medicine gets personal
2014 UHN research report

UHN Research Snapshot

Total Researchers	**883**
Fellows	675
Graduate Students	767
Total Trainees	**1,442**
Support Staff	1,628
Research Space	981,953 sq. ft.
Publications	2,910
Total Funding	**$344,384,007**

University Health Network (UHN) comprises four hospitals: Princess Margaret Cancer Centre, (PM Cancer Centre), Toronto General Hospital (TGH), Toronto Rehab (TR) and Toronto Western Hospital (TWH). It also has five research institutes: PM Cancer Centre, Techna Institute for the Advancement of Technology for Health (Techna), Toronto General Research Institute (TGRI), Toronto Rehabilitation Institute (TRI) and Toronto Western Research Institute (TWRI). The scope of research and complexity of cases at UHN have made it a national and international source for discovery, education and patient care. UHN is a research hospital affiliated with the University of Toronto (UT) and is a member of the Toronto Academic Health Science Network (TAHSN).

Cover Image: Susan Jaglal, PhD, Professor & Vice-Chair, Research, Department of Physical Therapy; Toronto Rehabilitation Institute-UHN Chair, University of Toronto; Senior Scientist, Toronto Rehabilitation Institute, University Health Network

Making Medicine Personal

Robert Bell MDCM, MSc, FACS, FRCSC, President and Chief Executive Officer, UHN

Christopher Paige PhD, FCAHS, Vice President, Research, UHN

Recent advances in our understanding of human biology have set in motion a potential revolution in health care based on an individual's unique makeup. The best ways to acquire and integrate personal information into medical practice comprise major challenges to UHN's research teams.

Medicine has always been personal—at some level—whether or not we knew it.

First, we each have a personal array of genes: our genome. Sometimes these genes are defective from birth, leading to diseases that may be mild to catastrophic. More commonly, genes mutate over the course of our lives; most mutations are inconsequential, but some lead to serious diseases like cancer. Acting on this knowledge remained nearly impossible until the advent of fast and accurate methods to determine the genetic makeup of normal and cancer cells, and the discovery of drugs that target particular mutations. Our research teams are developing ways to integrate this information into medical practice. Clinical trials focused on integrating molecular profiling of tumours into cancer diagnostics and treatment are already well underway.

At a different level, what could be more personal than when your immune cells attack your own tissue? This occurs in autoimmune inflammatory diseases such as rheumatoid arthritis, inflammatory

bowel disease and multiple sclerosis. While there have been major advances in treating these conditions, we still do not know why some patients respond to one anti-inflammatory drug while others do not. UHN research teams are discovering new ways to predict response and tailor interventions for these patients.

A bold example of personalized medicine is growing new tissue from a person's own cells. UHN researchers have established protocols to grow heart cells to replace damaged tissue, insulin-producing cells to control diabetes and cartilage-producing cells to improve damaged joints. New imaging technologies are also being developed to monitor these cells in the body, which is critical for their use in the clinic. These early steps portend an entirely new approach to treating disease.

Making medicine personal at UHN goes far beyond cells, molecules and tissues.

Can there be anything more personal than talking to your surgeon as an electrode is inserted into your brain? UHN has pioneered deep brain stimulation for movement disorders, depression, Alzheimer disease and other disorders. Because each brain is unique, dialog between patient and surgeon helps pinpoint the exact location of the electrode, transforming the patient into a key member of their own surgical team.

Ultimately, making health care personal means putting the patient first. At UHN, integrated care teams bring together health professionals and patients with the aim of optimizing care and improving the patient experience. Collaborative practice for a patient recovering from stroke brings together individuals skilled in acute care, and experts in rehabilitation and patient/family education.

A critical issue is to determine if personalized medicine is affordable—or if it is, in fact, the only way to make health care sustainable. In the long run, will customized treatments save money through greater efficiency and fewer subsequent visits? UHN researchers are studying the effect of personalized approaches on the health care system and beyond. These studies will guide policy makers on the most effective use of our health care dollars and help health care providers to better use existing resources.

Even with our four hospitals, five research institutes and four foundations (The Princess Margaret Cancer Foundation, Toronto General & Western Hospital Foundation, Toronto Rehab Foundation, Arthritis Research Foundation), UHN cannot progress fast enough on our own to meet our lofty goals. Fortunately, we are helped enormously by our partnership with the University of Toronto and the other research hospitals in the Toronto Academic Health Science Network. Working with these colleagues and others in Canada and around the world, UHN researchers are improving health care at multiple levels by making medicine personal.

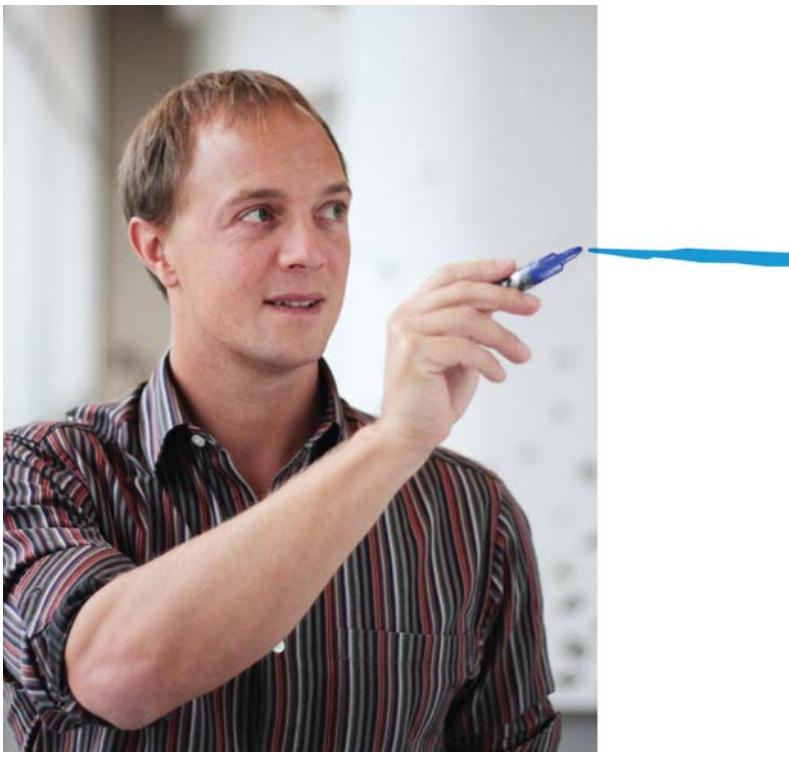
Brightening the Brain

Using imaging to understand the science of sadness

Depressive disorders exert huge tolls on society through health care-related costs and lost productivity. Moreover, it is very difficult to predict which treatments will benefit which patients. In fact, very little is known about why some individuals respond well to certain treatments, while others do not. To address this issue, Dr. Jonathan Downar investigated whether individual patient response to repetitive transcranial magnetic stimulation (rTMS) could be predicted by imaging the brain using functional magnetic resonance imaging (fMRI). rTMS treatment for depression uses powerful, focused magnetic field pulses to alter activity within emotion-regulating brain regions.

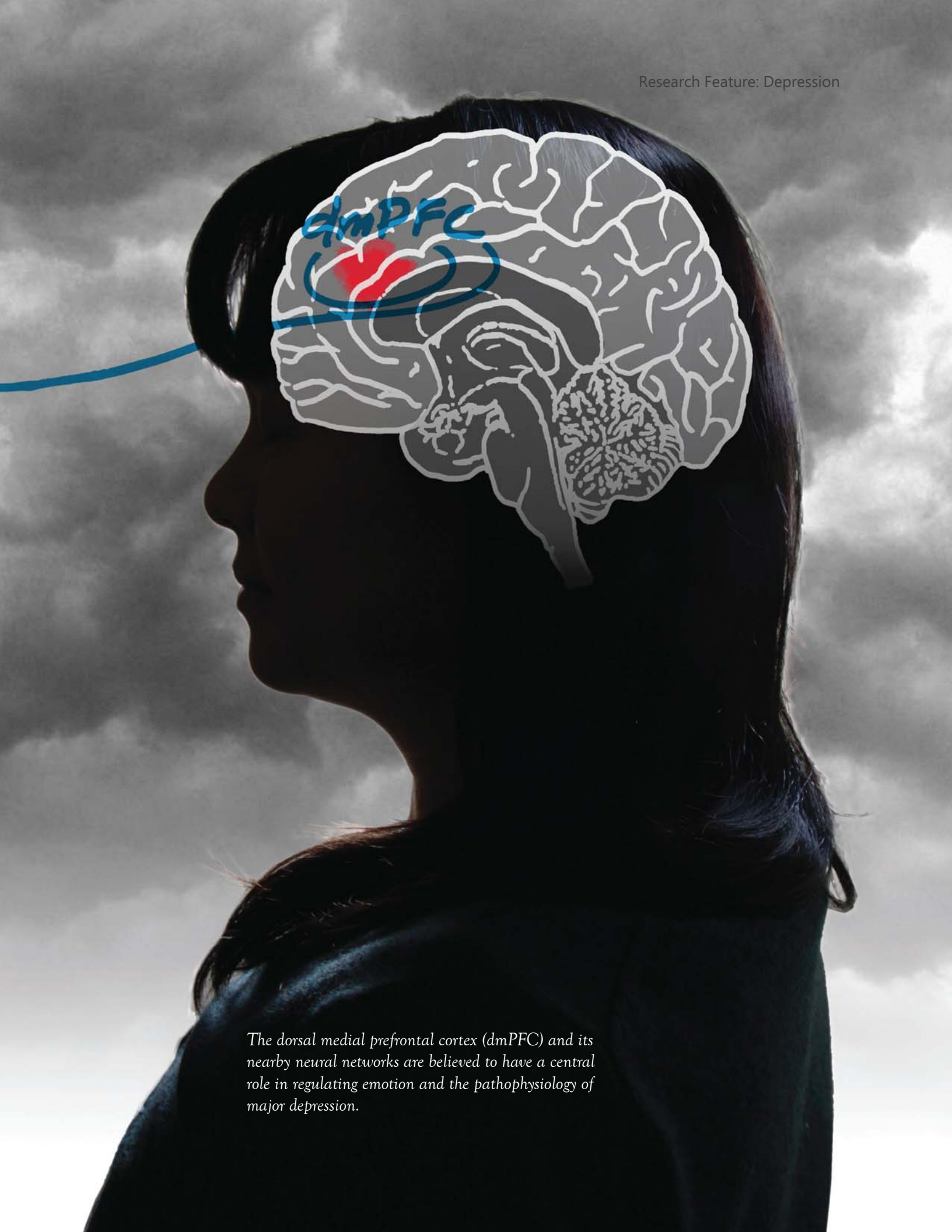
Brain maps were created for 25 patients before and after rTMS treatment. About half the patients showed a positive response to treatment, while the other half had little improvement. After analyzing the fMRI images, Dr. Downar's team found that patients that responded well to rTMS had high connectivity within specific circuits in the frontal lobes of the brain. These regions have been previously linked to depression and, on a functional level, are involved in self-regulation of thoughts, feelings and behaviour.

This study provides important new insights into the underlying neurobiological mechanisms that indicate which individuals may respond better to rTMS treatment and brings researchers one step closer to better customizing rTMS for different patients.



Measuring brain connectivity could be used to ensure that individuals are provided with therapies that benefit them the most.

Salomons TV et al. Neuropsychopharmacology 2014 Jan.
Supported by Ontario Brain Institute, Canadian Biomarker Integration Network for Depression, Buchan Family Foundation and Toronto General & Western Hospital Foundation.



The dorsal medial prefrontal cortex (dmPFC) and its nearby neural networks are believed to have a central role in regulating emotion and the pathophysiology of major depression.

Making Hepatitis C History

Tailoring a cure to each patient's infection

Over 180 million people worldwide are infected with the hepatitis C virus (HCV). The virus causes progressive damage to the liver that can lead to liver failure or liver cancer. Traditionally, HCV infections are treated with a combination of medications for up to a year that can cause serious side effects yet have relatively low cure rates. A person's response to these medications varies and depends on age, race, the strain of virus, the amount of virus in the blood and the extent of liver damage.

In the past two years, significant progress has been made in the fight against HCV; researchers have identified several drug combinations that are highly effective at curing HCV infections. One of these drug combinations was evaluated in a study led by Dr. Jordan Feld.

The study enrolled over 600 patients who had never been treated previously and were infected with genotype 1 HCV, the most common strain of the virus. Participants received either the new therapeutic regimen or a placebo—pills containing no medicine—for 12 weeks. Overall, 96% of patients treated with the new regimen were cured of their infection and the pills were tolerated well with only mild side effects.

HCV leads to more years of life lost than any other infectious disease in Ontario and is the most common cause for liver transplantation. With this new treatment regimen and others in development showing extremely high cure rates with relatively few side effects, eliminating HCV infection from Canada is now possible.

Eliminating a disease is a rare opportunity in medicine. These new treatments make it possible to move towards an HCV-free Canada.

Feld JJ et al. N Engl J Med. 2014 April. Supported by Toronto General & Western Hospital Foundation and AbbVie.

Representative heat map of Canada showing total HCV cases per province (red >100,000 ; orange >25,000; green <1,000; data from Public Health Agency of Canada, 2007). The new therapeutic regimen, represented by the blue pill, could help eliminate the virus.

The Artistry of Gene Analysis

A new tool to aid in the discovery of cancer-causing genes

Cancers arise due to spontaneous changes in DNA, which accumulate over time and cause unrestricted cell growth. The accumulation of these changes makes it challenging to ascertain which ones initiated the cancer.

To bypass this problem, researchers normally introduce DNA errors into cells and then use the cells as a tool for identifying cancer-causing genes. However, this has only been successfully achieved using cells from zebrafish and mice. Recent efforts by Dr. Rama Khokha's laboratory have provided a powerful new method to address this gap. Using several cutting-edge genomic techniques, they successfully introduced traceable genome-wide DNA errors into normal human cells.

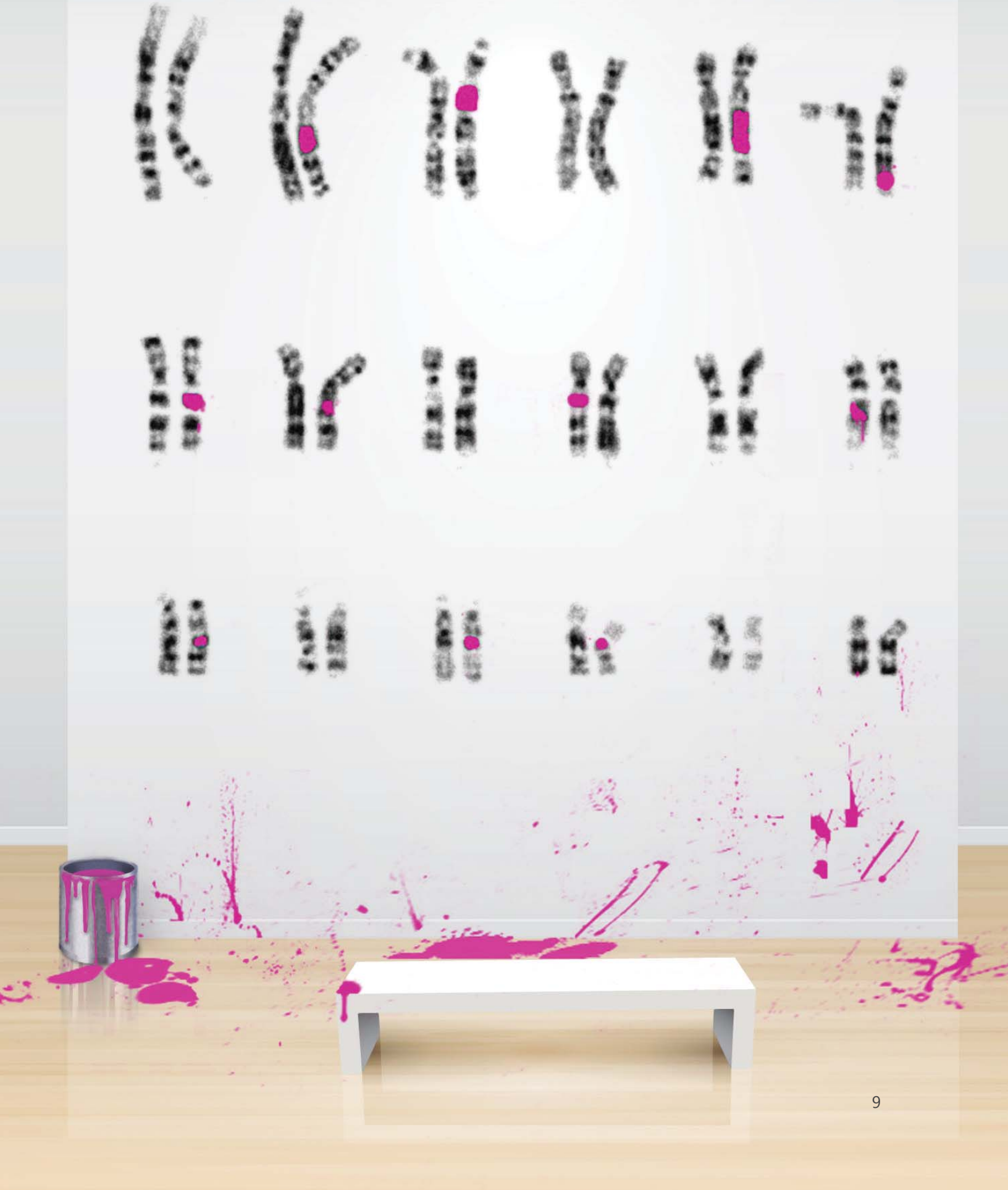
The team used a new combination of retroviruses and short DNA sequences to insert DNA at random sites across the genome. This rapidly transformed the normal cells into tumour cells with DNA alterations comparable to those found in many human cancers.

Detailed genomic analyses of these newly generated tumours yielded 80 candidate genes with the potential to drive cancer growth. Importantly, one of the genes was defective in at least one in ten of the tumours that were generated. This gene is known to be involved in regulating DNA organization and has previously been shown to suppress cell growth.

As Dr. Khokha explains, "Our results reveal the potential for using viruses and transposons to rapidly uncover new cancer-causing targets. This will accelerate the global effort to decipher the genes, pathways and networks that drive cancer development and growth."

Uncovering the genetic elements that cause cancer will help us develop customized treatments to meet each patient's needs.

Molyneux SD et al. Nat Genet 2014 Aug. Supported by Ontario Institute for Cancer Research, Canadian Cancer Society Research Institute and PM Cancer Foundation. T Mak is a Tier 1 Canada Research Chair in Inflammation Responses and Traumatic Injury.



The Road to Recovery

Customizing stroke rehabilitation one step at a time

For those recovering from a stroke, walking using each side of the body equally (ie, symmetrically) can be a challenge. This 'gait asymmetry' is due to impaired movement control on one side of the body, a common stroke-related condition. While a frequent rehabilitation goal is to restore symmetry, there are few studies on how gait asymmetry changes with rehabilitation, making it difficult to know which approach works best in which patient.

To address this, Dr. Kara Patterson followed the individual progress of stroke rehabilitation inpatients over two years. Patients showed robust improvements in controlling leg movements, balance and overall mobility. However, over 80% of those with gait asymmetry did not improve in symmetry of either length or timing of steps taken by each side when walking.

People with gait asymmetry could be at risk for further complications, such as loss of bone density in the compromised limb or injury to the functioning limb. This study reveals a need to re-evaluate rehabilitation programs after stroke and place more attention on restoring gait symmetry.

"Although movement control improves after rehabilitation, gait asymmetry persists in stroke patients," says Dr. Patterson. "This suggests that there are other unknown underlying causes that need to be targeted during rehabilitation and coupled with individualized feedback for each patient. Such customized programs could help patients to correct their gait using approaches that work best for them."

Tailored rehabilitation solutions could help patients regain the full use of both sides of their body after a stroke.

Patterson KK et al. Neurorehabil Neural Repair. 2014 May. Supported by Heart & Stroke Foundation (Focus on Stroke personnel award), Canadian Stroke Network, Canada Foundation for Innovation, Ontario Innovation Trust, Ministry of Research and Innovation, and Toronto Rehab Foundation.

Good Things in Small Packages

Nanoparticle turns laser light into cancer-killing heat

Photothermal therapy is a promising treatment option in cancer. It works like this: a nanoparticle converts laser light into localized heat that kills nearby cancer cells. Gold nanoparticles are currently used for photothermal therapy, but they are non-biodegradable and have toxicity concerns.

An emerging alternative nanoparticle is the porphysome, which is biodegradable and as effective as gold in transforming laser light into heat energy. An added benefit is that porphysomes may accumulate in tumour tissue, which along with the precision of laser light delivery, ensures that healthy cells remain unharmed. Unlike a metal such as gold, porphysomes can break apart and lose their ability to convert light into heat under sustained high-intensity light.

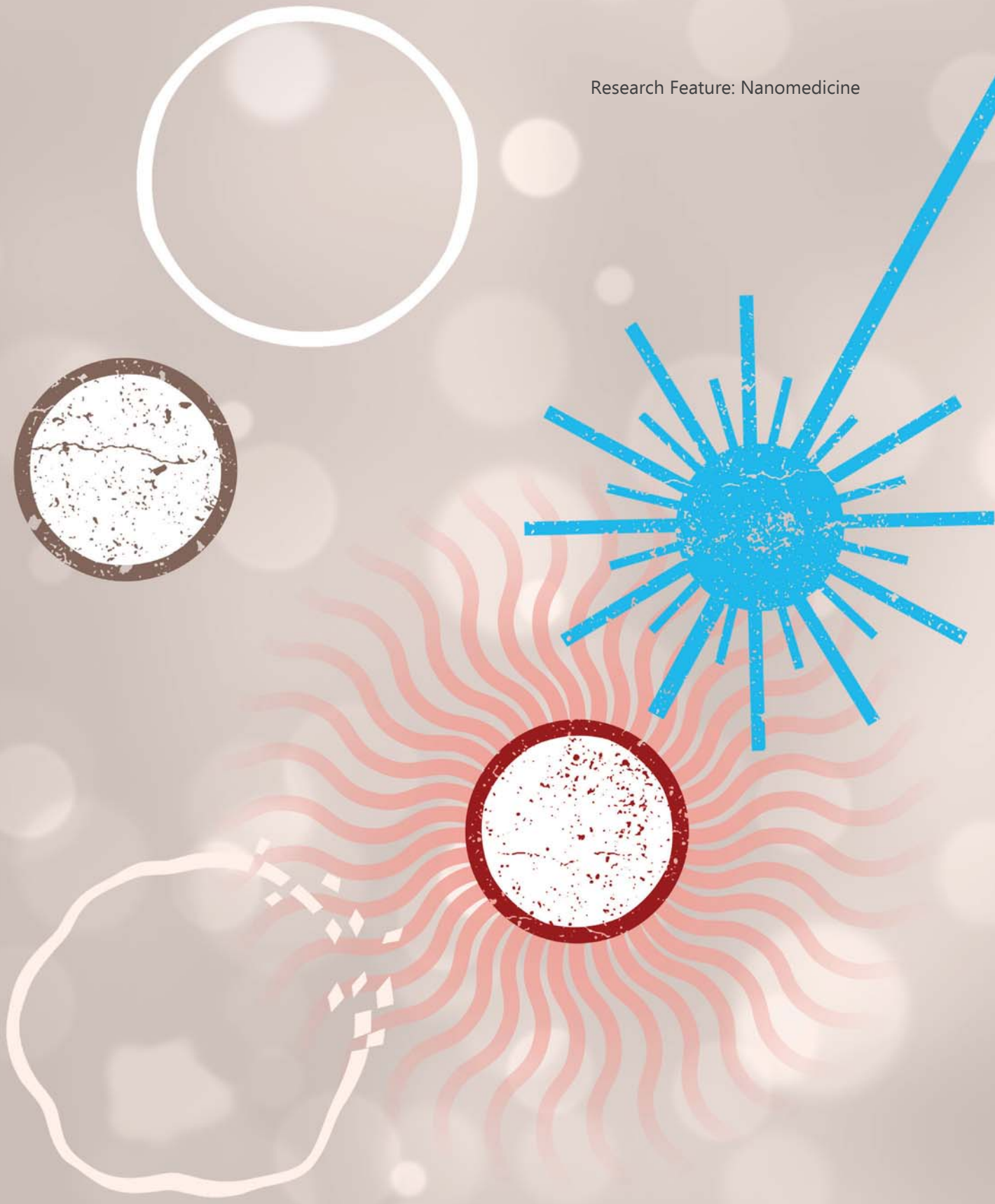
Dr. Gang Zheng and his team are leading the race to develop porphysomes for cancer therapy. Recently, they created a porphysome loaded with manganese particles. They found that these porphysomes are non-toxic, have excellent photothermal properties and are highly stable (able to maintain their photothermal ability even after prolonged light exposure).

Adding manganese also makes these particles detectable by MRI. This has important implications for image-guided therapy, as porphysomes can be used to simultaneously visualize tumours and apply treatment in real time.

This porphysome is a valuable new tool for personalized therapies that could be used to target a variety of difficult-to-treat cancers.

Through its multiple capabilities, the porphysome can help visualize and kill tumours.

MacDonald TD, et al. Angew Chem Int Edit. 2014 Jul. Supported by Ontario Institute for Cancer Research, Natural Sciences and Engineering Research Council of Canada, Canadian Institutes of Health Research, Canada Foundation for Innovation and PM Cancer Foundation. G Zheng holds the Joey and Toby Tanenbaum/Brazilian Ball Chair in Prostate Cancer Research.



Cancer cells close to laser-excited porphysomes are killed. Both the location of the laser and the ability of porphysomes to be targeted to tumours allows for the treatment to be tailored to each patient.

Better Health Through Chemistry

Expanding medicinal chemistry at UHN

Basic research provides insights into the mechanisms, pathways and genetics of human diseases. These insights power a new way of developing therapies known as rational drug design: seeking out substances capable of affecting disease pathways to provide therapeutic benefits to patients. Whether it is to block an enzyme in a cancerous tumour or to prevent the build-up of plaques in the brain that cause Alzheimer disease, new drugs hold great promise for the future of health care.

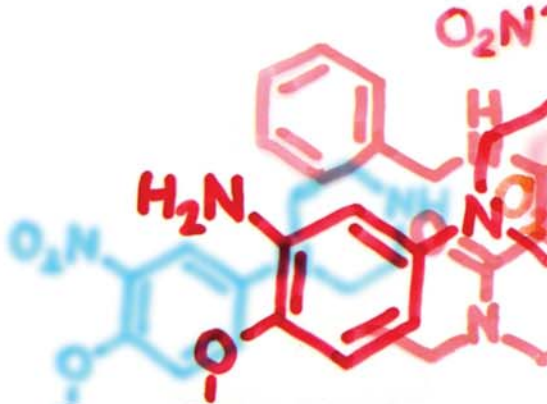
Between the discovery of a disease pathway in the lab and the first clinical trial of a new drug is a critical effort by medicinal chemists to find chemicals that have the desired effect. By strategically designing small molecules to interact with a biomolecular target, medicinal chemists must identify and optimize a compound that is 'drug-like'—a compound that safely influences the molecular target in the body, while avoiding the creation of toxic side-effects.

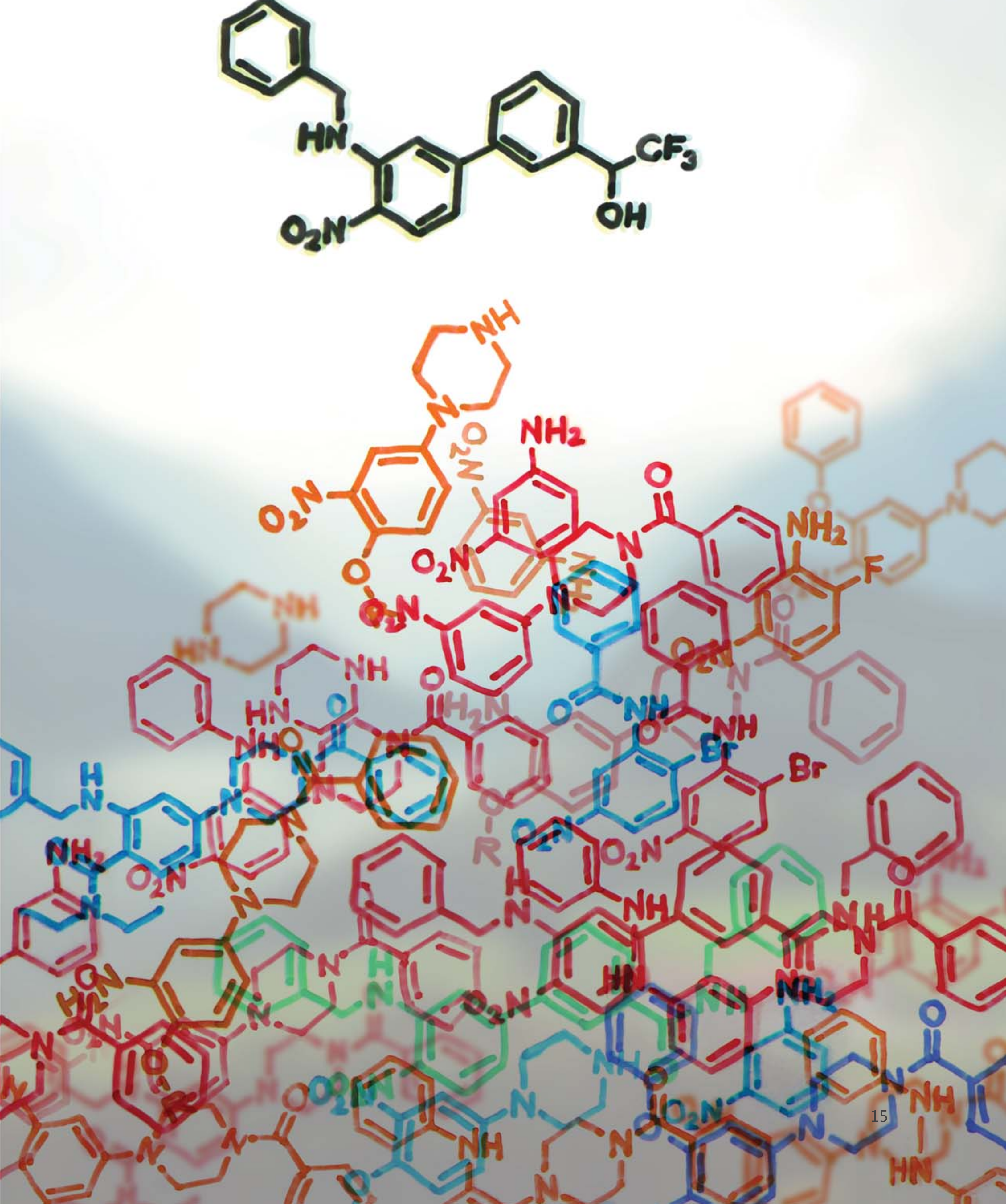
UHN's drug discovery efforts received a major boost last year with the launch of a new medicinal chemistry facility at TWRI headed by Dr. Donald Weaver, a medicinal chemist and neurologist who has led several successful drug design programs. The facility provides computational resources for drug design and modelling; and facilities for the biological screening and preclinical development of candidate drugs.

This new facility complements existing UHN medicinal chemistry capabilities that include the Therapeutics Group at the Campbell Family Institute (led by Dr. Henry Pauls, Director, Medicinal Chemistry) and the Center for Molecular Design and Preformulations (led by Dr. Lakshmi Kotra, Director). These facilities collaborate with UHN researchers to provide the specialized computer simulations, chemical synthesis and detailed analysis needed to develop a new drug. Adding a new dimension to these facilities is UHNShanghai, a foreign enterprise wholly owned by UHN, that synthesizes chemical reagents and pharmaceutical intermediates for use in research and development services worldwide.

Medicinal chemists help transform biological insights into innovations that improve health for Canadians.

Image caption: Compound 1140 (black) represents the pinnacle candidate in the search for a drug to prevent harmful plaques in Alzheimer disease. It was optimized from a pool of representative compounds (coloured) using a structure-based design program (courtesy of Dr. Donald Weaver).





Year in Discovery

A selection of high-impact research at UHN

Earlier Detection of Leukemia

A team of scientists led by Dr. John Dick identified a mutation in the protein known as DNMT3α that is linked to the development of acute myeloid leukemia (AML). AML is a cancer that grows in bone marrow and interferes with the production of normal blood cells. The identification of DNMT3α mutations as a pre-leukemic marker could lead to earlier detection and improved strategies for the treatment of AML. *Shlush LI et al. Nature. 2014 Feb.*

Improving Quality of Life

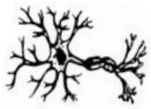
The results of a clinical trial led by Dr. Camilla Zimmermann suggest that early palliative care can significantly enhance the quality of life in patients with advanced cancer. Better quality of life, including reduced emotional distress and physical pain, can improve compliance with medical treatments and relationships with caregivers. Patients with cancer typically have a reduced quality of life, which worsens with progression of the disease. *Zimmermann C et al. Lancet. 2014 May.*

From Drug Discovery to Clinical Testing

A possible anticancer therapy has been discovered by scientists at the Campbell Family Institute. Dr. Tak Mak and his team identified the enzyme PLK4 as a new cancer target. The finding led to the identification of CFI-400945 as a potential anticancer drug. Administration of CFI-400945 inhibited the activity of PLK4 and reduced tumour growth in mice. Clinical testing is now evaluating the drug's ability to reduce solid tumour growth. *Mason JM et al. Cancer Cell. 2014 Aug.*

A Better Treatment for HIV

A superior treatment for human immunodeficiency virus (HIV) was discovered. The new drug dolutegravir, along with the drug combination of abacavir and lamivudine, was found to be more effective and had fewer side effects than the currently recommended treatment for HIV. The clinical trial was led by Dr. Sharon Walmsley, who is currently studying the efficacy and safety of this new drug combination over a longer time period. *Walmsley SL et al. N Engl J Med. 2013 Nov.*



Inflammation in Diabetes

Inflammation mediated by macrophages (a type of blood cell) contributes to the development of type 2 diabetes (T2D). By altering the activity of a subset of nerves, Dr. Minna Woo and her team promoted the anti-inflammatory activity of macrophages, which prevented the onset of T2D in an experimental model. Inducing the anti-inflammatory state of macrophages may represent a powerful new strategy to prevent and treat T2D. *Wang L et al. Nat Med. 2014 May.*

Dealing with Stress to Prevent Cancer

Blood is sustained by hematopoietic stem cells (HSCs) that survive for long periods of time and are able to self-renew. Because of their longevity, HSCs are exposed to stressful stimuli, like fluctuations in nutrient levels and toxic substances, that can damage cells and make them cancerous. Dr. John Dick and his team recently revealed the cellular mechanism that maintains a healthy HSC pool by clearing individual cells that have been damaged by stress. *van Galen P et al. Nature. 2014 June.*

Discoveries to Reality

A selection of UHN commercialization milestones

2013 UHN Inventors of the Year

The recipients of UHN's Inventor of the Year award are scientists who have demonstrated an outstanding ability to apply biomedical research towards the creation of new, inventive and patient-oriented technologies, products and therapeutics. The 2013 award was presented to two recipients: The Campbell Family Institute's Drug Development Team (led by Dr. Tak Mak) for the development of multiple new cancer therapeutics; and Dr. Ralph DaCosta for a device that can detect bacterial infections in wounds.

The Campbell Family Team developed multiple new cancer drugs that are in or are nearing clinical trials. The most recent drug, CFI-400945, shows preclinical efficacy in the difficult-to-treat 'triple negative' form of breast cancer. Their research has also led to licensing agreements and the founding of several spin-off companies (eg, Miikana, Agios). These discoveries are major contributions to the cancer treatment landscape.

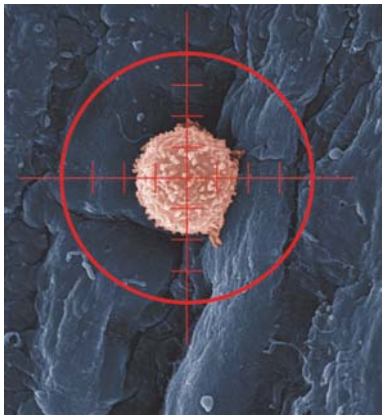
Dr. DaCosta invented a handheld optical imaging device that detects the quantity and distribution of bacteria in wounds. It can deliver results at the point of care, enabling clinicians to make informed decisions in real time. This inexpensive device may also help to revolutionize wound care in developing countries.

UHN transforms innovative research into technologies, products and drugs that reach people worldwide.

Photo caption (L-R): Drs. Ralph DaCosta and Tak Mak.

Medical Device

MyndMove™ is a therapy marketed by MyndTec Inc., a company co-founded by Dr. Milos Popovic. It helps to recover hand and arm motion in patients suffering from paralysis caused by stroke or spinal cord injury. During rehabilitation, a patient actively attempts a movement (eg, holding a cup) while a trained therapist uses the non-invasive device to stimulate various sets of muscles to create functional movements. This strengthens new neural connections specific to each patient that expedite recovery from paralysis and minimize long-term disability. This year, milestones include: Health Canada medical device licensing approval, a nationwide launch of MyndMove™ and the issuance of its first US patent.



Therapeutic Agent

The research of Drs. John Dick and Jean Wang has revealed new ways to target cancer stem cells. Cancer stem cells are formed when normal stem cells, immature cells found in bone marrow that give rise to all blood cells, develop certain mutations that lead to blood cancers like acute myeloid leukemia. Cancer stem cells are often resistant to conventional therapies. The research findings, licensed to Trillium Therapeutics Inc., will help to develop more effective drugs to target mutations in leukemia. Trillium recently secured $33 million towards their cancer stem cell program based on this research. These funds will help advance new drug studies, drug manufacturing and Phase I clinical trials.

Quality Assurance

Drs. Mohammad Islam, Robert Heaton and David Jaffray have developed IQM, a device that provides an automated 'final check' of machines that deliver radiation therapy (pictured above). These machines require vigilant quality testing because each radiation therapy treatment has an individualized plan due to factors that can change even within the same patient (eg, position). IQM streamlines quality assurance testing to ensure safe and successful delivery of radiation. In turn, this maximizes the time that machines can be used to treat cancer patients (over 50% receive radiation during their treatment). This year, IQM was licensed to iRT, a German start-up company, and was deployed to over 20 clinical testing sites.

Year in Funding

A selection of UHN research funding milestones

Targeting Each Patient's Tumour

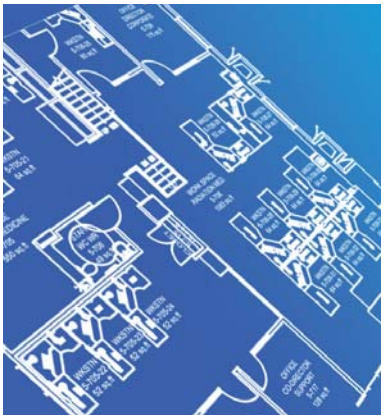
On September 10, 2014, a team of researchers led by Drs. Bradly Wouters and Robert Bristow were awarded $6.6 million over five years from the Terry Fox Foundation. These funds will support research to develop new and more personalized treatments that target the low oxygen levels in tumours—a characteristic that may contribute to a cancer's ability to resist treatment and spread within a person. Other UHN researchers involved in this project include Drs. David Jaffray, Marianne Koritzinsky, Michael Milosevic and Anthony Fyles.

The announcement was made by Dr. Victor Ling (President and Scientific Director, Terry Fox Research Institute) during a special event held at PM Cancer Centre. According to Dr. Ling, a total of $14.6 million was awarded through the Terry Fox New Frontiers Program to five innovative research projects across Canada—three of which were in Ontario. "Each of the Ontario-based projects that we are funding has the potential to revolutionize care for patients with hard-to-treat or advanced cancers through a personalized approach to treatment," said Dr. Ling.

Terry Fox Foundation funding will support innovative research programs that will accelerate the growth and realization of personalized medicine treatments.

Clinical Trials

On September 12, 2014, Brain Canada announced that it will provide $10 million to fund a Phase III trial (the FRONTIER trial) to evaluate the effectiveness of NA-1, a promising new drug developed by Dr. Michael Tymianski. To test the drug's ability to reduce the damage caused by a stroke, paramedics will administer the drug to 518 stroke patients in Toronto, Peel Region and Vancouver starting in January 2015. "NA-1 is the only emergency treatment that can re-open blocked arteries if given within three to four-and-a-half hours of the onset of stroke symptoms," says Dr. Laurie Morrison, lead researcher on the FRONTIER trial.



Infrastructure

On January 8, 2014, the Canada Foundation for Innovation announced that nine teams led by UHN researchers were awarded $4.8 million through its John R. Evans Leaders Fund program. This investment, with additional contributions from the private sector, the Ontario Ministry of Research and Innovation, and UHN foundations, will help to develop state-of-the-art facilities to advance research focused on arrhythmias (P. Backx), spinal cord injury (M. Fehlings), cancer (D. Jaffray, H. He, T. Pugh), diabetes and obesity (T. Lam), neurodegenerative diseases (D. Weaver), infectious and neurological diseases (L. Kotra) and vision disorders (V. Wallace).

Researchers

This year, five UHN researchers successfully renewed their Tier 1 Canada Research Chairs, including Drs. Tak Mak (Chair in Inflammation Responses and Traumatic Injury), Linda Penn (Chair in Molecular Oncology), Benjamin Neel (Chair in Signal Transduction and Human Disease), Eleanor Fish (Chair in Women's Health and Immunobiology) and Gordon Keller (Chair in Embryonic Stem Cell Biology). Over the next seven years, these Chairs will provide $7 million to help support the innovative research programs of these world-leading scientists.

Research News

UHN Ranked Number One

For the fourth year in a row, UHN was listed as Canada's top-funded research hospital on the *Top 40 Research Hospitals in Canada List 2014*, released by RE$EARCH Infosource Inc. The list ranks hospitals across Canada by research funding data. During the 2013 fiscal year, UHN reported $312 million in research expenditures.

caTissueSuite Launch

On December 20, 2013, caTissueSuite was officially launched at UHN. This comprehensive database gives researchers access to information on tissue samples collected and analyzed across UHN's research labs. This includes clinical data (eg, pathology reports) and patient consent information.

New Global Partnership

The PM Cancer Centre signed a Memorandum of Understanding with India's Tata Memorial Centre to create a partnership aimed at advancing innovation and delivery of best practices in cancer care, research and education. The centres will pool their knowledge and expertise, and encourage academic collaboration.

UHN's Vector Facility

The much-anticipated Vector Core Facility was officially launched at the Krembil Discovery Tower this year. This essential resource, which is led by Dr. Jeffrey Medin, will provide researchers with custom-made tools for gene delivery, markers for *in vivo* cell tracking and next-generation tools to optimize cell therapy applications.

Customizing Medicine

Techna hosted its second annual Symposium focused on the topic of personalized cancer medicine (PCM) and its future potential in health care. Experts from across disciplines and sectors discussed the technologies needed to realize PCM and the challenges ahead for research, development and implementation.

Top Cancer Discovery

Dr. Camilla Zimmermann's research, which determined the factors that influence the quality of life of individuals caring for patients with advanced cancer, was selected as one of the top discoveries of 2013 by the Canadian Cancer Society. The study suggested that early palliative care would improve the well-being of caregivers.

Research Distinctions

Selected honours bestowed upon UHN researchers

Dr. David Alter

2013 Heart & Stroke Foundation Ontario Mid-Career Investigator Award

Dr. Phyllis Billia

Clinician Scientist Salary Award (Phase 2), Canadian Institutes of Health Research

2014 Young Investigator Award, Basic Science Category, Canadian Cardiovascular Society

Dr. Marcelo Cypel

Early Researcher Award, Ontario Ministry of Research and Innovation

Dr. John Dick

Fellow, The Royal Society (UK)

Dr. Michael Fehlings

Fellow, Royal Society of Canada

Dr. Nigil Haroon

2013 SAA-Jane Bruckel Young Investigator Award, Spondylitis Association of America (SAA)

Dr. Brian Hodges

2014 ASME Gold Medal Award, Association for the Study of Medical Education (ASME)

Dr. Murray Krahn

2013 Dr. Jill M. Sanders Award of Excellence in Health Technology Assessment, Canadian Agency for Drugs and Technologies in Health

Dr. Douglas Lee

2014 Robert E. Beamish Award, Canadian Cardiovascular Society

Dr. Tak Mak

2014 Dr. Chew Wei Memorial Prize in Cancer Research, University of British Columbia

Dr. Catherine O'Brien

Early Researcher Award, Ontario Ministry of Research and Innovation

Dr. Lillian Siu

Board of Directors, American Association for Cancer Research

Dr. Peter St George-Hyslop

2014 Dan David Prize, Dan David Foundation

Dr. Donna Stewart

Member, Order of Canada

Dr. Ian Tannock

Member, Order of Canada

Dr. Brian Wilson

Fellow, The Optical Society

2014 Britton Chance Biomedical Optics Award, International Society for Optics and Photonics

UHN Foundations

Arthritis Research Foundation

The Princess Margaret Cancer Foundation

Toronto General & Western Hospital Foundation

Toronto Rehab Foundation

UHN Foundations

Arthritis Research Foundation

A Day at the Races On October 6, 2013, the Arthritis Research Foundation proudly held the 14th annual *Day at the Races*, the Foundation's signature fundraising event in support of arthritis and autoimmune disease research. This event has raised over $1,680,000 for arthritis and related autoimmune disease research.

This year, Honorary Chair Dr. Edward Keystone was recognized for his outstanding research contributions in the areas of rheumatoid arthritis and clinical therapeutics.

Dr. Keystone is committed to overcoming key challenges currently faced by rheumatologists. One of these challenges is the lack of clinical tools that are capable of predicting how individual patients will respond to different medications. This is particularly important because treatments are often administered by trial and error, which can be prohibitively costly and expose patients to harmful side effects. Dr. Keystone's work addresses this issue through exploring ways to better utilize the existing suite of therapeutic options so that the right treatment is provided at the right time to the right patient.

Dr. Keystone's research program is also focused on the development of new rheumatoid arthritis therapies that more effectively target the disease. His approach takes full advantage of new, cutting-edge technologies, analytical approaches and computing power. This highly collaborative project represents an unprecedented global effort to pinpoint the genes and protein markers that identify early signs of rheumatoid arthritis, predict disease progression and the optimal therapy for individual patients, as well as inform the development of innovative therapies.

The ultimate success of this research will be to translate findings into innovative strategies that prevent disease onset and drive remission.

Photo caption (L-R): Peter Kircher, Sandy Hawley, Helen Ching-Kircher and Dr. Edward Keystone (photo by Jono & Laynie Co.)

The Princess Margaret Cancer Foundation

Billion Dollar Challenge: Getting Closer

On October 15, 2014, The PM Cancer Foundation celebrated the halfway point in its five-year *Billion Dollar Challenge* with an event called 'A Golden Day'. The campaign aims to help revolutionize cancer care by supporting the creation of a new gold standard of personalized cancer medicine. The funds raised are already facilitating PM Cancer Centre's largest physical research expansion in its history and its most ambitious recruitment drive.

The halfway celebration of the *Billion Dollar Challenge* was attended by supporters from the Canadian mining industry who donated over $3.2 million—represented by six gold bars. Ian Telfer, Chairman of the Board of Goldcorp Inc., spoke at the event on behalf of the gold mining industry and the thousands of patients treated at the Centre each year. As a patient benefitting from research into more precise and personalized cancer care, he was pleased to make his own generous donation to support research at the PM Cancer Centre.

The PM Cancer Centre is getting closer to realizing its goal of personalized cancer medicine, thanks to new technology and a better understanding of the individual and complex nature of cancer. The IMPACT and COMPACT studies are excellent examples of how the Centre is re-tooling and preparing for a more personalized approach to cancer diagnostics. These studies have already sequenced the DNA of over 2,000 tumours and used this information to direct patients to clinical studies of drugs targeted to their specific type of cancer.

The *Billion Dollar Challenge* is a partnership between the Foundation and researchers at PM Cancer Centre. At the beginning of the campaign, each group was challenged to raise $500 million over five years. At the halfway point, the groups have raised $576 million.

Photo caption: Canadian gold mining industry leaders (left image) Ian Telfer with RCMP Officers and (right image; L-R) Sean Boyd, President and CEO of Agnico Eagle Mines Limited, with Ian Telfer (photo by Michael Tenaglia).

Toronto General & Western Hospital Foundation

A New Home for Discovery Over seven years of planning, fundraising and construction culminated in the celebration of the official opening of the Krembil Discovery Tower on November 20, 2013. At the heart of the celebration was a tribute to the generosity of the Krembil Family.

"Researchers will tell you they don't lack ideas or pathways to pursue in their labs—they lack only the human and physical resources to do so. That's what we told Bob and Linda Krembil and family," said Tennys Hanson, President and CEO of Toronto General & Western Hospital Foundation. The Krembil Family listened and stepped forward with a $30 million lead gift for the building, which was matched with an additional $30 million in private funding. With $60 million in donations secured, UHN was able to attract $29 million in support from the Canada Foundation for Innovation for the Tower.

"The Krembil Discovery Tower is now a reality thanks to the fundraising efforts of our generous donor community who were inspired by the Krembil family's leadership," said John Mulvihill, Chair of the UHN Board of Trustees. He also acknowledged Robert Krembil's volunteer services as a UHN Trustee and son Mark Krembil's involvement as a Toronto General & Western Hospital Foundation Board Member.

At the celebration, Robert Krembil explained why it was so important to his family to support TWRI. "We have been involved with neuroscience at TWH for several years and have observed the evolving breadth and depth of talent. Our team of scientists and clinicians is exceptionally impressive on many dimensions in comparison to other neuroscience centres around the world. Now we have a facility that is appropriate for such a renowned group."

Photo caption (L-R): Jacob Krembil, John Mulvihill, Stacey Krembil, Nancy Mulvihill, Linda Krembil, Mark Krembil, Dr. Gerry Halbert, Tootsie Halbert and Robert Krembil (photo by John Loper).

Toronto Rehab Foundation

New Outpatient Centre Opens its Doors

Toronto Rehab's Fred A. Litwin Outpatient Centre is a one-stop destination for patients and families, housing a number of essential services under one roof. The multimillion dollar donation from Fred A. Litwin and the Litwin family is enabling pioneering research and more efficient service for thousands of patients each year.

"Toronto Rehab is a jewel in the health care landscape," says Fred Litwin, Chief Executive Officer and President of Forum Financial Corporation. "The hospital cares for individuals as they regain their independence and recapture their potential. What could be more rewarding than helping people return to their families, their communities and their lives? I am so proud of my family's association with this great hospital."

Through the Fred A. Litwin Outpatient Centre, patients can access the latest therapies being developed by researchers at Toronto Rehab. For example, patients with paralysis resulting from spinal cord injury and stroke can now have their limb function restored through Functional Electric Stimulation (FES)—a therapy that uses electricity to push muscles into action and retrain the central nervous system. MyndMove™, a device created by Dr. Milos Popovic, has produced unprecedented levels of recovery and is the first therapy to produce significant increases in upper arm mobility in patients.

The Litwin family's transformative gift is enabling world-leading advances that will impact the future of health care. "On May 29, 2014, Toronto Rehab celebrated the establishment and the dedication of the Fred A. Litwin Outpatient Centre," says Cindy Yelle, President and CEO of Toronto Rehab Foundation. "It was an important moment that will undoubtedly go down in the history of this great organization."

Photo caption: Fred and Mary Litwin pictured in Toronto Rehab's Fred A. Litwin Outpatient Centre (photo by William Suarez).

UHN Research Institutes

Princess Margaret Cancer Centre

Techna Institute

Toronto General Research Institute

Toronto Rehabilitation Institute

Toronto Western Research Institute

Princess Margaret Cancer Centre

Research Space	390,672 sq. ft.
External Funding	$150,154,247
Publications	1,224
Senior Scientists	45
Scientists	17
Affiliate Scientists	14
Assistant Scientists	3
CCRU	297
Total Researchers	376
Fellows	286
Graduate Students	242
Total Trainees	528
Total Staff	780

Research Council on Oncology (RCO)

Director, PM Cancer Centre; Chair, RCO; Director, Executive Committee Benjamin Neel
Executive Committee Mitsuhiko Ikura, Rama Khokha, Senthil Muthuswamy, Pamela Ohashi, Gary Rodin, Ming-Sound Tsao, Brian Wilson, Bradly Wouters
Chair, Appointments Committee Rama Khokha
Medical Director, Laboratory Medicine Program Sylvia Asa
Medical Director, Cancer Program Mary Gospodarowicz
Head, Radiation Medicine Fei-Fei Liu
Head, Medical Oncology and Hematology Malcolm Moore
Head, CCRU Amit Oza
Chief, Surgical Oncology Jonathan Irish
Executive Director, Research Operations Lisa Alcia
Senior Vice President, UHN and Executive Lead, PM Cancer Centre Marnie Escaf
Vice President, Research Christopher Paige

Researchers

Senior Scientists

Kenneth Aldape
Cheryl Arrowsmith
Sylvia Asa
Norman Boyd
Robert Bristow
Avijit Chakrabartty
Gerald Devins
John Dick
Shereen Ezzat
Lucia Gagliese
Razqallah Hakem
David Hedley
Richard Hill
Doris Howell
Mitsuhiko Ikura
Norman Iscove
David Jaffray
Igor Jurisica
Gordon Keller
Rama Khokha
Thomas Kislinger
Lothar Lilge
Fei-Fei Liu
Geoffrey Liu
Tak Mak
Jeffrey Medin
Mark Minden
Senthil Muthuswamy
Benjamin Neel
Pamela Ohashi
Emil Pai
Christopher Paige
Linda Penn
Gilbert Privé
Brian Raught
Gary Rodin
Robert Rottapel
Aaron Schimmer
Vuk Stambolic
James Till
Ming-Sound Tsao
I Alex Vitkin
Brian Wilson
Bradly Wouters
Gang Zheng

Scientists

Laurie Ailles
Scott Bratman
Ralph DaCosta
Daniel De Carvalho
Kim Edelstein
Benjamin Haibe-Kains
Housheng Hansen He
Naoto Hirano
Michael Hoffman
Mathieu Lupien
Nadeem Moghal
Catherine O'Brien
Trevor Pugh

Michael Roehrl
Rodger Tiedemann
Gelareh Zadeh
Camilla Zimmermann

Assistant Scientists

Toshiyuki Araki
Zhenyue Hao
Lakshmi Muthuswamy

Affiliate Scientists

Eric Xueyu Chen
Mary Jane Esplen
Anthony Joshua
C Anne Koch
Malcolm Moore
Michael Moran
Michael Reedijk
Paul Ritvo
Leonardo Salmena
Michael Sherar
Suzanne Trudel
Jean Wang
Julia Wang
Wei Xu

Cancer Clinical Research Unit (CCRU)

Ayman Al Habeeb
Hamideh Alasti
Eitan Amir
Mostafa Atri
Wing Au
Michael Baker
Linda Balneaves
Subrata Banerjee
David Barth
Eric Bartlett
Andrew Bayley
Philippe Bedard
J Robert Beecroft
Akbar Beiki-Ardakani
Robert Bell
Hal Berman
Marcus Bernardini
Lori Bernstein
Mark Bernstein
Andrea Bezjak
Jean-Pierre Bissonnette
Martin Blackstein
Ivan Blasutig
Robert Bleakney
Scott Boerner
Jette Borg
Anthony Brade
Donald Branch
Stephen Breen
William Brien
James Brierley
Dale Brown
John Bryson
Karina Bukhanov
Ronald Burkes
Marcus Butler
Marco Carlone
Charles Catton
Pamela Catton
David Cescon
Hong Chang
Tanya Chawla
Christine Chen
Douglas Chepeha
Runjan Chetty
Carol Cheung
Frederick Cheung
John Cho
Charles Cho
Young-bin Cho
James Chow
Caroline Chung
Peter Chung
Tulin Cil
Blaise Clarke
Sean Cleary
Tatiana Conrad
Catherine Coolens
Timothy Craig
Adrian Crawley
Andrew Crean
R Michael Crump
Pavel Crystal
Christine Cserti
Bernard Cummings
Marcelo Cypel
Norma D'Agostino
Andrei Damyanovich
Gail Darling
Laura Dawson
John de Almeida
Marc de Perrot
Jan Delabie
Neesha Dhani
Eleftherios Diamandis
Robert Dinniwell
Jason Dodge
Susan Done
James Downar
Alexandra Easson
Saibishkumar Elantholi Parameswaran
Mary Elliott
Christine Elser
Jaime Escallon
Andrew Evans
Ronald Feld
Louis Fenkell
Peter Ferguson
Sarah Ferguson
Antonio Finelli
Peter Fitzgerald
Rachel Fleming
Neil Fleshner
Jeremy Freeman
Anthony Fyles
Steven Gallinger
William Geddie
Frederick Gentili
Sandeep Ghai
Sangeet Ghai
Danny Ghazarian
Ralph Gilbert
Meredith Giuliani
Rebecca Gladdy
David Goldstein
Pamela Goodwin
Mary Gospodarowicz
David Grant
David Green
Paul Greig
Robert Gryfe
Patrick Gullane
Abha Gupta
Vikas Gupta
Sarah Hafezi-Bakhtiari
Masoom Haider
Sarah Hales
Robert Hamilton
Kathy Han
Anthony Hanbidge
Breffni Hannon
Robert Heaton
Mostafa Heydarian
Chia-Sing Ho
David Hodgson
Stefan Hofer
David Hogg
Andrew Hope
David Hwang
Elizabeth Hyjek
Jonathan Irish
Mohammad Islam
Nassir Jaffer
Hyun-Jung Jang
Raymond Jang
Jeff Jaskolka

Michael Jewett
Kartik Jhaveri
John Jezioranski
Jennifer Jones
John Kachura
Tuula Kalliomäki
Suzanne Kamel-Reid
Zahra Kassam
Edward Kassel
Ebru Kaya
Armand Keating
Harald Keller
Erin Kennedy
Shaf Keshavjee
Korosh Khalili
Tim-Rasmus Kiehl
Dong Hwan Kim
John Kim
Tae Kyoung Kim
Jennifer Knox
Hyang-Mi Ko
Paul Kongkham
Hatem Krema
Timo Krings
Monika Krzyzanowska
Walter Kucharczyk
Vishal Kukreti
Vathany Kulasingam
Girish Kulkarni
Supriya Kulkarni
Kevin Kuo
John Kuruvilla
Stéphane Laframboise
Normand Laperriere
Natasha Leighl
Wey-Liang Leong
Daniel Létourneau
Wilfred Levin
Madeline Li
Winnie Li
Patricia Lindsay
Jeffrey Lipton
Christopher Lo
Helen Mackay
Miller Macpherson
Ernie Mak
Lee Manchul
Myles Margolis
Warren Mason
Andrew Matthew
J Andrea McCart
David McCready
Ian McGilvray
Robin McLeod
Andrea McNiven
Tatiana Melnyk
Cynthia Ménard
Ravi Menezes
Ozgur Mete
Ur Metser
Howard Michaels
David Mikulis
Barbara-Ann Millar
Kim Miller
Naomi Miller
Michael Milosevic
Chantal Morel
Lyndon Morley
Douglas Moseley
Carol-anne Moulton
Anna Marie Mulligan
K Joan Murphy
Kieran Murphy
Rumina Musani
Elsie Nguyen
Rinat Nissim
Nancy Olivieri
Martin O'Malley
Anne O'Neill
Brian O'Sullivan
Amit Oza
Sophia Pantazi
Narinder Paul
Jacob Pendergrast
Bayardo Perez-Ordonez
Andrew Pierre
Anna Porwit
Anca Prica
Thomas Purdie
Fayez Quereshy
Dheeraj Rajan
Albiruni Razak
Donna Reece
Julia Ridley
G Jolie Ringash
Alexandra Rink
Heidi Roberts
Graham Roche-Nagle
Patrik Rogalla
Barry Rosen
Lorne Rotstein
Marjan Rouzbahman
Gilda Santos
Anabel Scaranelo
Andre Schuh
Matthew Seftel
Stefano Serra
Michael Sharpe
Patricia Shaw
Frances Shepherd
Manohar Shroff
E Rand Simpson
Lillian Siu
Roger Smith
Boraiah Sreeharsha
Srikala Sridhar
Teodor Stanescu
Alexander Sun
D Robert Sutherland
Carol Swallow
Joan Sweet
Jeff Tanguay
Mojgan Taremi
Bryce Taylor
Karel terBrugge
Seng Thipphavong
Paaladinesh Thavendiranathan
Santhosh Thyagu
Anne Tierens
Ants Toi
Emina Torlakovic
John Trachtenberg
Richard Tsang
Theodore van der Kwast
Monique van Prooijen
Thomas Waddell
John Waldron
Richard Ward
Padraig Warde
David Warr
Alice Wei
Ilan Weinreb
Woodrow Wells
Xiao-Yan Wen
Kirsten Wentlandt
Lawrence White
Daniel Winer
Bernd Wintersperger
Ian Witterick
Rebecca Wong
Robert Wood
Jay Wunder
Kazuhiro Yasufuku
Karen Yee
Erik Yeo
Ivan Yeung
Bruce Youngson
Eugene Yu
Beibei Zhang
Toni Zhong
Alexandre Zlotta

Techna Institute

Research Space	9,730 sq. ft.
External Funding	$2,366,677
Publications	249
Core Leads	8
Faculty	3
Affiliated Faculty	39
Total Researchers	50
Fellows	11
Graduate Students	55
Total Trainees	66
Total Staff	32

Techna Leadership Team

Director, Techna Institute David Jaffray
Director, Clinical Faculty Kieran Murphy
Director, Commercialization Mark Taylor
Director, Operations & Engineering Luke Brzozowski
Director, Clinical Processes Howard Abrams
Director, Research Faculty Paul Santerre
Director, Communication & Knowledge Transfer Gunther Eysenbach
Vice President, Research Christopher Paige

Researchers

Design & Engineering for Health

Core Lead
Joseph Cafazzo

Affiliated Faculty
James Drake
Anthony Easty
Emily Seto
Patricia Trbovich
Leonard Tse

Guided Therapeutics

Core Leads
Jonathan Irish
David Jaffray

Faculty
Margarete Akens
Ralph DaCosta
Arash Zarrine-Afsar

Affiliated Faculty
Dionne Aleman
Jean-Pierre Bissonnette
Timothy Chan
Catherine Coolens
John De Almeida
James Drake
Gabor Fichtinger
Justin Grant
Mojgan Hodaie
Andrew Hope
Mohammad Islam
Daniel Létourneau
Andres Lozano
Claire McCann
Cynthia Ménard
Narinder Paul
Thomas Purdie
Dheeraj Rajan
Alexandra Rink
Michael Sharpe
Michael Sherar
Teodor Stanescu
I Alex Vitkin
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
Christine Allen
Shyh-Dar Li
John Valliant

Photonics

Core Lead
Brian Wilson

Toronto General Research Institute

Research Space	238,189 sq. ft.
External Funding	$73,803,562
Publications	1,048
Senior Scientists	58
Scientists	26
Affiliate Scientists	49
Assistant Scientists	2
Clinical Researchers	121
Total Researchers	256
Fellows	225
Graduate Students	165
Total Trainees	390
Total Staff	464

Research Council

Director, TGRI; Chair, TGRI Research Council; Division Head (Acting), Experimental Therapeutics Mansoor Husain
Division Head, Advanced Diagnostics Myron Cybulsky
Division Head, Support, Systems & Outcomes David Urbach
Program Medical Director, Peter Munk Cardiac Centre Barry Rubin
Program Medical Director, Transplantation Atul Humar
Surgeon-in-Chief; Program Medical Director, Surgical & Critical Care Shaf Keshavjee
Physician-in-Chief; Program Medical Director, Medical & Community Care Edward Cole
Chair, TGRI Appointments Committee Thomas Waddell
Group Lead, Cardiovascular Douglas Lee
Group Lead, Metabolism Michael Wheeler
Group Lead, Infection & Immunity TBD
Group Lead, Respiratory & Critical Care Mingyao Liu
Group Lead, Communities of Health Shabbir Alibhai
Executive Director, Research Operations Lisa Alcia
Senior Vice President, UHN and Executive Lead, TGH Scott McIntaggart
Vice President, Research Christopher Paige

Researchers

Advanced Diagnostics

Senior Scientists
Johane Allard
Peter Backx
Stuart Berger
Daniel Cattran
Myron Cybulsky
I George Fantus
Eleanor Fish
Joseph Fisher
John Floras
Reginald Gorczynski
Avrum Gotlieb
Tony Lam
Gary Lewis
Mingyao Liu
Peter Liu
Kelly MacDonald
Kumaraswamy Nanthakumar
York Pei
Barry Rubin
Katherine Siminovitch
Michael Wheeler
Eldad Zacksenhaus
Li Zhang

Scientists
Filio (Phyllis) Billia
David Cherney
Shannon Dunn
Jason Fish
Anthony Gramolini
Tianru Jin
Bruce Perkins
Heather Reich
Clinton Robbins
Jonathan Rocheleau
Daniel Winer
Minna Woo

Affiliate Scientists
Donald Branch
Hong Chang
David Clark
Jeffrey Medin
Anna Sawka
Florence Wong

Experimental Therapeutics

Senior Scientists
T Douglas Bradley
Mark Cattral
Marc de Perrot
Niall Ferguson
Atul Humar
Mansoor Husain
Harry Janssen
Kevin Kain
Armand Keating
David Kelvin
Shaf Keshavjee
Walter Kucharczyk
Gary Levy
Ren-Ke Li
Nancy Olivieri
Vivek Rao
Thomas Waddell
Sharon Walmsley

Richard Weisel

Scientists

Vijay Chauhan
Marcelo Cypel
Jordan Feld
M Margaret Herridge
Keyvan Karkouti
Rupert Kaul
Lakshmi Kotra
J Andrea McCart
Ian McGilvray
M Cristina Nostro

Affiliate Scientists

Marissa Battistella
Denise Belsham
Limin Chen
Chung-Wai Chow
Gregory Downey
Stephen Fremes
Anand Ghanekar
David Grant
Raymond Hui
Shahid Husain
David Hwang
Joel Katz
Thomas Lindsay
Cheri McGowan
Milica Radisic
Raymond Reilly
Sheila Riazi
Heather Ross
Coleman Rotstein
Masaaki Sato
Michael Sefton
Markus Selzner
Darrell Tan
Kazuhiro Yasufuku
Terrence Yau

Assistant Scientists

Lena Serghides
Sara Nunes de Vasconcelos

Support, Systems & Outcomes

Senior Scientists

Shabbir Alibhai
Anne Bassett
Claire Bombardier
Angela Cheung
Abdallah Daar
Anthony Easty
Gunther Eysenbach
Alastair Flint
Allan Kaplan
Moira Kapral
Murray Krahn
Charmaine Lok
Gary Rodin
Peter Singer
Donna Stewart
David Urbach

Scientists

Anna Gagliardi
Douglas Lee
Robert Nolan
Janet Raboud

Affiliate Scientists

Patricia Colton
Caroline Davis
Gina Dimitropoulos
Alan Fung
Sherry Grace
Enza Gucciardi
Brian Hodges
M Jane Irvine
Jennifer Jones
Adrienne Kovacs
Gail McVey
I Gary Naglie
Kathryn Nichol
Marion Olmsted
Rima Styra
George Tomlinson
Alice Wei
D Blake Woodside

Clinical Researchers

Susan Abbey
Howard Abrams
Mostafa Atri
Carmen Avila-Casado
Michael Baker
Joanne Bargman
W Scott Beattie
Ivan Blasutig
Isaac Bogoch
Vera Bril
Ryan Brydges
Joseph Cafazzo
Douglas Cameron
Charles Chan
Christopher Chan
Anil Chopra
Hance Clarke
Sean Clarke
Edward Cole
Richard Cooper
Robert Cusimano
Paul Daly
Tirone David
Diego Delgado
Eleftherios Diamandis
George Djaiani
Adam Dubrowski
Vladimir Dzavik
Eddy Fan
Michael Farkouh
Ludwik Fedorko
Christopher Feindel
Scott Fung
Sandra Grgas
Michael Gardam
Susan George
Sangeet Ghai
Shiphra Ginsburg
John Granton
Sophie Grigoriadis
Flavio Habal
Michelle Hladunewich
Eric Horlick
Susy Hota
Cheryl Jaigobin
S Vanita Jassal
Angela Jerath
Michael Jewett
Rohan John
K Wayne Johnston
Jacek Karski
Hans Katzberg
Sidney Kennedy
Edward Keystone
S Joseph Kim
Tae Kyoung Kim
Simon Kitto
Deepali Kumar
Ayelet Kuper
Megan Landes
Leslie Lilly
Christine Maheu
Stuart McCluskey
Traci McFarlane
Massimiliano Meineri
Judith Miller
Leonid Minkovich
Chantal Morel
Carol-anne Moulton
Emily Musing
Gary Newton
Gerald O'Leary
Mark Osten
Christopher Overgaard
Maral Ouzounian
Carolyn Plummer
Heather Pollex
Dheeraj Rajan
Harry Rakowski
Anthony Ralph-Edwards
Eberhard Renner
Robert Richardson
Charlotte Ringsted
Heidi Roberts
Graham Roche-Nagle
John Ross
Peter Rossos
John Rutka
Irving Salit
James Scholey
Leonard Schwartz
Nazia Selzner-Malekkiani
Shane Shapera
Morris Sherman
Candice Silversides
Lianne Singer
Samir Sinha
Smit Sinha
Anna Skorzewska
Peter Slinger
Miranda So
Sanjeev Sockalingam
Michael Sole
Marshall Sussman
Kong Teng Tan
Paaladinesh Thavendiranathan
Kathryn Tinckam
Wendy Tsang
Leonard Tse
Alice Tseng
Annette Vegas
Rachel Maya Wald
Marcin Wasowicz
Duminda Wijeysundera
Stephen Wolman
Pui-Yuen Wong
Rene Wong
Nicole Woods
Douglas Wooster
Robert Wu
Paul Yip

Toronto Rehabilitation Institute

Research Space	64,515 sq. ft.
External Funding	$8,650,762
Publications	389
Senior Scientists	18
Scientists	22
Affiliate Scientists	78
Total Researchers	118
Fellows	55
Graduate Students	177
Total Trainees	232
Total Staff	127

Research Advisory Committee (RAC)

Director, TRI; Chair, RAC Geoff Fernie
Team Leaders T Douglas Bradley, Tilak Dutta, Robin Green, Avril Mansfield, Katherine McGilton, Alex Mihailidis, Paul Oh, Milos Popovic, Yana Yunusova
Sub-Committee Chairs Katherine McGilton, Catriona Steele
Business Development Catharine Hancharek, Gavin Ouyang, Promise Xu
Research Operations Kamal Garcha, Alex Karabanow, Bridgette Murphy, Lois Ward, Amy Xi Chen, Katherine Zeman
Trainee Representatives Alexandra Arnold-Oatley, Gabriela Melo Ghisi, Jennifer Tomaszczyk
Clinical Liaison Mark Bayley
Liaisons Susan Rappolt, Elizabeth Rochon
Senior Vice President, UHN and Executive Lead, TR Susan Jewell
Vice President, Research Christopher Paige

Researchers

Artificial Intelligence & Robotics

Senior Scientist
Alex Mihailidis

Scientists
Frank Rudzicz
Babak Taati

Affiliate Scientists
Sven Dickinson
David Fleet
Deborah Hébert
Jesse Hoey
Dana Kulić
James Little
Alan Mackworth
Goldie Nejat
Pascal Poupart
Rosemary Ricciardelli
Rosalie Wang

Cardiorespiratory Fitness

Senior Scientists
David Alter
Sherry Grace

Scientists
Tracey Colella
Paul Oh

Affiliate Scientists
Krista Lanctôt

Cognition

Senior Scientists
Angela Colantonio
Robin Green

Scientists
Mark Bayley
Nora Cullen

Affiliate Scientists
Nicole Anderson
Deirdre Dawson
Michelle Keightley
Brian Levine
Doug Richards
Jennifer Steeves

Communication

Senior Scientist
Elizabeth Rochon

Scientist
Frank Rudzicz

Affiliate Scientists
Sonya Allin
Melanie Baljko
Boaz Ben-David
Craig Chambers
Tom Chau
Petros Faloutsos
Karen Gordon
Julie Mendelson
Aravind Namasivayam
M Kathleen Pichora-Fuller
Frank Russo

Alexander Shaw
Fraser Shein
Gurjit Singh
Pascal van Lieshout
Yana Yunusova

Mobility

Senior Scientists
Dina Brooks
Brian Maki
William McIlroy
Scientists
William Gage
Avril Mansfield
Kara Patterson
Affiliate Scientists
Alastair Flint
Mary Fox
Andrea Iaboni
Andrew Laing
Sunita Mathur
Laura Middleton
George Mochizuki
Stephen Perry
James Pratt
Karl Zabjek

Neural Engineering & Therapeutics

Senior Scientist
Milos Popovic
Scientists
B Catharine Craven
César Márquez-Chin
Kei Masani
Kristin Musselman
Frank Rudzicz
Jose Zariffa
Affiliate Scientists
Sandra Black
Julio Furlan
Lora Giangregorio
Pamela Houghton
Mary Nagai
Ethne Nussbaum
Linda Rapson
Ze'ev Seltzer
John Shepherd
Molly Verrier
Timothy Welsh
Paul Yoo

Optimize

Senior Scientists
Cheryl Cott
Sherry Grace
Susan Jaglal
Pia Kontos
Katherine McGilton
I Gary Naglie
Susan Rappolt
Scientists
Shabbir Alibhai
Andrea Furlan
Walter Wodchis
Affiliate Scientists
G Ross Baker
Veronique Boscart
Jill Cameron
Mary Fox
Michel Landry
Nizar Mahomed
Denise Reid
Nancy Salbach
Kathryn Sibley

Sleep & Upper Airway

Senior Scientists
T Douglas Bradley
Catriona Steele
Scientists
Hisham Alshaer
Frank Rudzicz
Azadeh Yadollahi
Affiliate Scientists
Liza Duizer
Jack Goodman
David James
Heather Keller
Sonja Molfenter
Brian Murray
Clodagh Ryan
Scott Thomas

Technology

Senior Scientist
Geoff Fernie
Scientists
Jennifer Campos
Tilak Dutta
Andrea Furlan
Bruce Haycock
César Márquez-Chin
Christine Novak
Azadeh Yadollahi

Affiliate Scientists
Veronique Boscart
Karen Gordon
Dinesh Kumbhare
Matthew Muller
Hani Naguib
Donald Philip
Veronica Wadey

Toronto Western Research Institute

Research Space	155,246 sq. ft.
External Funding	$36,606,009
Publications	667
Senior Scientists	37
Scientists	11
Affiliate Scientists	20
Clinical Researchers	93
Total Researchers	161
Fellows	98
Graduate Students	128
Total Trainees	226
Total Staff	225

Research Council

Director and Chair, TWRI Research Council Donald Weaver
Division Head, Brain, Imaging & Behaviour – Systems Neuroscience Karen Davis
Division Head, Fundamental Neurobiology Peter Carlen
Division Head, Genetics & Development James Eubanks
Division Head, Health Care & Outcomes Research Elizabeth Badley
Division Head, Patient-based Clinical Research TBD
Division Head, Vision Science Valerie Wallace
Interim Clinical Representative, Krembil Neuroscience Program Vera Bril
Clinical Representative, Musculoskeletal Health & Arthritis Program Robert Inman
Clinical Representative, Musculoskeletal Program Nizar Mahomed
Chair, Trainee Affairs Committee Frances Skinner
Executive Director, Research Operations Lisa Alcia
Senior Vice President, UHN and Executive Lead, TWH Katherine Sabo
Vice President, Research Christopher Paige

Researchers

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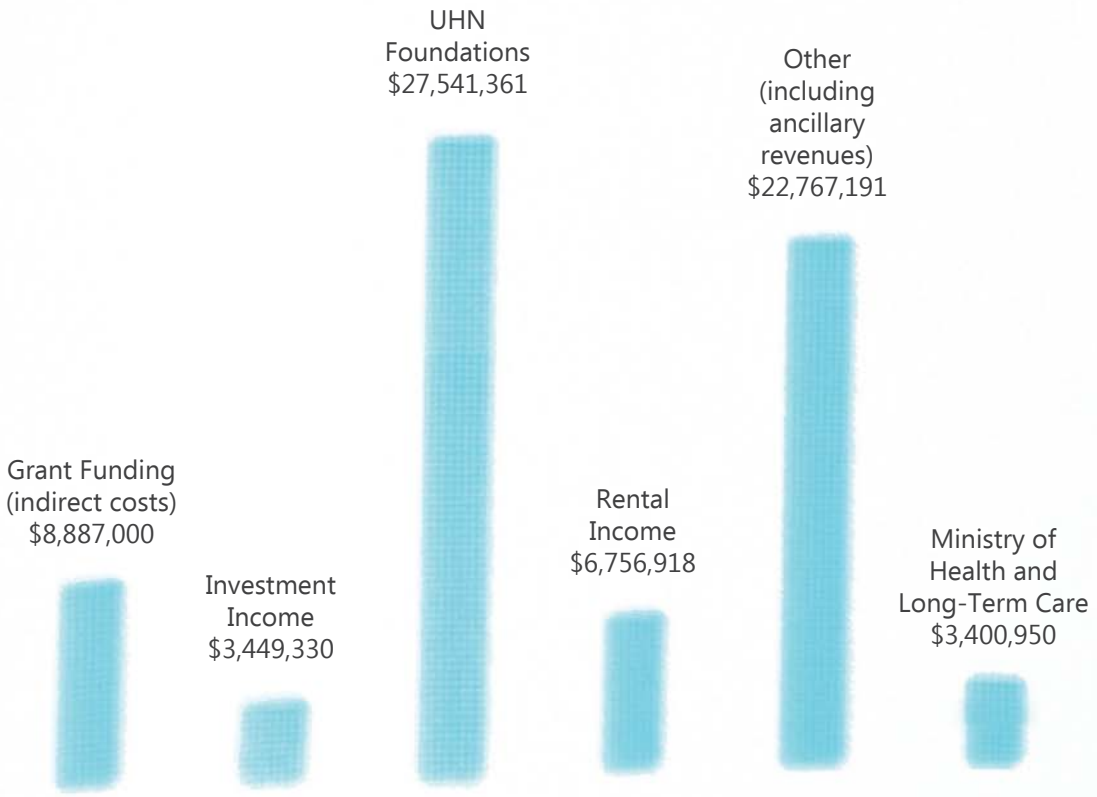
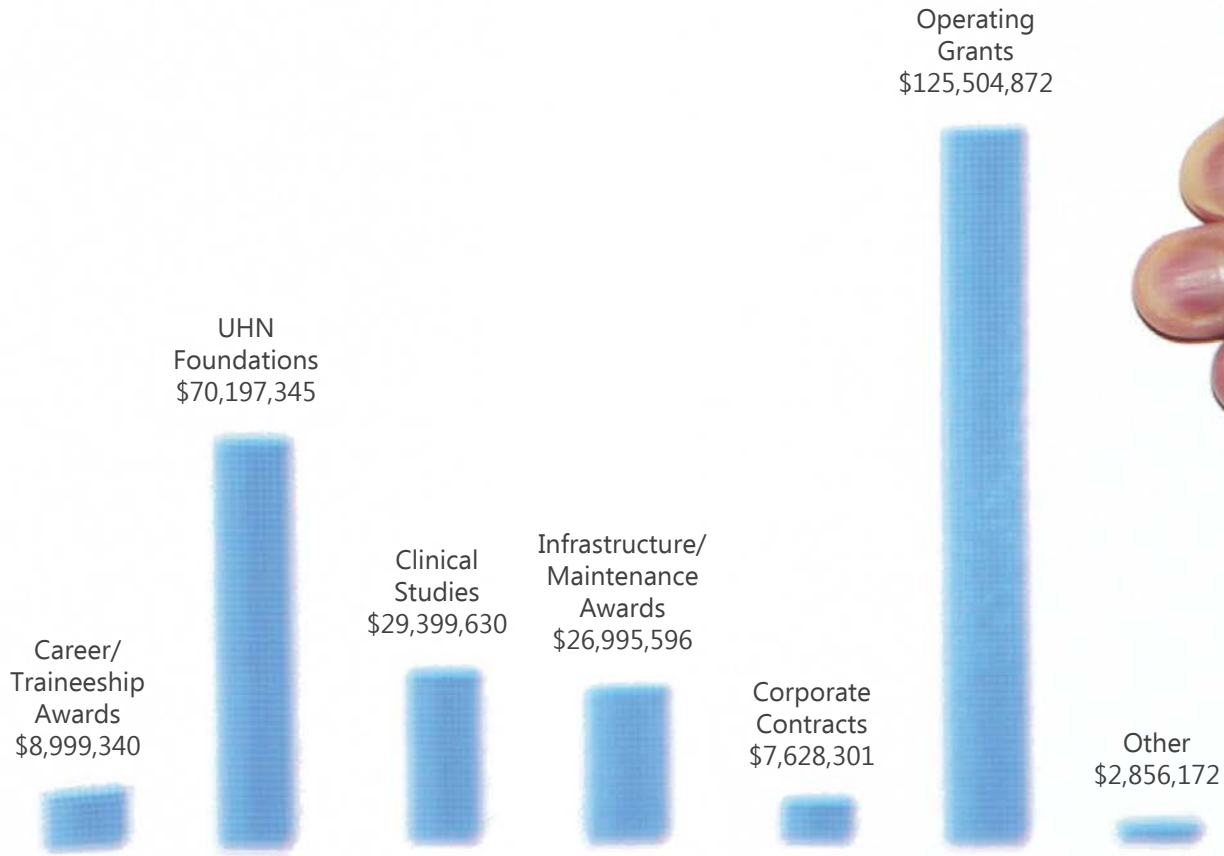
Total Core Research Funding $72,802,750



Total External Project Funding $271,581,257



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