publications

313
staff

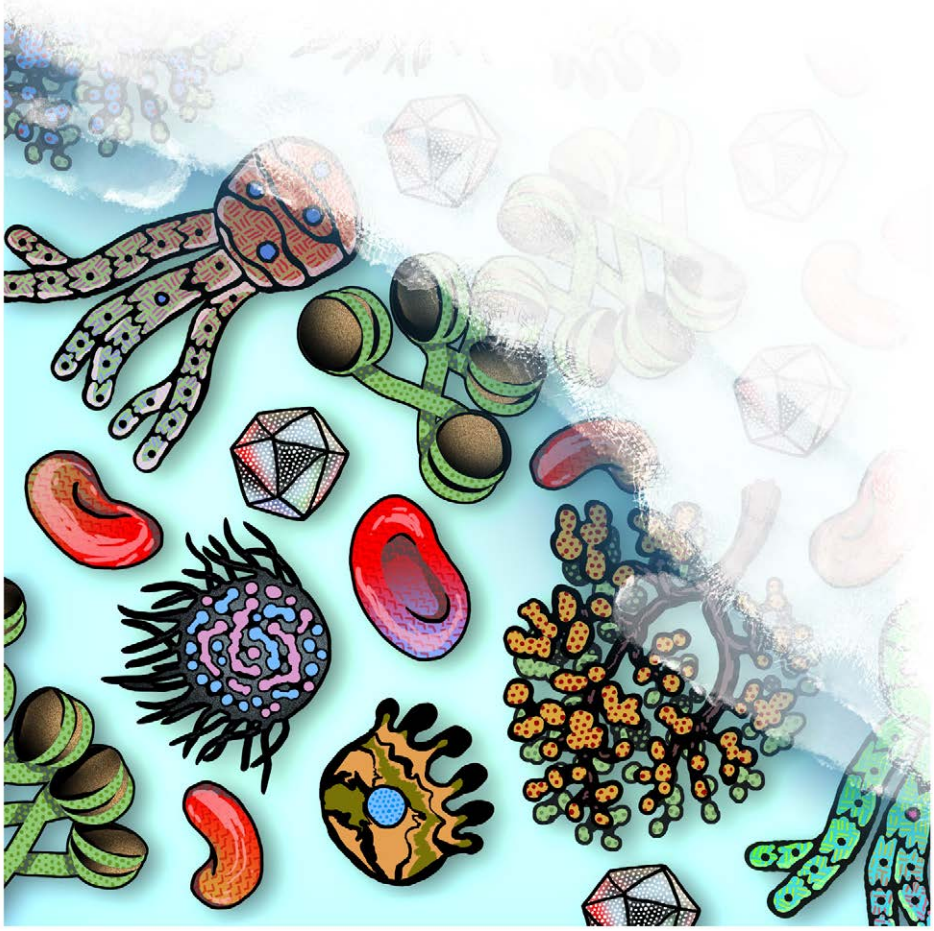
in it together

to discover the unknown

Dr. Lena Serghides
Scientist, TGHRI

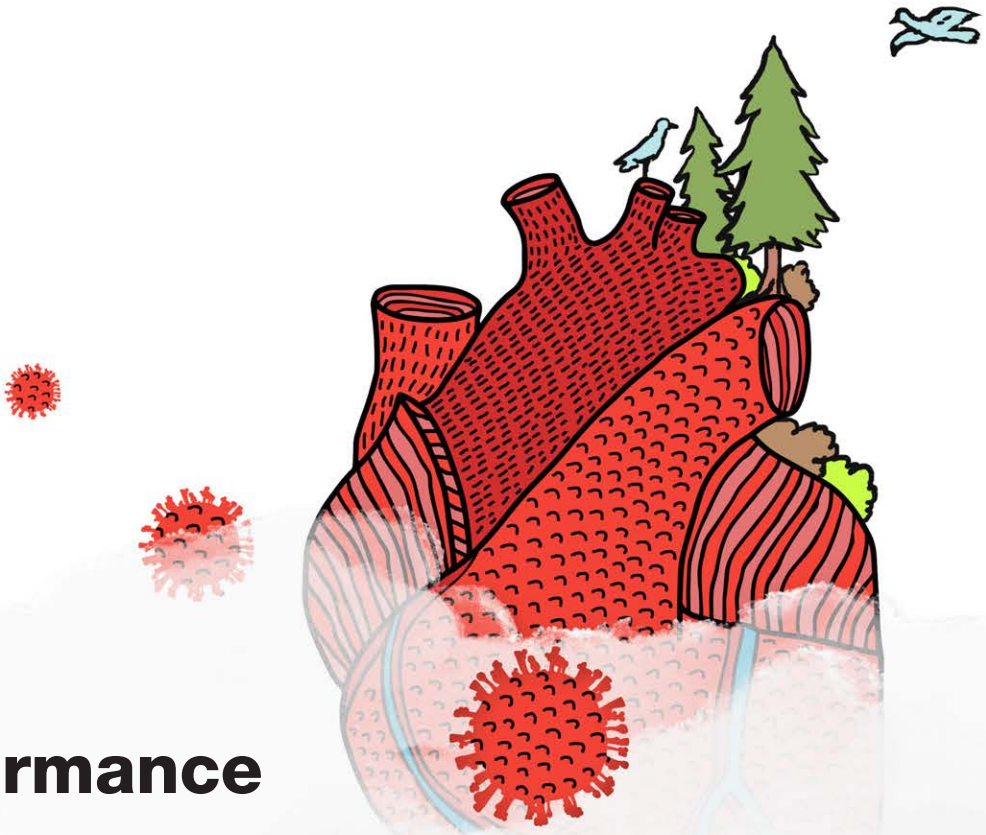
Dr. Slava Epelman
Scientist, TGHRI

Dr. Thomas Waddell
Senior Scientist, TGHRI



MYSTERIES UNCOVERED

Toronto General Hospital Research Institute researchers are revealing new insights into health and disease



Peak Performance

Immune cells in the heart work hard to eliminate viruses that damage heart muscle

Have you been sick with a cold recently? That sore and scratchy throat is caused by infection with a cold virus, which is typically eliminated by the immune system in a week or so.

In some cases, however, cold and other viruses can infect the heart, which could lead to much more serious consequences. Viral infection can cause myocarditis, inflammation of the heart muscle that can compromise its ability to pump blood. Little is known about how the immune system plays a role in this disease.

To address this gap in knowledge, Dr. **Slava Epelman** led a study to examine the role of dendritic cells, a type of immune cell, in viral myocarditis. His research team found that at least five types of dendritic cells reside in the heart, where they trigger immune responses to help eliminate infections.

The team noted that the two most abundant types of dendritic cells in the heart were crucial for eliminating viruses that infect the heart. The absence of these cells not only dampened the anti-virus response, but also led to significant heart damage that impaired the organ's pumping action—an early warning sign for heart failure.

These results suggest that dendritic cells are important gatekeepers of heart health: they quickly eliminate viral infections before the infections can cause full-blown heart failure. Understanding the role that these immune cells play in this process could help with the development of new therapies to treat heart infections.

Clemente-Casares X et al. Immunity. 2017 Nov 21;47(5):974-989. Supported by the Canadian Institutes of Health Research (CIHR), the Heart and Stroke Foundation, the March of Dimes Canada, the Ted Rogers Centre for Heart Research, the Heart & Stroke/Richard Lewar Centre of Excellence in Cardiovascular Research, the Peter Munk Cardiac Centre (PMCC), the National Institutes of Health (NIH) and the Toronto General & Western Hospital Foundation (TGWHF). M Cybulsky holds a Tier 1 Canada Research Chair (CRC) in Arterial Wall Biology and Atherogenesis.

Treatment for Two

HIV drugs alter levels of a hormone that is critical to a healthy pregnancy

A healthy pregnant woman translates to a healthy baby. This is the reason that many women go to great lengths to improve their health once they become pregnant.

But as Dr. **Lena Serghides** discovered in two studies, women who are infected with the human immunodeficiency virus (HIV) face greater challenges when trying to ensure the health of their babies.

HIV-positive pregnant women are advised to take a drug regimen—commonly referred to as combination antiretroviral therapy (cART)—to prevent mother-to-child transmission of the virus. Unfortunately, these drug regimens are often associated with a number of adverse birth outcomes, including preterm delivery and low birth weight.

To better understand how these treatments affect birth outcomes, Dr. Serghides and her research team measured the levels of several different hormones in pregnant women, before and after they were randomly assigned to take two different cART regimens.

Her team found that levels of the hormone estradiol were decreased in women taking one type of cART regimen and increased in those taking the other. These changes were linked to significantly lower birth weight, suggesting that hormonal changes may contribute to the adverse birth outcomes for women taking cART.

Says Dr. Serghides, "The results of our study underscore the need for more research on the long-term effects of these regimens as they may affect fetal development by differentially altering hormone levels."

McDonald CR et al. Clin Infect Dis. 2018 Jan 18;66(3):428-436 & Balogun KA et al. Clin Infect Dis. 2018 Jan 18;66(3):420-427.
Supported by CIHR; the Ontario HIV Treatment Network G655; the Canadian Foundation for AIDS Research; the Global Alliance to Prevent Prematurity and Stillbirth; and Grand Challenges in Global Health: Preventing Preterm Birth Initiative. KC Kain holds a Tier 1 CRC in Molecular Parasitology.

Tools of the Trade

A new method enables scientists to better control the production of cell types

Jack of all trades, master of none. It can be nice to have many skills, but sometimes it's better to focus on building expertise in one key area.

The same may be true when developing cell therapies with iPS and iPL cells, as Dr. **Thomas Waddell** and his graduate student Li Guo found. iPS cells are stem cells that can be used to make a wide variety of cell therapies; however, their use is limited because they could grow into unwanted cell types, including tumours.

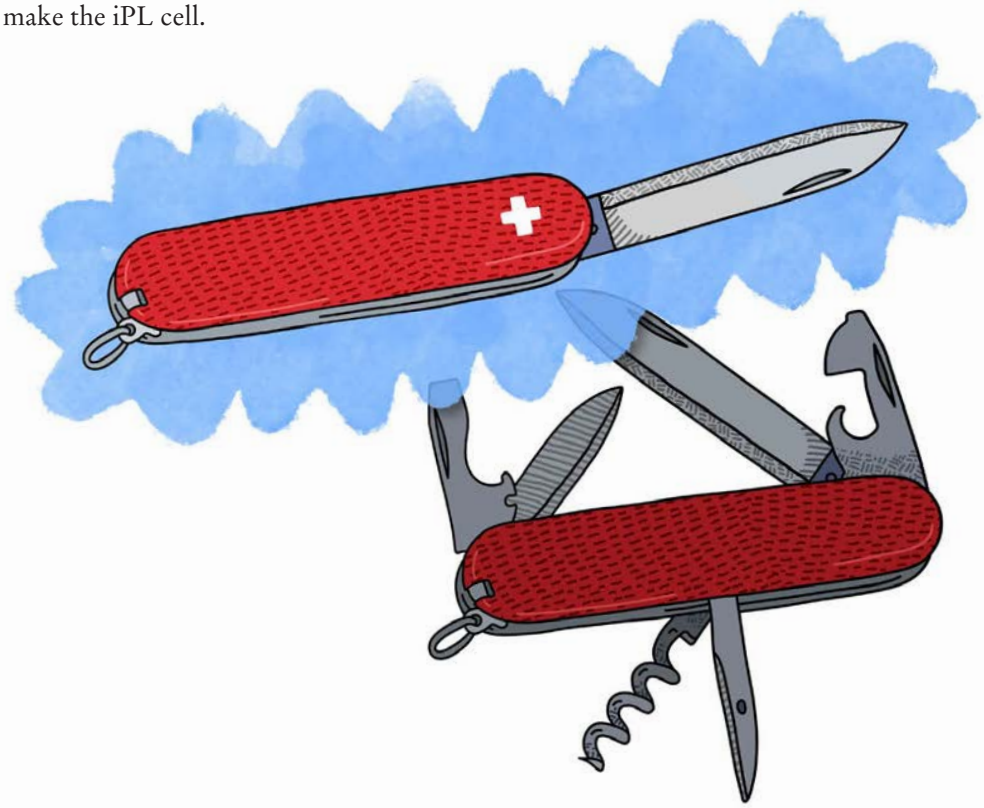
To address these limitations, the research team (along with Dr. Andras Nagy from the Lunenfeld-Tanenbaum Research Institute) used an approach called 'interrupted reprogramming' to make iPL cells. In contrast to iPS cells, iPL cells can be coaxed into becoming only a restricted number of different cell types, depending on the type of cell that was used to make the iPL cell.

This method makes it easier to control which cell types can be produced and to create batches of cells that are more pure.

To explore the potential use of iPL cells to treat respiratory disease, the research team focused on a type of cell—known as a club cell—that is found on the inner surface of the lungs. They used their approach to convert club cells into iPL cells; then, they coaxed the iPL cells into becoming other types of lung cells, such as goblet cells, which produce a thick fluid that traps foreign substances in the lungs.

This method could be used to develop new cell-based therapies to speed up the healing process after lung injury or to repair donor lungs before transplantation.

Guo L et al. Stem Cell Reports. 2017 Dec 12;9(6):1780-1795. Supported by the Hospital for Sick Children Transplant and Regenerative Medicine Program, CIHR, the Ontario Research Fund (ORF) and TGWHF. TK Waddell holds the Pearson-Ginsberg Chair in Thoracic Surgery and the Thomson Family Chair in Translational Research. A Nagy holds a Tier 1 CRC in Stem Cells and Regeneration.



Promoting Gender Equity in the Sciences

Every year, the YWCA Toronto *Women of Distinction Awards* recognize trailblazing women who are making a difference in the lives of women. This year they chose to honour Dr. Milica Radisic.

Dr. Radisic, a Senior Scientist at TGHRI, is recognized as an exceptional mentor through her teaching and leadership activities. She participates in several outreach programs to promote science and engineering to girls. And, she actively advocates for gender equity in the selection of keynote speakers, award winners and new fellows at the Tissue Engineering and Regenerative Medicine International Society.

"Dr. Radisic is a brilliant mentor and inspiring role model," says Dr. Brad Wouters, Executive Vice President, Science and Research. "She is very deserving of this recognition and we are proud that she is part of the UHN research community."

A Risk Uncovered

Almost one in every two Canadians with diabetes will develop kidney disease, a leading cause of illness and death. Drs. David Cherney and Bruce Perkins discovered a key factor that influences the progression of kidney disease in these patients. *JCI Insight. 2018 Jan 11;3(1). pii: 96968.*

Attracting Funding

UHN spin-off company Thornhill Medical, which was founded by Drs. Joseph Fisher and Ludwik Fedorko, secured funding to expand its global sales and marketing presence and to conduct research in the fields of non-invasive cardiac and brain stress testing.

Research Council

Director, TGHRI (Chair) **Mansoor Husain**
Research Division Head, Advanced Diagnostics **Myron Cybulsky**
Research Division Head, Experimental Therapeutics (Acting) **Mansoor Husain**
Research Division Head, Support, Systems & Outcomes **Murray Krahn**
Clinical Program Head, Peter Munk Cardiac Centre **Barry Rubin**
Clinical Program Head, Medical & Community Care **Edward Cole**
Clinical Program Head, Surgical and Critical Care **Shaf Keshavjee**
Clinical Program Head, Transplantation **Atul Humar**
Surgeon-in-Chief **Shaf Keshavjee**
Physician-in-Chief **Edward Cole**
Chair, TGHRI Appointments Committee **Jason Fish**
Group Lead, Cardiovascular **Slava Epelman**
Group Lead, Communities of Health **Shabbir Alibhai**
Group Lead, Infection & Immunity **Adam Gehring**
Group Lead, Metabolism **Minna Woo**
Group Lead, Respiratory & Critical Care **Mingyao Liu**
Senior Vice President and Executive Lead, TG **Scott McIntaggart**
Executive Vice President, Science and Research **Brad Wouters**

Researchers

Advanced Diagnostics

Emeritus Scientist
Daniel Cattran
Senior Scientists
Johane Allard
Peter Backx
Myron Cybulsky
I George Fantus
Eleanor Fish
Jason Fish
Joseph Fisher
John Floras
Tony Lam
Gary Lewis
Mingyao Liu
Kumaraswamy Nanthakumar
York Pei
Bruce Perkins
James Scholey
Katherine Siminovitch
Michael Wheeler
Minna Woo
Eldad Zacksenhaus
Li Zhang
Scientists
Moumita Barua
Filio (Phyllis) Billia
David Cherney
Bryan Coburn
Shannon Dunn
Slava Epelman
Anthony Gramolini
Tianru Jin
Ana Konvalinka
Heather Reich
Clinton Robbins
Jonathan Rocheleau
Paaladinesh Thavendiranathan
Daniel Winer
Affiliate Scientists
Donald Branch
Hong Chang
Peter Liu
Julie Lovshin
Philip Millar
Sheila Riazi
Barry Rubin
Anna Sawka
Markus Selzner
William Stansfield
Florence Wong

Experimental Therapeutics

Senior Scientists
T Douglas Bradley
Mark Cattral
Marc de Perrot
Niall Ferguson
Herbert Gaisano
Margaret Herridge
Atul Humar
Mansoor Husain
Harry Janssen
Kevin Kain
Keyvan Karkouti
Rupert Kaul
Shaf Keshavjee
Lakshmi Kotra
Michael Laflamme
Gary Levy
Ren-Ke Li
Ian McGilvray
Nancy Olivieri
Milica Radisic
Vivek Rao
Thomas Waddell
Sharon Walmsley
Richard Weisel
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Chung-Wai Chow
Marcelo Cypel
Satya Dash

Jordan Feld
Adam Gehring
Ewan Goligher
Michael Gollob
J Andrea McCart
M Cristina Nostro
Nazia Selzner
Lena Serghides
Sara Vasconcelos
Kazuhiro Yasufuku

Assistant Scientists
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Sonya MacParland

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Mamatha Bhat
Gail Darling
Anand Ghanekar
Siba Haykal
Raymond Hui
Shahid Husain
David Hwang
Angela Jerath
Stephen Juvet
Joel Katz
David Kelvin
Raymond Kim
Thomas Lindsay
Cedric Manlhiot
Tereza Martinu
Raymond Reilly
Heather Ross
Michael Sefton
Darrell Tan
Terrence Yau

Support, Systems & Outcomes

Emeritus Scientist
Janet Raboud

Senior Scientists
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Anne Bassett
Claire Bombardier
Angela Cheung
Peter Cram
Alastair Flint
Moira Kapral
Murray Krahn
Douglas Lee
Charmaine Lok
Robert Nolan
Gary Rodin
Peter Singer
Donna Stewart
George Tomlinson
David Urbach

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Bettina Hansen
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Valeria Rac
Beate Sander

Assistant Scientist
Andy Wong

Affiliate Scientists
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Suzanne Fredericks
Andrew Ha
Adrienne Kovacs
Lori MacCallum
Jane MacIver
Gail McVey
Nicholas Mitsakakis
Karen Okrainec
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Jacob Pendergrast
Rima Styra
Alice Wei
D Blake Woodside

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Peter Adamson
Carmen Avila-Casado
Mitesh Badiwala
Joanne Bargman
W Scott Beattie
Chaim Bell
Lee Benson
Andrea Boggild
Isaac Bogoch
Vera Bril
Jennifer Bryan
John Byrne
Jeannie Callum
Carl Cardella
Charles Chan
Christopher Chan
Raymond Chan
Lucas Chartier
Anil Chopra
Hance Clarke
Edward Cole
Patricia Colton
Richard Cooper
Sharon Cushing
Robert Cusimano
Tirone David
Lorenzo Del Sorbo
Diego Delgado
Allan Detsky
Eleftherios Diamandis
George Djaiani
Michael Domanski
Laura Donahoe
James Downar
Daniel Drucker
Vladimir Dzavik
Eddy Fan
Michael Farkouh
Ludwik Fedorko
Andrew Feifer
Denice Feig
Christopher Feindel
Stanley Fenton
Olavo Fernandes
Jolene Fisher
Scott Fung

Michael Gardam
Susan George
Sangeet Ghai
Shiphra Ginsburg
Melissa Gitman
Pauline Glaves
Roger Goldstein
Avrum Gotlieb
David Grant
John Granton
Sandra Grgas
Luis Guimaraes
Aliya Gulamhusein
Flavio Habal
Christoph Haller
Robert Hamilton
Kate Hanneman
Louise Harris
Jennifer Harrison
Carol Heck
Edward Hickey
Michelle Hladunewich
Brian Hodges
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Allan Kaplan
Hans Katzberg
Rita Katznelson
John Kavanagh
Edward Keystone
Yasmin Khan
S Joseph Kim
John Kingdom
Caroline Kramer
Kulamakan Kulasegaram
Vathany Kulasingam
Deepali Kumar
Ayelet Kuper
Bindee Kuriya
Salima Ladak
Karim Ladha
Megan Landes
Stephen Lapinsky
Patrick Lawler
Jason Lee
Lani Lieberman
Leslie Lilly
Yulia Lin
Jessica Liu
Alexander Logan
Christine Maheu
Susanna Mak
Katherine Marseu
Mina Matsuda-Abedini
Tony Mazzulli
Stuart McCluskey
Brian McCrindle
Michael McDonald
Micheal McInnis
Rory McQuillan
Karen McRae
Sangeeta Mehta
Massimiliano Meineri
Ozgur Mete
Leonid Minkovich
Ravi Mohan
Jakov Moric
Andrew Morris
Denise Morris
Istvan Mucsi
Laveena Munshi
Patricia Murphy
Maria Mylopoulos
Krishnakumar Nair
Geoffrey Nguyen
Marta Novak
Erwin Oechslin
Gerald O'Leary
Mark Osten
Mirek Otremba
Maral Ouzounian
Christopher Overgaard
Prodipto Pal
Blake Papsin
Rulan Parekh
John Parker
Matteo Parotto
Keyur Patel
Christopher Patriquin
David Pothier
Harry Rakowski
Anthony Ralph-Edwards
Ravi Retnakaran
Lisa Puchalski Ritchie
S Lucy Roche
Graham Roche-Nagle
Patrik Rogalla
Coleman Rotstein
John Rutka
Irving Salit
Gonzalo Sapisochin
Heidi Schmidt
Leonard Schwartz
Phillip Segal
Peter Seidelin
Rita Selby
Mohammad Shafiee
Shane Shapera
Morris Sherman
Eran Shlomovitz
Naveed Siddiqui
Candice Silversides
Lianne Singer
Sunita Singh
Samir Sinha
Anna Skorzewska
Peter Slinger
Kenneth Sniderman
Miranda So
Sanjeev Sockalingam
Michael Sole
Christine Soong
Danna Spears
A Hillary Steinhart
Eva Szentgyorgyi
Kong Teng Tan
Walter Tavares
Kathryn Tinckam
Sheldon Tobe
Kathryn Trottier
Wendy Tsang
Alice Tseng
Jacob Udell
Amar Uxa
Rajkumar Vajpeyi
Annette Vegas
Patrick Veit-Haibach
Raghu Venugopal
Allan Vescan
Andrea Waddell
Rachel Wald
Marcin Wasowicz
Lawrence White
Cynthia Whitehead
Duminda Wijeysundera
Stephen Wolman
Pui-Yuen Wong
David K Wong
Anna Woo
Robert Wu
Peter Wu
Jonathan Yeung
Colina Yim
Paul Yip
Noe Zamel
Bernard Zinman

TECHNA INSTITUTE FOR ADVANCEMENT OF TECHNOLOGY FOR HEALTH

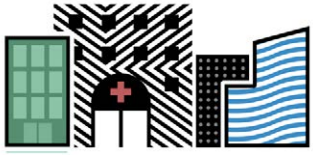
52
researchers

24
trainees

8 research fellows

16 graduate students

30.4K
sq. ft. research space



$9.6M
external funding

278
publications

71
staff

in it together

to redefine what's possible

Dr. Kazuhiro Yasufuku
Affiliated Faculty, Techna; Scientist, TGHRI

VISIONARY MEDICINE

From nanotech to image-guided surgery, Techna researchers are transforming the way that health care is delivered

Guaranteed Delivery

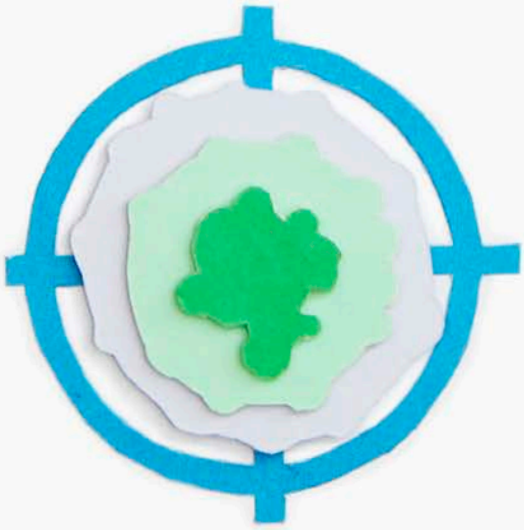
Enlisting tiny nanoparticles to deliver a new kind of therapy for lung cancer

They say good things come in small packages. A recent therapy developed by Dr. **Kazuhiro Yasufuku** epitomizes this phrase. Measuring less than a thousand times the width of a single hair, it promises to transform the way that lung cancer is treated.

The approach uses a technology known as small interfering RNA (siRNA), which can be used to target and silence the genes that drive lung cancer cell growth.

However, delivering this promising drug to cancer cells has been a challenge because the siRNAs are just as likely to kill a healthy cell as a cancer cell.

To overcome this challenge, Dr. Yasufuku linked an siRNA molecule to a tiny nanoparticle that specifically infiltrates lung cancer cells. These newly designed nanoparticles dramatically slowed the growth of lung cancer cells in an experimental model of disease without affecting healthy cells.



Explains Dr. Yasufuku "Our study demonstrates that it is possible to develop siRNAs that target cancer cells more precisely. We are refining this technique in hopes of developing customized siRNA treatments for patients with advanced lung cancer who currently have little to no therapeutic options and high rates of mortality."

Kato T, et al. Mol Cancer Res. 2017 Oct 9. pii: molcanres.0341.2016. Supported by The Princess Margaret Cancer Foundation (PMCF).

ASTRO Gold Medal

Dr. David Jaffray was awarded one of three *2018 Gold Medals* from the American Society for Radiation Oncology (ASTRO). ASTRO is the premier radiation oncology society in the world, with more than 10,000 members that include physicians, nurses, biologists, physicists, radiation therapists, dosimetrists and other health care professionals who specialize in treating patients with radiation therapies.

The *Gold Medal* is ASTRO's highest honour, bestowed on members who have made outstanding contributions to the field of radiation oncology. This includes research, clinical care, teaching and service.

Dr. Jaffray's research is focused on the development and application of image-guided radiation therapy. His contributions include advancing the use of cone-beam CT to image patients at the time of treatment, and improving the targeting of radiation therapy.

Acumyn Acquired

Acumyn Inc. was recently acquired by global radiotherapy giant Elekta. UHN created Acumyn to commercialize AQUA™, a clinical software platform developed at PM Cancer Centre to help manage and automate the complex and demanding quality assurance tests in a radiotherapy clinic.

It is an example of Techna using its medical device engineering and product development expertise to help advance a product to commercial success.

Techna's services included project management, documentation to achieve ISO 13485 and 9001 certification, the creation of marketing materials, a user manual and website, user interface design and financial services.

This expertise, combined with real-world evidence and product refining provided by PM Cancer Centre and the support of UHN's Technology Development and Commercialization office, helped Acumyn to scale-up and succeed.

Leadership Team

Director, Techna Institute **David Jaffray**
Director, Clinical Processes **Howard Abrams**
Senior Director, Techna Innovation **Luke Brzozowski**
Director, Knowledge Transfer **Nicole Hartnett**
Director, Clinical Research Faculty **Jonathan Irish**
Director, Physical Sciences Research Faculty **J Paul Santerre**
Director, Commercialization **Mark Taylor**
Executive Vice President, Science and Research **Brad Wouters**

Researchers

Design & Engineering for Health

Core Lead
Joseph Cafazzo

Affiliated Faculty
Emily Seto
Patricia Trbovich

Guided Therapeutics

Core Leads
Jonathan Irish
David Jaffray
Walter Kucharczyk

Scientists
Margarete Akens
Arash Zarrine-Afsar
Jinzi Zheng

Affiliated Faculty
Dionne Aleman
Jean-Pierre Bissonnette
Timothy Chan
Douglas Chepeha
Catherine Coolens
John de Almeida
Jonathan Downar
James Drake
Gabor Fichtinger
Howard Ginsburg
Justin Grant
Andrew Hope
Mohammad Islam
Daniel Létourneau
Andres Lozano
Claire McCann
Chris McIntosh
Cynthia Ménard
Kieran Murphy
Kumaraswamy Nanthakumar
Narinder Paul
Thomas Purdie
Dheeraj Rajan
Alexandra Rink
Patrik Rogalla
Michael Sherar
Teodor Stanescu
Michael Velec
Robert Weersink
Bernd Wintersperger
Kazuhiro Yasufuku

Informatics & Communications Technology

Core Leads
Igor Jurisica
Peter Rossos

Affiliated Faculty
Brenda Gallie
Alejandro Jadad
Michael Jewett
Gordon Tait
Christian Veillette

Nanotechnology & Radiochemistry

Core Leads
Ur Metser
Gang Zheng

Affiliated Faculty
John Valliant

Photonics

Core Lead
Brian Wilson

Scientist
Ralph DaCosta

Affiliated Faculty
I Alex Vitkin

PRINCESS MARGARET CANCER CENTRE

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Dr. Mary Jane Esplen
Affiliate Scientist,
PM Cancer Centre

Dr. Naoto Hirano
Senior Scientist,
PM Cancer Centre

Dr. Hansen He
Senior Scientist,
PM Cancer Centre

CONQUERING CHALLENGES

Princess Margaret Cancer Centre researchers are improving care for patients throughout the entire cancer journey

Into the Light

A new program to support breast cancer survivors

Coping with cancer and receiving treatment can leave patients scarred and emotionally drained. Having lived through a combination of surgery, chemotherapy and radiotherapy, survivors often grapple with cancer's emotional toll long after their physical recovery.

"Breast cancer survivors may have lost one or both of their breasts, have residual scars or swelling, and start menopause prematurely," describes Dr. **Mary Jane Esplen**. "These effects often cause survivors to experience grief, lowered self-esteem and confidence, and shame about the appearance of their body."

To improve the emotional well-being of breast cancer survivors, Dr. Esplen developed a program called Restoring Body Image after Cancer (ReBIC). The program consists of eight group sessions where participants are encouraged to generate a series of images in their mind's eye. These exercises help them to express their personal identity and self-image difficulties and to work through them. Factors that promote a negative body image and feelings of shame are also discussed.

In a study completed by Dr. Esplen to evaluate the impact of ReBIC, participants reported improvements in body image, their quality of life and ability to manage breast cancer-related symptoms. In light of its success, ReBIC is now being offered at University Health Network.

EsplenMJ, et al. J Clin Oncol. 2018 Mar; 36(8):749-756. Supported by the Canadian Breast Cancer Foundation (now part of the Canadian Cancer Society) and the Canadian Breast Cancer Research Alliance.

Performance Upgrade for Immune Cells

Enhancing immunotherapy to treat a variety of cancers

When it comes to self-improvement, we have all sorts of tools at our disposal: glasses to improve our vision, treadmills to help us stay fit, and vaccines to ward off infectious diseases.

A research team led by Dr. **Naoto Hirano** has engineered a molecule with the potential to enhance the effectiveness of our immune system against cancer.

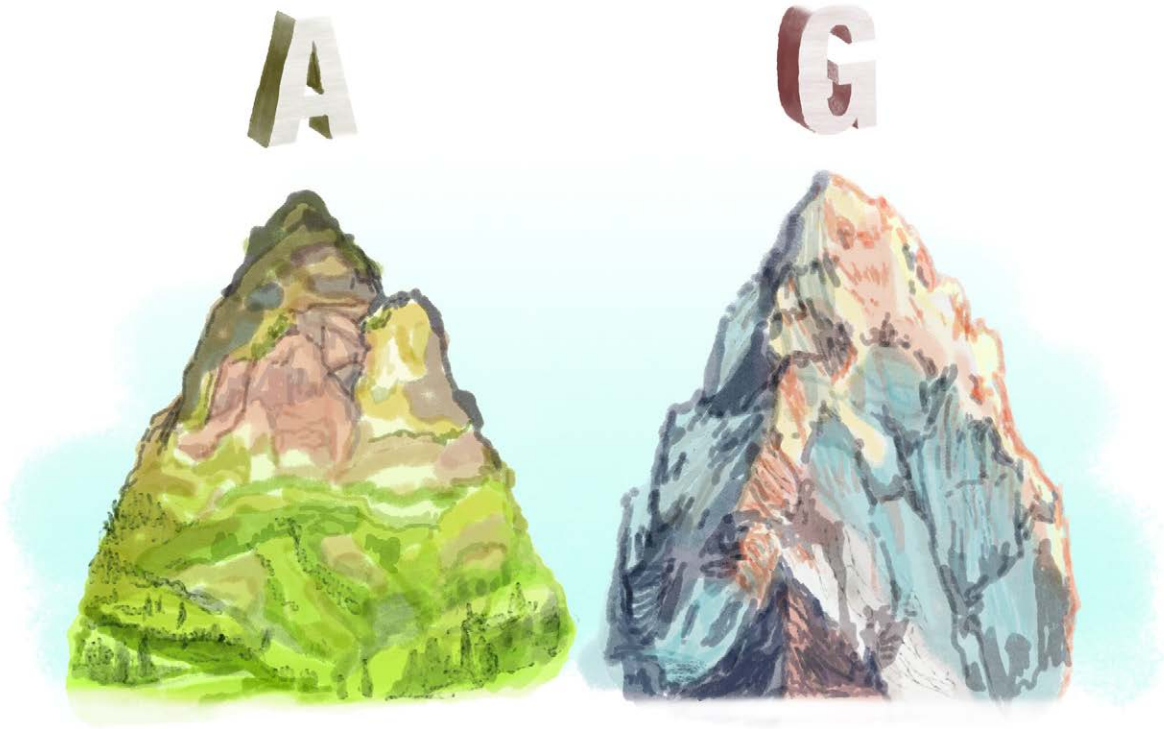
Chimeric antigen receptor (CAR) T cell therapy is an immunotherapy currently approved in the United States to treat blood cancers. It involves extracting immune cells from the patient, genetically engineering them to recognize cancerous cells, and infusing them back into the patient where they are able to target and kill cancerous cells.

"The CAR molecule enables immune cells to recognize cancerous cells," explains Dr. Hirano.

"We have engineered an improved CAR molecule that imparts greater potency to immune cells against different cancers, including solid tumours, and showed that it did not worsen any potential side effects in experimental models."

Future work will focus on validating these findings and translating them into clinical trials to improve the safety and efficacy of the CAR T cell therapy.

Kagoya Y, et al. Nat Med. 2018 Mar; 24(3):352-359. Supported by CIHR, the Ontario Institute for Cancer Research (OICR), BioCanRx, Japan Society for the Promotion of Science, the Government of Ontario, the Natural Sciences and Engineering Research Council of Canada (NSERC), Takara Bio Inc. and PMCF.



Little Changes that Matter

A single DNA letter variation in the genome can impact cancer risk

Just as a snowfall atop a mountain can mark the beginning of an avalanche, a single, often innocuous event can mark the beginning of a catastrophe.

Some of the most devastating cancers can also have an unremarkable beginning. Dr. **Hansen He** has discovered just such a seemingly innocuous event.

Tracing back the progression of prostate cancer, Dr. He and his team discovered that varying a single letter in an individual's genetic code can increase the risk for a more aggressive form of prostate cancer.

"We found that this particular genetic variation is not in a functional region of the genome—such as a region that contains instructions for building cellular machinery or for housekeeping activities," says Dr. He.

"Rather, it was in a region of the genome considered to have no useful information."

"We need more studies at the genome level to understand how these single genetic variations can change the way cells regulate their activity," adds Dr. He. "Then we can evaluate how they change the risk for cancer and take steps to prevent them from worsening outcomes."

Hua JT, et al. Cell. 2018 Jul 26; 174(3):564-575.e18. Supported by NSERC; CIHR; the Movember Foundation; Prostate Cancer Canada; the U.S. Department of Defense; The Terry Fox Research Institute; the Ministry of Economic Development, Job Creation and Trade; and PMCF.

UHN Spinout Company AVROBIO Goes Public

In June 2018, the UHN spinout company AVROBIO held an initial public offering (IPO) on the NASDAQ stock exchange. It raised more than US $100 million, and had a market cap of greater than US $651 million.

The clinical stage company, which was founded based on the work of Dr. Christopher Paige (UHN Senior Scientist) and Dr. Jeffrey Medin (previously a researcher at UHN; now at the Medical College of Wisconsin), is focused on developing curative lentiviral-based gene therapies to treat rare diseases.

The IPO was well received by the investment community. The offering follows several previous rounds of financing—resulting in over US $90 million invested, including a US $60 million Series B raise. In celebration of the public listing, AVROBIO President and CEO Geoff MacKay and a team of AVROBIO's staff, partners and leaders participated in the closing bell ceremony of the NASDAQ stock exchange (pictured).

Oncologist Honoured

Congratulations to Dr. Frances Shepherd (above), a medical oncologist at PM Cancer Centre, who received the prestigious 2018 *Canada Gairdner Wightman Award* for her global leadership in lung cancer research.

The award recognizes Dr. Shepherd's outstanding impact over her 30-year career in the field of clinical trials for lung cancer.

She has led landmark studies that have changed treatment and outcomes for patients with lung cancer. For example, she led the *Canadian Clinical Trials Group Lung Cancer Site*, which revealed that post-operative chemotherapy can increase the cure rate for resected lung cancer, and that molecularly targeted treatments can improve survival even in the most advanced stages of the disease.

The recognition adds to Dr. Shepherd's other honours, such as the *Order of Canada* and the *Queen Elizabeth II Jubilee Medal*.

Research Council on Oncology

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Head, Cancer Clinical Research Unit; Head, Medical Oncology and Hematology **Amit Oza**
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A Michael Rauth

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Brian Raught
Gary Rodin
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Aaron Schimmer
Vuk Stambolic
Ming-Sound Tsao
I Alex Vitkin
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Gang Zheng
Camilla Zimmermann

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Marianne Koritzinsky
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Mark Bray
Eric Chen
Phedias Diamandis
Ryan Dowling
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C Anne Koch
Paul Kongkham
Robert Kridel
Benjamin Lok
Michael Moran
Michael Reedijk
Leonardo Salmena
Suzanne Trudel
Jean Wang

Paul Waterhouse
Wei Xu
Eldad Zacksenhaus

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Hamideh Alasti
Zishan Allibhai
Eitan Amir
Mostafa Atri
Michael Baker
Subrata Banerjee
Aisling Barry
David Barth
Eric Bartlett
Andrew Bayley
Philippe Bedard
J Robert Beecroft
Alejandro Berlin
Marcus Bernardini
Mark Bernstein
Lori Bernstein
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Scott Boerner
Geneviève Bouchard-Fortier
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Abha Gupta
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Suzanne Kamel-Reid
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Edward Kassel
Armand Keating
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Korosh Khalili
Rasmus Kiehl
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Dennis Kim
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Monika Krzyzanowska
Vishal Kukreti
Supriya Kulkarni
Girish Kulkarni
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Nafisha Lalani
Wilson Lam
Normand Laperriere
Linda Lee
Jason Lee
Natasha Leighl
Wey Leong
Wilfred Levin
Stéphanie Lheureux
Madeline Li
Patricia Lindsay
Jeffrey Lipton
Christopher Lo
Ernie Mak
Myles Margolis
Warren Mason
Andrew Matthew
Walter Maxymiw
Taymaa May
Dawn Maze
J Andrea McCart
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Ian McGilvray
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Ur Metser
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Rinat Nissim
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Woodrow Wells
Ian Witterick
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Jason Wong
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Jay Wunder
Kazuhiro Yasufuku
Karen Yee
Erik Yeo
Bruce Youngson
Eugene Yu
Toni Zhong
Alexandre Zlotta

TORONTO REHABILITATION INSTITUTE

114
researchers

137
trainees

23 research fellows

114 graduate students

56K
sq. ft. research space

$12M
external funding

471
publications

78
staff

in it together

for a healthier future

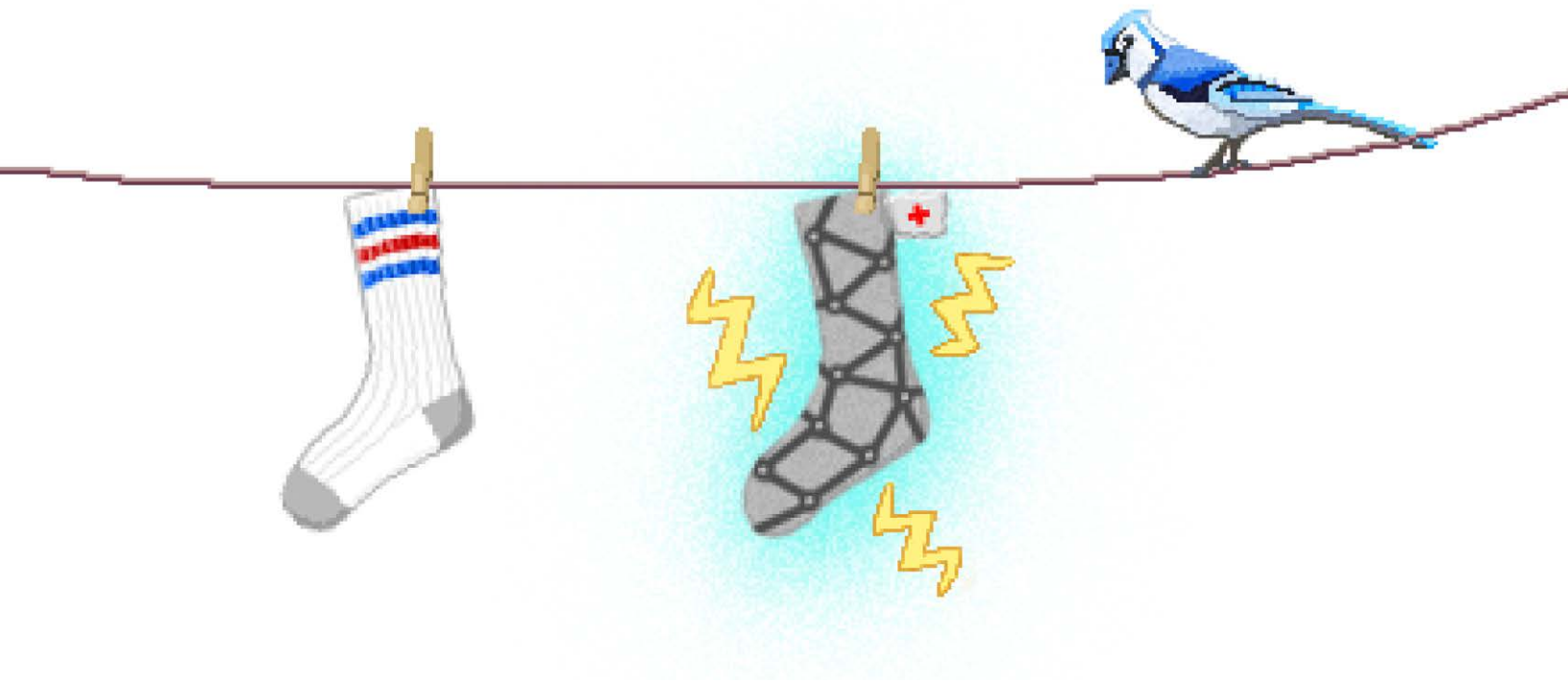
Dr. Azadeh Yadollahi
Scientist, TRI

Dr. Babak Taati
Scientist, TRI

Dr. Alison Novak
Scientist, TRI

THE FUTURE OF REHABILITATION

Toronto Rehabilitation Institute offers
a glimpse of things to come



Shock Your Socks off

Electrical stimulation could alleviate symptoms of sleep apnea

Electricity is a powerful treatment for many conditions. It can keep the heart beating at a healthy pace and restore movement in paralyzed limbs.

Dr. **Azadeh Yadollahi** discovered that electricity could also be used to prevent the accumulation of excess fluid in legs.

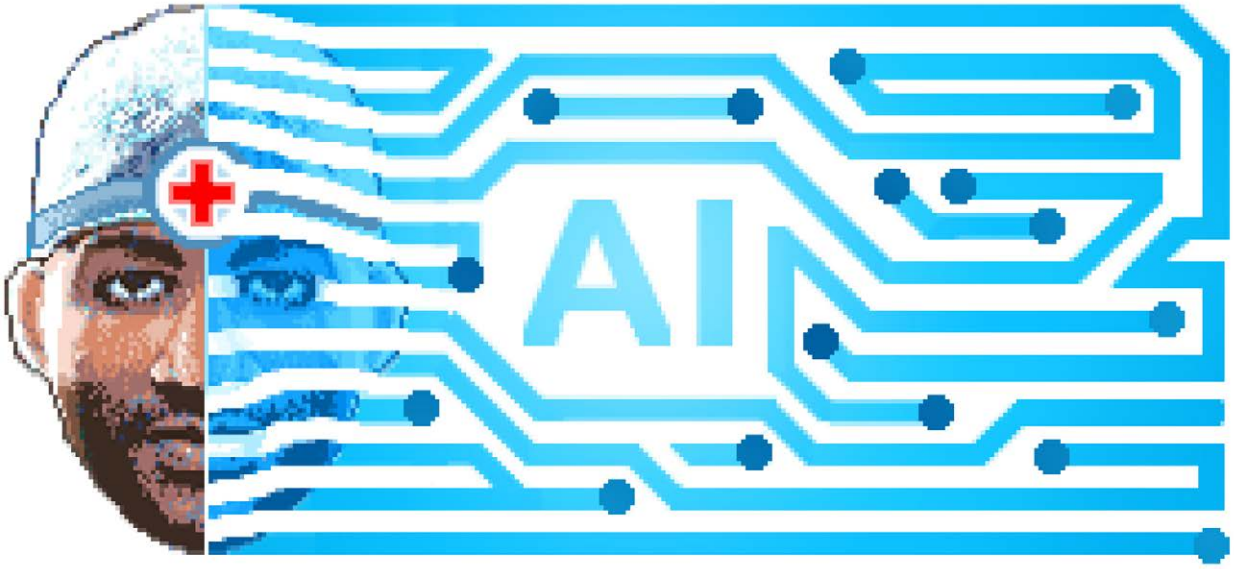
During prolonged periods of inactivity, fluid tends to pool in the legs. This can lead to a variety of complications including painful swelling and increased risk of leg ulcers and blood clots. While sleeping, the excess leg fluid can also move into the neck, where it can worsen the symptoms of sleep apnea, a disorder in which breathing slows or stops for minutes at a time during sleep.

In a recent study, Dr. Yahollahi tested whether electrical stimulation of calf muscles could reduce leg fluid buildup.

She measured fluid buildup in the legs of 13 patients with sleep apnea while they sat for 1.5 hours during two separate sessions. In one session, the electrical therapy was applied through a custom-made sock; whereas in the other session, participants received a mock therapy. She found that electrical stimulation reduced fluid buildup by 43% and leg swelling by almost 90%.

"Our findings show that electrical stimulation of the calf is a promising strategy to prevent leg fluid accumulation. The improvements that we observed suggest that our approach has the potential to ease the symptoms of sleep apnea," says Dr. Yadollahi.

Vena D, et al. Sci Rep. 2017 Jul 20;7(1):6055. Supported by the Toronto Rehab Foundation (TRF).



RoboDoc to the Rescue

Using artificial intelligence to optimize treatment in Parkinson disease

Artificial intelligence (AI) has blurred the lines between science fiction and reality with self-driving cars, humanoid robots and virtual assistants. Researchers are also harnessing its power to improve treatments for diseases, like Parkinson disease.

Parkinson disease is characterized by slowed and stiff movements and tremors. Although these symptoms can be controlled through medications like levodopa, many patients who take levodopa experience side effects such as muscle spasms and involuntary movements.

A major challenge for neurologists is adjusting levodopa's dosage, so that the disease symptoms are reduced without worsening the drug's side effects. Moreover, evaluating the side effects' severity is subjective and varies by neurologist.

To remedy this, a research team led by Dr. **Babak Taati** is using a form of AI known as deep learning.

The researchers captured short videos of patients receiving infusions of levodopa and used the deep learning algorithm to measure the severity of the patients' spasms and involuntary movements. Their findings revealed that the AI algorithm performed as well as or better than neurologists at gauging treatment response.

"Our AI algorithm was able to accurately detect the onset and the remission of side effects in response to levodopa infusion. We hope to turn our algorithm into a clinical tool that helps doctors prescribe more effective treatments," says Dr. Taati.

Li MH et al. Parkinsonism Relat Disord. 2018 Aug;53:42-45.
Supported by NSERC, TRF and TGWHF.

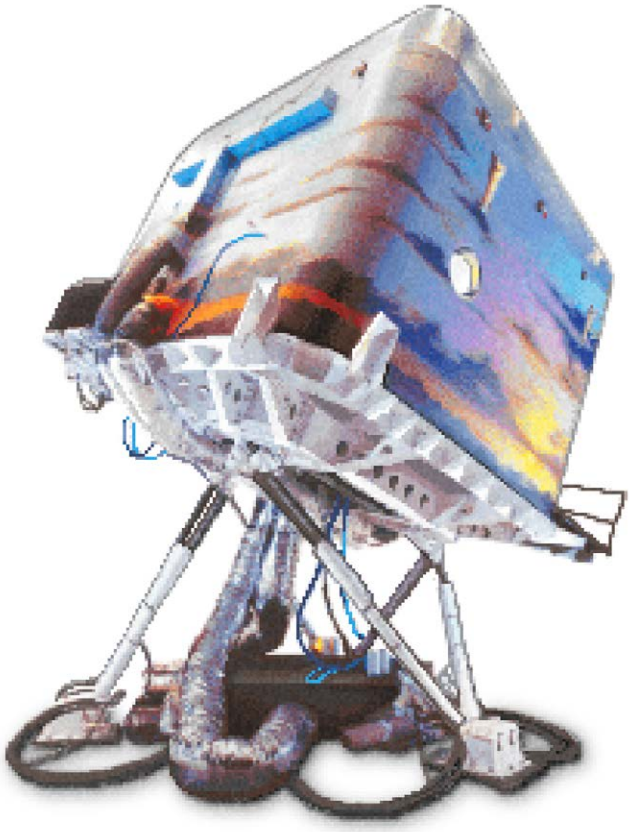
Setting a High Bar for Safety

Defining the features of the best handrails to prevent falls

A massive, one-of-a-kind research facility is located underneath Toronto Rehab, and researchers are using it to help make the world a safer and more accessible place for everyone.

Known as the Challenging Environment Assessment Laboratory (CEAL), this facility houses a cutting-edge hydraulic motion simulator that can be used to mimic everyday environmental challenges, such as driving with headlight glare or walking on an icy, inclined surface.

Dr. **Alison Novak** and her team recently used CEAL to improve the design of handrails to help prevent falls in healthy adults.



The research team asked study participants wearing safety harnesses to stand next to a handrail within the advanced motion simulator (illustrated below). The platform was then programmed to deliver quick and sudden movements to make participants fall. The resulting falls were recorded with motion capture cameras, while handrail sensors recorded forces applied to the rail.

The team found that participants' ability to recover their balance and control during a fall increased as the height of the handrail increased, and that higher handrails might provide greater stability with reduced physical demands.

"Given that the handrail heights that we tested are within the range required by the International Building Code, our findings could be used to improve current building standards," explains Dr. Novak.

"Future research will determine the handrail features to prevent falls in older adults and people with mobility or balance impairments, as these individuals are at high risk of falls and fall-related injuries."

Komisar V et al. Gait Posture. 2017 Dec 14(60);209-216. Supported by CIHR, AGE-WELL (Aging Gracefully across Environments using Technology to Support Wellness, Engagement and Long Life), TRI, the University of Toronto and TRF.

DriverLab Gearing up to Improve Vehicle Design

In October 2017, the most advanced driving simulator in Canada hit the virtual road at UHN. As a part of TRI's CEAL, DriverLab enables researchers to study the impact of our health on driving performance, with the aim of increasing safety for the elderly and those with injury or illness.

"It provides realistic and challenging driving conditions through the use of a full-size passenger vehicle and 360-degree visual projection and surround-sound systems, all mounted on a hydraulic motion platform with seven degrees-of-freedom. It also includes unique rain and headlight glare simulators," explains Dr. Jennifer Campos, Chief CEAL Scientist. "This technology will help improve driver safety by considering the effects of drugs, drowsiness and distraction on driving performance and by optimizing vehicle design, including automated vehicle technologies."

DriverLab was made possible by the Canadian Institutes of Health Research, the Canada Foundation for Innovation, the Government of Ontario and the Toronto Rehab Foundation.

New Director Welcomed

In 2018, Dr. Milos Popovic was appointed as TRI's Director of Research. He comes with over 15 years of experience as a researcher at TRI, during which time he has made outstanding contributions, including the creation of MyndMove™—a new therapy to help paralyzed stroke patients regain upper limb function.

Tech for Brain Health

CRANIA
CENTER FOR ADVANCING NEUROTECHNOLOGICAL INNOVATION TO APPLICATION
Turning Challenges into Opportunities

UHN and the University of Toronto launched the CenteR for Advancing Neurotechnological Innovation to Application (CRANIA). Housed in Toronto Western Hospital, CRANIA will bring together multidisciplinary research and clinical expertise to develop and commercialize implantable devices to treat neurological disorders.

Research Advisory Council

Director, TRI (Chair) **Milos Popovic**
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Scientist
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Affiliate Scientists
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Artificial Intelligence & Robotics for Rehabilitation

Senior Scientist
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Scientists
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Babak Taati

Affiliate Scientists
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Tilak Dutta
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César Márquez-Chin
Alison Novak
Christine Novak
Azadeh Yadollahi

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Sukhvinder Kalsi-Ryan
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Ethne Nussbaum
Linda Rapson
Luc Tremblay
Molly Verrier
Timothy Welsh
Paul Yoo

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Susan Jaglal
Pia Kontos
Katherine McGilton
I Gary Naglie

Scientists
Shabbir Alibhai
Nora Cullen

Affiliate Scientists
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Veronique Boscart
Jill Cameron
Mary Fox
Nancy Salbach
Kathryn Sibley

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W Darlene Reid

Scientists
Hisham Alshaer
Azadeh Yadollahi

Affiliate Scientists
Owen Lyons
Clodagh Ryan

Swallowing Science

Senior Scientist
Catriona Steele

Affiliate Scientist
Lisa Duizer

Clinical Researchers

Eugene Chang
Susan Marzolini

KREMBIL RESEARCH INSTITUTE

196
researchers

160
trainees

49 research fellows

111 graduate students

153K
sq. ft. research space

$50.8M
external funding

905
publications

223
staff

in it together

to protect the brain

Dr. Antonio Strafella
Senior Scientist, Krembil

Dr. Ivan Radovanovic
Scientist, Krembil

DIGGING DEEP

Krembil researchers are unearthing the mechanisms underpining neurological diseases such as Parkinson disease and epilepsy

The Root Cause

Mutation of *KRAS* gene increases risk of hemorrhagic stroke

Roots grow to sustain trees. They split from the main stem and become progressively smaller as they burrow deeper into the soil to seek nutrients and water. Likewise, the arteries in our body grow and branch out into smaller blood vessels that feed and nurture our cells.

In rare cases this process is disrupted, and poorly formed blood vessels develop in the brain. These are referred to as brain arteriovenous malformations (BAVMs). These vessels are weaker and more likely to rupture and cause a stroke.

To get more insight into how BAVMs develop and why they are prone to rupturing or leaking, Dr. **Ivan Radovanovic** co-led a study with Dr. Jason Fish from the Toronto General Hospital Research Institute that examined the genetic content of BAVM tissue that was surgically removed from patients.

The researchers found that BAVMs from more than half the patients contained a mutated version of the *KRAS* gene, which is best known for its role in promoting the growth and survival of cancer cells. The altered gene was only located in the cells lining the BAVMs where it weakened the blood vessels.

"Fortuitously, there are cancer drugs available that dampen KRAS effects on cells. The next step will be to test whether these drugs can reverse the effects of mutated KRAS in experimental models of BAVMs," says Dr. Radovanovic.

Nikolaev SI, et al. NEJM. 2018 Jan 18;378(3):250-261. Supported by CIHR, TGWHF, Novartis, the Canada Foundation for Innovation, NSERC, the Swiss Cancer League, the European Research Council, the American Heart Association, the Canada First Research Excellence Fund, the Government of Ontario, the Brain Aneurysm Foundation and UHN's Department of Surgery and Division of Neurosurgery. JE Fish holds a Tier 2 CRC in Vascular Cell and Molecular Biology. M Tymianski holds a Tier 1 CRC in Translational Stroke Research.

Parkinson State of Mind

Discovering alternate brain states that shed new light on Parkinson disease

Just as the appearance of trees can drastically change between two seasons—green and vibrant in spring to leafless and barren in the winter—new evidence suggests that the human brain can also exist in two different states.

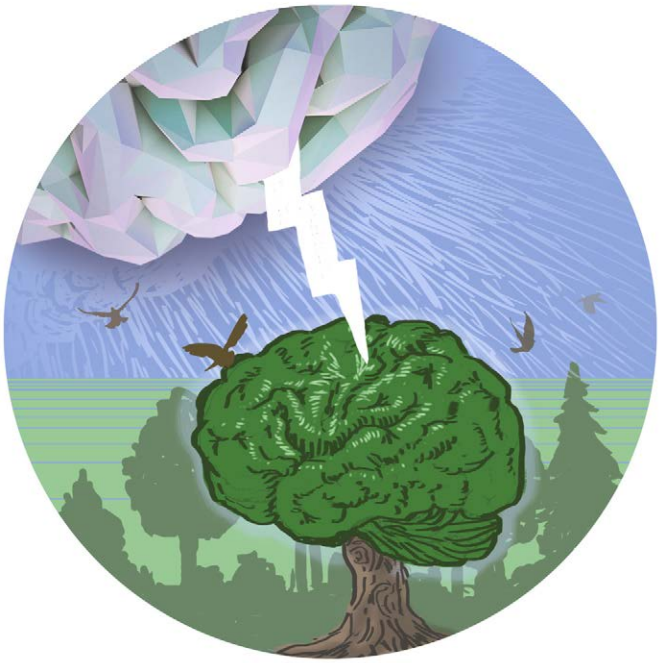
This intriguing discovery was made after Dr. **Antonio Strafella** and his team used a highly sophisticated imaging technique called dynamic functional connectivity to visualize the brains of people with or without Parkinson disease.

The researchers discovered that the brain switches back and forth between two states: in the first state, the brain has sparse connections between cells that transmit information very efficiently; whereas in the second state, it has many connections that transmit information inefficiently.

By comparing the brain states of those with or without Parkinson disease, his team found that people with the disease were more likely to get stuck in the second state. Moreover, a shift in brain states from the first to the second was associated with more severe disease symptoms.

"We are the first to identify this second brain state," says Dr. Strafella. "Our results indicate that the brain of a patient with Parkinson disease is not very efficient at sending information. Our next step is to figure out what role this process plays in the evolution of the disease."

Kim J, et al. Brain. 2017 Nov 1;140(11):2955-2967. Supported by CIHR and TGWHF. A Strafella holds a Tier 2 CRC in Movement Disorders and Neuroimaging.



Changing Diagnosis

Genetic tests could improve diagnosis and treatment in patients with unexplained epilepsy

The brain is full of electrical activity. These electrical signals move from one cell to another, branching out to different parts of the brain and body where they control everything that we do.

In patients affected by epilepsy these signals misfire causing recurrent surges of abnormal electrical activity that lead to seizures. The cause of these surges is not well understood; however, researchers have shown that it can involve genetics, head trauma, developmental disorders, prenatal brain damage or infections.

Dr. **Danielle Andrade** recently examined the utility of a genetic test to help determine the cause of unexplained epilepsy in adults with an intellectual disability. The test detects a type of genetic alteration known as copy number variation (CNV), which has been linked to other diseases.

Dr. Andrade and her colleagues discovered that a high proportion of these patients carried rare CNVs that contributed to their epilepsy. Of the CNVs identified, eight were found to affect genes previously implicated in intellectual disability, autism and epilepsy.

"This study shows that genetic testing could provide clinicians with important information that may improve the diagnosis and treatment of epilepsy. Based on these findings, adults with epilepsy of unknown cause should be re-investigated with the modern DNA technologies available today," says Dr. Andrade.

Borlot F, et al. JAMA Neurol. 2017 Nov 1;74(11):1301-1311. Supported by TGWHF, the Ontario Brain Institute and the Government of Ontario. AS Bassett holds a Tier 1 CRC in Schizophrenia Genetics and Genomic Disorders.

UHN Launches Krembil Brain Institute

UHN established the Krembil Brain Institute (KBI) to create an academic health sciences entity that harmonizes the institution's clinical and research priorities in the neurosciences. The new Institute, led by Drs. Gelareh Zadeh and Donald Weaver, will promote new and strengthen existing collaborations between clinicians and researchers across UHN. This, in turn, will accelerate the development of new treatments and cures for diseases of the brain, spine and nerves.

"We have the expertise, the people power and the ambition to take neurosciences to the next phase, which is to understand where we can make the biggest impact on outcomes," says Dr. Zadeh. The Krembil Neuroscience Centre and the Krembil Research Institute will remain as operational entities within UHN alongside the KBI; however, UHN will move towards the use of a single KBI brand for neuroscience activities. "Establishing KBI allows us to position ourselves to be the predominant leader in brain medicine now and in the years to come," adds Dr. Weaver.

Computational Boost

Krembil has recruited two new researchers with expertise in computational biology: (pictured, L-R) Dr. Michael Reber who examines cell networks responsible for vision, and Dr. Milad Lankarany who studies information processing in the brain.

Fighting Blindness

Evotec AG and MaRS Innovation have established a strategic partnership with Dr. Jeremy Sivak to develop a new treatment for glaucoma, a leading cause of irreversible blindness. The treatment will be based on a lipid molecule discovered by Dr. Sivak's team.

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UHN FOUNDATIONS

Be Bold. Choose Your Colour. Support Research.

The Princess Margaret Cancer Foundation

Colour Your Hair to Conquer Cancer launched in the spring of 2018 as a pilot program at The Princess Margaret Cancer Foundation (PMCF). The program celebrated diversity, inspired creativity and engaged people across the country to be bold, choose their hair colour, donate and challenge others to raise funds for cancer research.

In May 2018—dubbed *Colour Your Hair Month*—people of all ages, from 202 communities across Canada, coloured their hair to raise money and awareness. Colour events were held throughout the month where people signed up to donate and have their hair coloured by PMCF's volunteer stylists.

The funds that were raised support PM Cancer Centre's commitment to leading the way in personalized cancer medicine. This commitment is reflected in PMCF's six research funding priorities spanning discovery research such as stem cells in cancer and cancer genomics, development of new drugs and therapies such as immunotherapy, and improving supportive care.

"I think it's a great campaign. It's fun and it's something that just about everybody can do," says Terry Bacinello, PMCF board member and honorary chair of the *Colour Your Hair to Conquer Cancer* campaign.

Ms. Bacinello said she participated because her family has been touched by cancer and she wanted to give back. She tried different temporary colours throughout the month before deciding on purple, after raising more than $15,000 for vital cancer research.

The program was especially popular on social media. Participants posted photos of their colour transformations with the hashtag *#GetYourColourOn* and built a colourful community of change makers.

In 2019, PMCF is taking the program to the next level—bigger and better!

Image: (L-R) Drs. David Jaffray and David Wiljer, and two PM Cancer Center staff participating in the event.

Billion Dollar Campaign Benefits Research

Toronto General & Western Hospital Foundation

The Toronto General & Western Hospital Foundation (TGWHF) set a bold goal to raise $1 billion by March 2018 and surpassed that goal by raising $1.2 billion for UHN. A $100-million gift from the late Peter Munk to his namesake facility pushed the campaign total over the top and was the single largest donation ever made to a Canadian hospital.

In the final year of the campaign, grants made by TGWHF to UHN totalled $81 million, with over 90% supporting research. The donor community stepped forward to fund significant investment in research at the Krembil and TGHRI, including the following:

- Expanding *ex vivo* technology for use in kidney and liver preservation;
- Developing a digital cardiovascular platform to expand research in precision and genomic medicine in collaboration with the Ted Rogers Centre for Heart Research at the Peter Munk Cardiac Centre;
- Creating a brain bank program to better understand complex interactions of the brain in diseases such as Parkinson disease;
- Acquiring a sequencing machine to analyze blood and tissue samples to detect early stages of arthritis;
- Supporting research on the neuroprotective function of the retina to prevent glaucoma; and
- Establishing the 100th Chair position funded by TGWHF. Chairs have been an integral part of advancing research at UHN.

"Thanks to our wonderful donors, our investigators can pursue the knowledge that can save and sustain lives by building new organs, curing arthritis, discovering treatments to preserve memory, restoring vision, repairing spinal cords, and developing new technologies to heal hearts," said TGWHF CEO Tennys Hanson.

Image: Peter Munk announcing his historic gift to UHN in September 2017.

Incredible People Make Incredible Happen

Toronto Rehab Foundation

UHN Researchers are set to accelerate research on brain disorders, such as Alzheimer disease, epilepsy and Parkinson disease, with a transformational gift of $20 million to the Toronto Rehab Foundation from Walter and Maria Schroeder and their family.

This generous gift established *The Walter and Maria Schroeder Institute for Brain Innovation & Recovery* at UHN to support a collaborative group of multidisciplinary researchers with expertise in engineering and the clinical neurosciences. Working as a team, they plan to create an environment and a framework to accelerate research into managing and treating brain diseases while delivering discoveries and breakthroughs in neurotechnology.

"The workings of the nervous system and its disorders cannot be understood using a single level of analysis, experimental technique or scientific discipline," explains TRI Director of Research Dr. Milos Popovic. "Instead, brain research requires multiple levels of analysis from basic neuroscience to bioengineering, computer science and robotics."

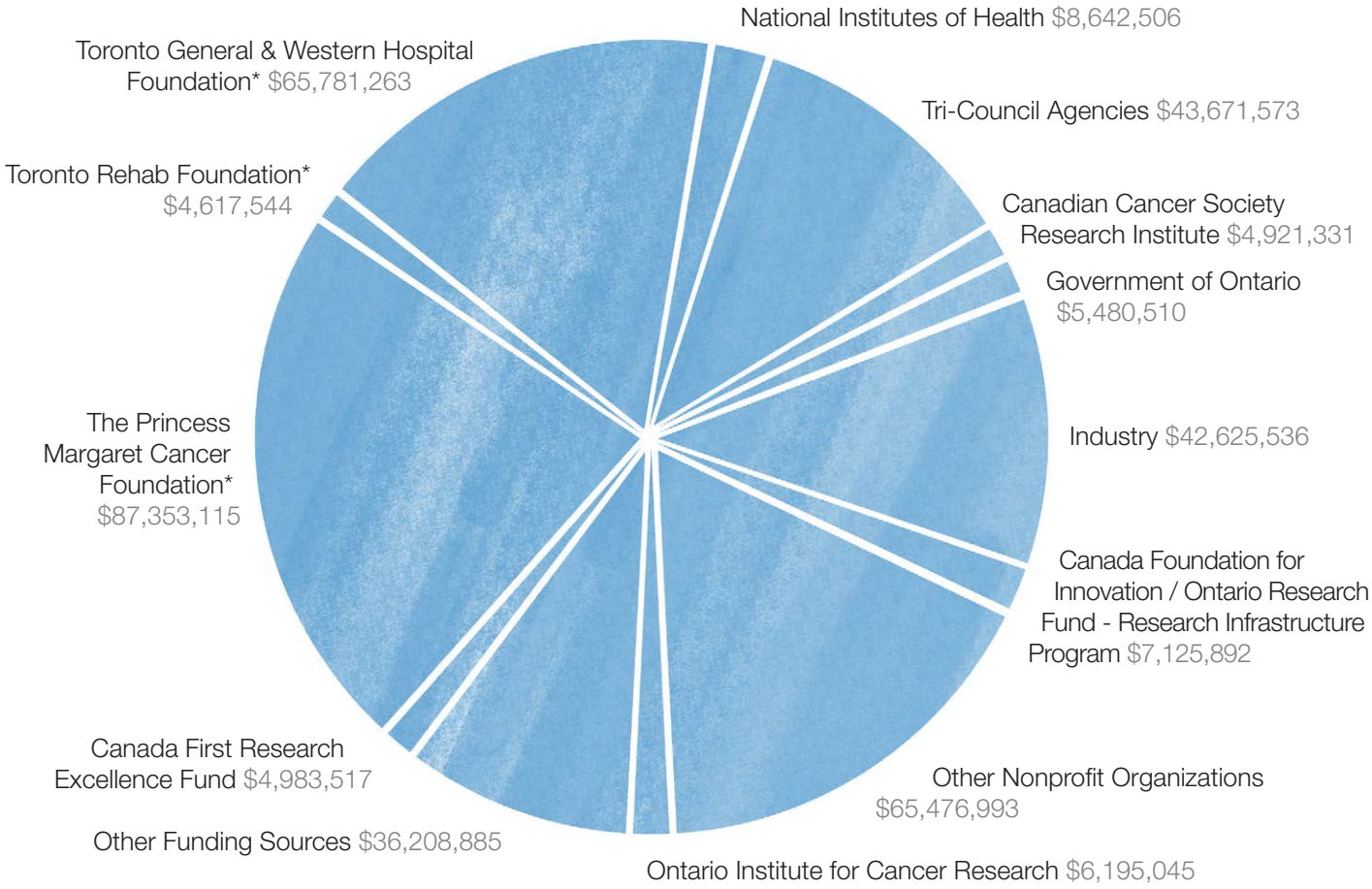
"The Schroeder's extraordinary support and commitment is helping TRI to take a quantum leap in advancing collaboration and sparking intellectual excitement that will serve to revolutionize brain science."

This donation represents the largest ever made to a rehabilitation hospital in Canada. And it helped Toronto Rehab Foundation successfully fulfill its $100 million *Where Incredible Happens* campaign in support of care and discovery of new technologies, therapies and products to prevent disability, restore function and enable independence.

Image: Walter and Maria Schroeder celebrate the announcement of their $20-million gift with The Walter and Maria Schroeder Institute for Brain Innovation & Recovery founding scientists. (Clockwise from Left) Dr. Robin Green, TRI Senior Scientist in cognitive neurosciences; Walter and Maria Shroeder; Dr. Milos Popovic, TRI Director of Research; Dr. Andrea Iaboni, geriatric psychiatrist and TRI clinical researcher; Dr. Kathy McGilton, Senior Scientist; and Dr. Alex Mihailidis, TRI Senior Scientist and Barbara G. Stymiest Research Chair in Rehabilitation Technology.

Financials

Research Funding by Source



TOTAL FUNDING $383,083,710

Financial data provided by UHN Research Financial Services. The above figures represent funding revenues (by source) received to support direct and indirect research for the fiscal year ending March 31, 2018. The 'Government of Ontario' funding category represents contributions from provincial government programs, including the Ministry of Health and Long-Term Care, and the Ministry of Economic Development, Job Creation and Trade (excluding the Ontario Research Fund - Research Infrastructure program). Funding agencies/organizations that contributed $3,500,000 or more are indicated.

**The Foundations donate to UHN for purposes in addition to supporting research, thus the figures above do not necessarily match UHN's audited financial statements for each foundation for the fiscal year ending March 31, 2018.*

Awards and Distinctions

Selected honours awarded to UHN researchers

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2018 Waterfront Award in Science and Technology

Dr. Richard Cooper

Distinguished Service Award, The Society for Airway Management

Dr. Karen Davis

Fellow, Canadian Academy of Health Sciences

Dr. Geoff Fernie

Member, Order of Canada

Dr. Andrea Furlan

2018–19 Mayday Fellow, The MAYDAY Fund

Dr. Shiphra Ginsburg

2018 Outstanding Achievement Award in the Evaluation of Clinical Competence, Medical Council of Canada

Dr. Dafna Gladman

2018 Carol Nachman Prize, sponsored by the German city of Wiesbaden

Dr. Sherry Grace

Michael L. Pollock Established Investigator Award, American Association of Cardiovascular and Pulmonary Rehabilitation

Dr. Margaret Herridge

2018 Lifetime Achievement Award, American Thoracic Society Assembly on Critical Care

Dr. Brian Hodges

Fellow, Canadian Academy of Health Sciences

Dr. David Jaffray

2018 ASTRO Gold Medal, American Society for Radiation Oncology

Dr. Edward Kassel

2017 Gold Medal, The American Society of Head and Neck Radiology

Dr. Armand Keating

2017 Lifetime Achievement Award, The Canadian Hematology Society

Dr. Murray Krahn

Tier 1 Canada Research Chair in Health Technology Assessment

Dr. Deepali Kumar

AST Achievement Award - Clinical Science Investigator, American Society of Transplantation

Dr. Jeffrey Lipton

2018 Brian Druker Award Recognizing Extraordinary Care in Chronic Myelogenous Leukemia (CML), Canadian CML Network

Dr. Kristin Musselman

Early Researcher Award, Ontario Ministry of Economic Development, Job Creation and Trade

Dr. Pamela Ohashi

2018 Robert L. Noble Prize, Canadian Cancer Society

Dr. Milos Popovic

2018 Jonas Salk Award, March of Dimes Canada

Dr. Trevor Pugh

2018 Stand Up To Cancer Phillip A. Sharp Innovation in Collaboration Award, Stand Up To Cancer

Tier 2 Canada Research Chair in Translational Genomics

Dr. Milica Radisic

2018 Women of Distinction Award, YMCA Toronto

Dr. Michael Sefton

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Dr. Frances Shepherd

2018 Canada Gairdner Wightman Award

Dr. Darrell Tan

2018 CAHR—CANFAR Excellence in Research Award for Clinical Sciences, CAHR—CANFAR

Dr. Susan Tarlo

2018 John M. Peters Award, American Thoracic Society Assembly on Environmental, Occupational and Population Health

Dr. Paaladinesh Thavendiranathan

Early Researcher Award, Ontario Ministry of Economic Development, Job Creation and Trade

Drs. Rodger Tiedemann

2018 William E. Rawls Prize, Canadian Cancer Society (co-recipient)

Dr. Michael Tymianski

Tier 1 Canada Research Chair in Translational Stroke Research (renewal)

Dr. Sara Vasconcelos

Early Researcher Award, Ontario Ministry of Economic Development, Job Creation and Trade

UHN Multi-Organ Transplant Program

AST Innovation Award, American Society of Transplantation

Dr. Gelareh Zadeh

2018 William E. Rawls Prize, Canadian Cancer Society (co-recipient)

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Canadian Institutes of Health Research
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Canadian Occupational Therapy Foundation
Canadian Partnership Against Cancer
Canadian Partnership for Stroke Recovery
Canadian Prostate Cancer Research Initiative
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Canadian Radiation Oncology Foundation
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Canadian Urology Research Consortium
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