Parent.
Musician.
Scientist.
Clinician.
Photographer.

REAL PEOPLE. REAL DATA. REAL IMPACT.

UHN Research Report 2022

UNIVERSITY HEALTH NETWORK

is a research hospital affiliated with the University of Toronto and a member of the Toronto Academic Health Science Network. UHN comprises four academic hospitals, an education institute, a technology accelerator and six research institutes. Research is supported in part by UHN Foundation and The Princess Margaret Cancer Foundation. The wide scope of research expertise and the complexity of care provided at UHN are made possible by the integration of discovery, education and patient care.

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

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

Featured on the front cover is Dr. Nigil Haroon, a Senior Scientist at the Schroeder Arthritis Institute. As well as being a world-renowned researcher and rheumatologist, he has a passion for life-long learning, plays the guitar (and used to play in a rock band), is a wildlife photographer (see the back cover of this report for a selection of his photos), and enjoys sports and spending time with his family. To learn more about his research, see page 10.

Contents

Dr. Brad Wouters, Executive Vice President, Science and Research, UHN.

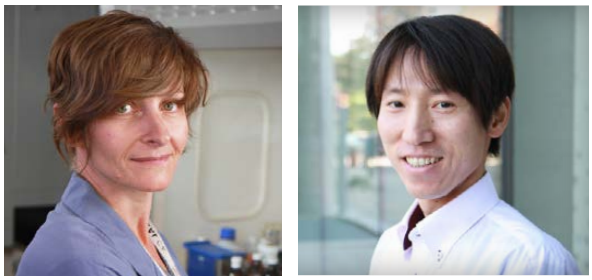
Real People. Real Data. Real Impact.

Despite repeating waves of the pandemic, we've begun to slowly return to a new normal. As many of us cautiously return to in-person interactions, we've been meeting people face to face whom we've only known virtually—adding to the excitement of being part of a team.

With science, much of what people see is on a screen, a social media post, a journal article…but science takes place in three dimensions. Science is driven by people working together with a shared goal of improving health—now and in the future.

In making this report, we interviewed **real people** who are passionate about what they do. We met Severine, a lab manager who creates paintings to illustrate key concepts of her research. We also met Aki, a clinician researcher who told us that he moved to Toronto from Japan because he can help more patients here through research than he could through his clinical practice alone.

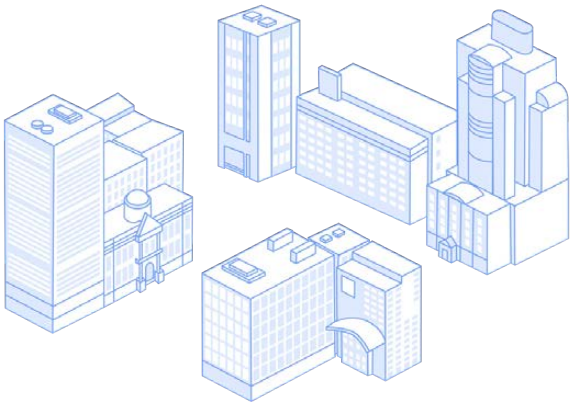
Severine and Aki also told us that the most exciting part of working in Toronto is its cultural diversity. This diversity is key to good science. Different people, perspectives, roles and expertise come together in our clinics, halls and labs. They enable us to come up with innovative ideas and ensure that our work benefits people around the world.



(L-R) Drs. Severine Cathelin and Akihiro (Aki) Nakamura.

We also talked about the pandemic. While members of TeamUHN mentioned the disruptions and slowdowns at the start of the pandemic, they also talked about silver linings, including new ways of collaborating virtually.

Research TeamUHN	**5,142**
Principal Investigators	1,167
Postdoctoral Researchers	287
Total Trainees	1,139
Graduate Students	784
Other Students	355
Total Staff	2,549
Institute Staff	2,026
Support Staff	198
Core Facilities Staff	325
Publications	4,664
Total Funding	$474.6M
Total Space	1.004M sq. ft.



Adding to this, I believe that the pandemic provided the public with a more nuanced, 'real' view of science. From the time when the first sequence of SARS-CoV-2 was published to the rollout of effective vaccines, all eyes have been on science. And yes, it can sometimes look messy from the outside. Research results are linked to an experimental context that has limitations. But we do have fail-safe mechanisms to address this. The scientific process relies on hard-won consensus. We and other researchers around the world look at the problem in new ways, ask different questions, verify results and open the path to discovery. In this report, we present findings that are so much more than a single study. They represent **real data** that are part of this greater conversation.

As a society, we need to mirror this scientific process. By keeping an open mind, staying engaged, adapting to challenges and leveraging our strengths to work together, we can achieve our goals and have **real impact**.

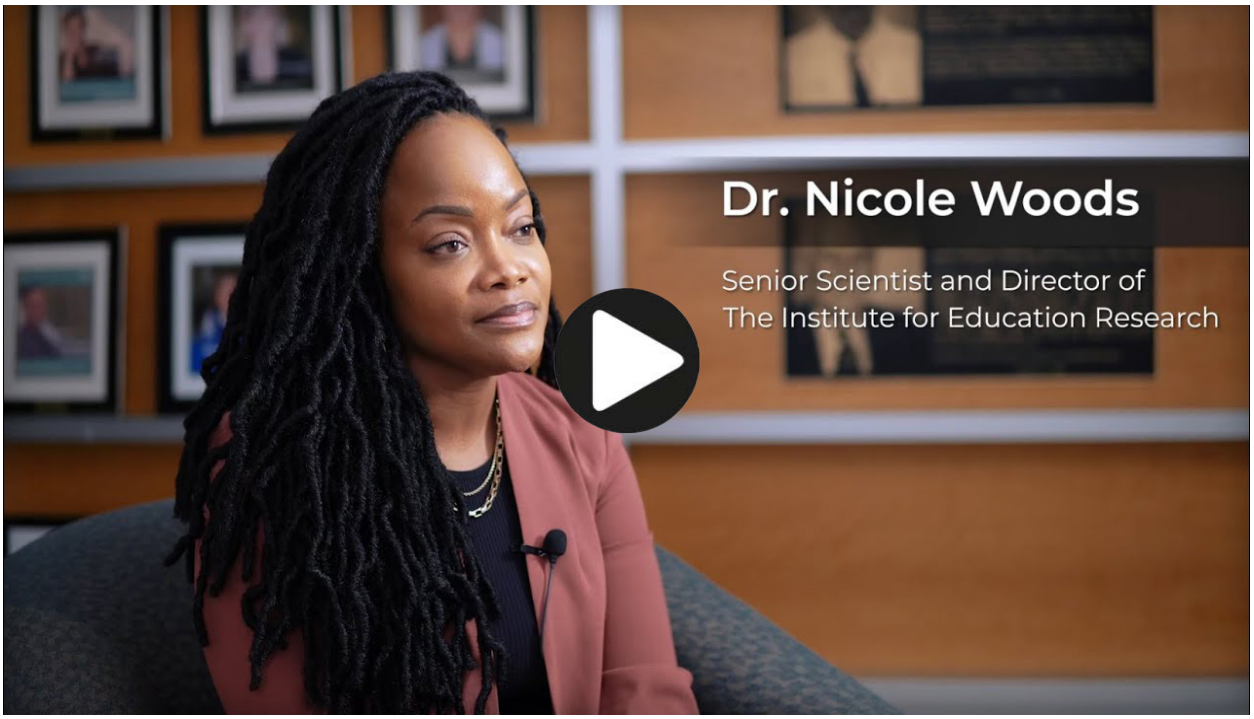
Through videos, images and text, this report highlights just some of the impact that research at UHN has had over the past year. These achievements include the world's first drone-delivered lung for transplant, a computer-assisted training program to help those with spinal cord injury, new insights into the cause of a debilitating form of arthritis and much more.

Our scientific achievements would not have been possible without our academic partner, the University of Toronto, our foundations—The Princess Margaret Cancer Foundation and UHN Foundation—and support from all levels of government, the private sector and many nonprofits. We also share our success with our patient partners, who inspire us to make a difference.

Read on to meet some of the people behind the data and how they are having a real impact on our journey towards *A Healthier World*.

One Step Ahead

Research hospitals: a vital link between discovery and health



INCUBATORS FOR INNOVATIVE CARE

Research hospitals are unique environments. They bring discoveries and clinical care together under one roof, enabling tight-knit collaborations that are key to applying research in the real world.

We asked members of TeamUHN what working in a research hospital means to them. Their responses, which you can watch in the video above, emphasize the following benefits:

- Research hospitals enable researchers to engage patients and frontline care providers as partners.
- Solutions can be rapidly prototyped, tested and applied in the clinical environment.
- Hospitals foster a supportive culture where practical knowledge is valued and can be used to address pressing problems.

BUILDING THE NEXT GENERATION

UHN, like other research hospitals, is affiliated with a degree-granting institution. While UHN's trainees receive their degrees from the **University of Toronto**, their research projects are carried out at the hospital. The multidisciplinary environment brings wide-reaching benefits to students:

- Trainees are mentored by world-class experts and encouraged to continuously innovate, improve upon current procedures and treatments, and solve health challenges in unconventional ways.
- As one of the world's top hospitals, UHN attracts curious, bright minds and enables them to reach their full potential. These diverse individuals become part of a resilient network of international experts that improve standards of care around the world.

- Trainees go on to careers in the public and private sectors, spreading the benefits and expanding the reach of their knowledge and expertise. This dissemination brings a higher quality of health care to Canadians from coast to coast to coast and to the world.

AN ECOSYSTEM OF EXCELLENCE

A research-infused healthcare system is well-prepared for emerging public health crises: health care teams can work directly with researchers to identify and solve problems as they arise. In short, research hospitals support the team science needed for the future cures:

- UHN has highly specialized preclinical research personnel and facilities. These teams and resources enable advanced therapeutics and diagnostics to be rapidly tested in experimental models before they are used clinically.
- The research hospital ecosystem constantly enriches its health care expertise and is a key resource for policy makers.
- As part of the global scientific enterprise, hospital researchers have access to international expertise, best practices and resources.
- Integrating commercialization ventures within the biotechnology sector brings new discoveries to Canadians and the global community faster. The associated revenues are reinvested in new discoveries—UHN generated over $81 million in licensing revenue over the last four years.

THE NEED FOR SUSTAINABLE FUNDING

Despite the vital role that research hospitals play in improving health, funding models often fail to support the full costs of doing research in hospitals (i.e., equipment, facilities and infrastructure costs). Watch the video below to learn more.

How much does research cost at our hospitals? The video above describes what it takes to cover the full costs of world-class research, biomedical discoveries and technologies to improve health—costs that include those incurred by scientists and those incurred by the organization to support their research.

A Team Sport

Exceptional science is born from diverse members of TeamUHN

(Top left, clockwise) Sarah Jiwa, Ankita Puri, Paraish Misra, Gregory Collins, Mark Gower and Shaghayegh Foroozan.

Scientific breakthroughs are made each and every day at UHN. Working together across roles, departments and disciplines enables us to think bigger and fight harder in our pursuit of *A Healthier World* through discovery and innovation.

To celebrate the incredible people behind our breakthroughs, we launched a campaign called **You @TeamUHN**. This news series highlights the unique roles and perspectives of our peers and their passion for advancing health and well-being.

In this series, TeamUHN members share what health research means to them and provide readers with an inside view of the work that is taking place across our institutes, medical programs, facilities, and operational and administrative teams.

See the next page to learn about the following members of TeamUHN:

- **Sasha Howell**, an Executive Assistant in the UHN corporate office, who supports Dr. Brad Wouters;
- **Andy Zeng**, an MD/PhD student at the Princess Margaret Cancer Centre, who is conducting research on leukemia in the lab of Dr. John Dick;
- **Niroshica Mohanathas**, a PhD student in the lab of Dr. Jennifer Campos at the KITE Research Institute who embraces her interests outside of the lab to enrich her research; and
- **Nadine Hubert**, Strategic Communications Manager at UHN Foundation, who supports fundraising for research.

SASHA HOWELL

How do you help enable world-class research?

I work behind the scenes in UHN's corporate office to help ensure that research runs smoothly. I accelerate approvals, coordinate meetings and schedules, and promote staff wellness so that our research teams can focus on making clinically important discoveries. UHN researchers are highly innovative and collaborative—qualities that spur exceptional science.

ANDY ZENG

What inspires you in your role?

I love translating insights from the clinic to the lab. One of my projects stemmed from the finding that treatment responses differ among patients with a deadly form of blood cancer. By combining clinical observations with molecular profiles of cancer cells, our lab is explaining these differences. Our discoveries could yield personalized therapies, and I am thrilled to be part of this important work.

NIROSHICA MOHANATHAS

What are your interests outside the lab?

I am a content creator on YouTube, Instagram and TikTok. Through this work, I collaborate with companies to promote products in the food, beauty and clothing industries. Balancing research and social media activities can be challenging, but I often apply transferable skills that I gain in one role, such as time management and idea pitching, to advance the other.

NADINE HUBERT

How do you contribute to *A Healthier World*?

I am a writer specializing in health care communications. For two decades, I have been part of a UHN-wide effort to raise $2 billion for research, education and patient care. UHN is home to world-leading specialists who are making groundbreaking discoveries that improve health. I share stories to inspire and thank the generous donors who make medical breakthroughs possible.

Krembil Research Institute

201
principal investigators

262
students and postdocs

58 postdoctoral researchers

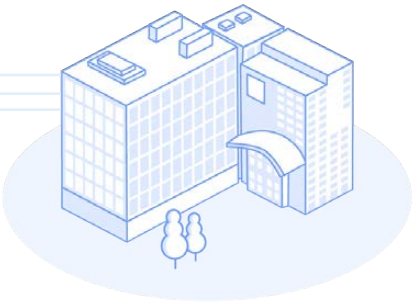
159 graduate students

45 other students

137.8K
sq. ft. research space

$67.7M
funding

Krembil Brain Institute
Schroeder Arthritis Institute
Donald K. Johnson Eye Institute

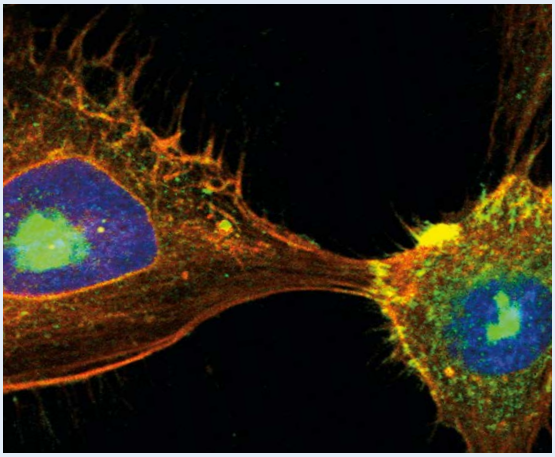


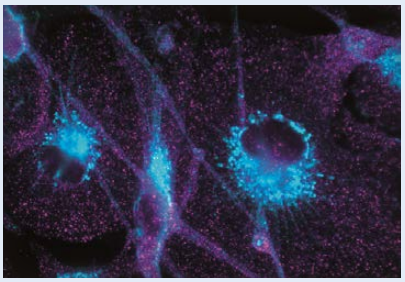
298
staff

1,218
publications

Neurological Disorders
Vision Disorders
Musculoskeletal Disorders
Mental Health and Addiction

Research Team at Krembil 761





Homing in on a Target

An international collaboration reveals a disease mechanism underlying axial spondyloarthritis

ABOUT THE RESEARCH TEAM

The team, led by Dr. Nigil Haroon, comprised more than 20 individuals from 14 research institutes located in Canada, Italy, South Korea, Slovakia, Belgium and the United States. "In translational research, there are significant benefits to working as part of an interdisciplinary team. For one, the pooled expertise enables you to speed up the pace of the research and overcome hurdles faster. Also, working with other clinical centres connects you with more patient collaborators, increasing participant diversity. This makes your findings more meaningful and enables you to validate your results in other settings," says Dr. Haroon.

KEY FINDINGS

The team examined how a protein called macrophage migration inhibitory factor (MIF) contributes to axial spondyloarthritis, a debilitating form of arthritis. Their previous work showed that levels of MIF are higher in patients with the disease and correlate with disease severity. The new findings reveal that MIF increases levels of a type of T cell—an immune cell that causes inflammation—in experimental models of the disease and in the clinic. By defining the underlying drivers of inflammation, the study lays the foundation for new therapies that target MIF.

Sci Transl Med. 2021 Oct 20. doi: 10.1126/scitranslmed.abg1210. Supported by the Canadian Institutes of Health Research, the Arthritis Society Canada, the American College of Rheumatology Research, the National Institutes of Health (USA), the Natural Sciences and Engineering Research Council of Canada, the Canada Foundation for Innovation, the Ontario Research Fund, IBM, the Ian Lawson Van Toch Cancer Informatics Fund and UHN Foundation. M Kapoor holds a Tier 1 Canada Research Chair in Mechanisms of Joint Degeneration.

Q&A Akihiro Nakamura

When did you start working in research?
I arrived in Canada in 2014 from the western part of Japan, near Nagasaki, where I practiced as a rheumatologist. I was initially exposed to basic research here in Canada, first in the laboratory of Dr. Mohit Kapoor, then with Dr. Haroon.

Why did you decide to do research rather than clinical practice alone?
As a clinician you might be able to help 100 or 200 patients a month, which is not insignificant. But, if we discover a new way to treat arthritis—especially one that addresses the root cause of the disease—we could help hundreds of thousands of individuals. That's why I decided to do research.

What strikes you as different about Toronto?
One of the biggest differences between Toronto and where I lived in Japan is that we have lots of diversity here. I really enjoy meeting people with different backgrounds and perspectives. For me, that's the most exciting thing about living here.

What advice would you give to someone interested in a career in science?
It may sound suprising, but I would recommend that they play sports and engage in other group activities. I played soccer as a child, and I believe that it taught me how to be a team player. Science is collaborative. Building positive relationships is the key to success, especially in medical research, which is highly multidisciplinary.

Research Highlights

WORMS AND DRUG DISCOVERY

Experimental models of early-stage Parkinson disease are limited. (L-R) Drs. **Lorraine Kalia** and **Suneil Kalia** addressed this issue using the roundworm *C. elegans*. The worm's nervous system can be used to replicate the defects seen in early stages of the disease—namely the accumulation of the protein alpha-synuclein in neurons. Drug screening using the model revealed a number of promising new drugs to treat Parkinson disease. *Full Story* / *Scientific Article*

EYEING NEW THERAPIES

Researchers led by Dr. **Jeremy Sivak** (above), in collaboration with Dr. **Vladimir Bantseev** at Genentech, developed a way to model the behaviour of drugs that are injected into the eye to target the retina. "What we observe in experimental models does not always match what happens in humans," says **Darren Chan**, a technician in Dr. Sivak's lab. The team validated their model, which mirrored how drugs behave in the human eye. The platform has the potential to help expedite preclinical drug development. *Full Story* / *Scientific Article*

McEwen Stem Cell Institute

5
principal investigators

28
students and postdocs

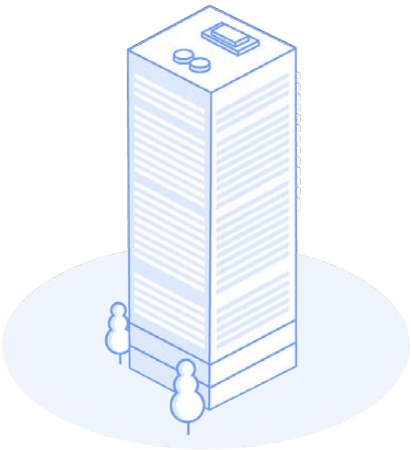
9 postdoctoral researchers

16 graduate students

3 other students

17.2K
sq. ft. research space

$9.2M
funding

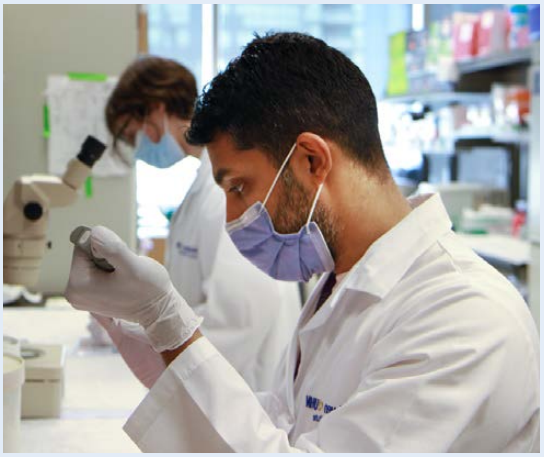


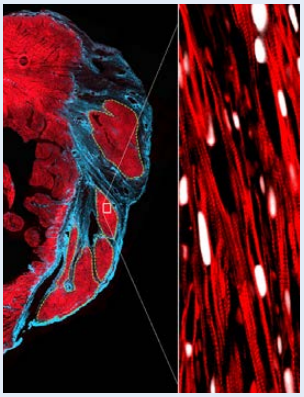
20
staff

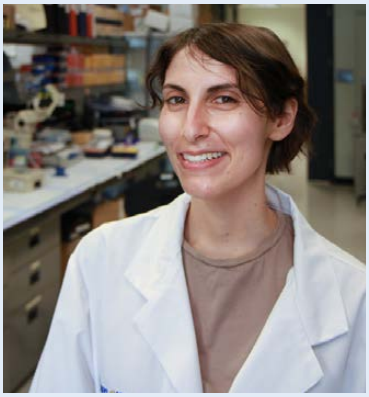
Regenerative Medicine
Cardiovascular Diseases
Diabetes and Kidney Disease
Chronic Respiratory Diseases
Cancers

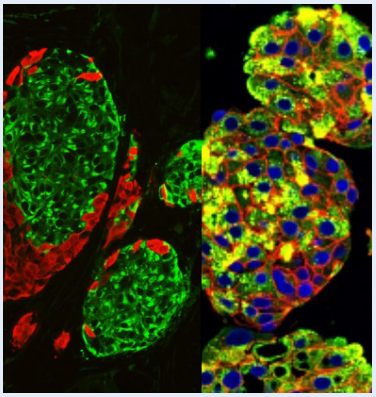
10
publications

Research Team at McEwen 53









One Less Roadblock

Method improves the safety of type 1 diabetes cell therapy aimed at eliminating insulin injections

ABOUT THE RESEARCH TEAM

"This work was truly a team effort," says Dr. Cristina Nostro, who led the project with research associate **Farida Sarangi** and a former postdoctoral researcher Dr. **Yasaman Aghazadeh**. Collaborators included Drs. Thomas Kislinger (mass spectrometry expertise) and Sara Vasconcelos (cell transplantation expertise; also described in side story 'Helping Cells Take Root' on p.15). "As we advance this project to the clinic, relationships with surgeons and clinical experts at the *Ajmera Transplant Centre* will be key," adds Dr. Nostro.

KEY FINDINGS

The study reveals a new approach for purifying therapeutic cells that could be used to treat type 1 diabetes. In individuals living with this disease, insulin-producing beta cells in the pancreas are killed by the immune system. Despite the progress that has been made in developing cell therapies to restore beta cells, a key barrier has persisted: lab-produced pancreatic cells are heterogenous and may not be pure enough to inject without causing teratomas—outgrowths of off-target cells. To overcome this issue, the team used the GP2 cell surface marker to filter the cells before transplantation, which eliminated the risk of teratomas. "For experimental therapies to be moved to the clinic, safety always comes first. Our findings provide an important strategy to reduce potentially serious complications," explains Dr. Nostro.

Stem Cell Rep. 2022 Apr 12. doi: 10.1016/j.stemcr.2022.03.004. Supported by the Canadian Institutes of Health Research, the Juvenile Diabetes Research Foundation Canadian Clinical Trials Network, the Toronto General Hospital Research Institute, Medicine by Design, the Government of Ontario, the Banting and Best Diabetes Centre and UHN Foundation.

Q&A Cristina Nostro

What got you interested in science?
My first encounter with science was in high school biology class, and I found it fascinating. I went on to do a degree in biology, including a one-year exchange in Manchester, UK. That's where I saw what research is and the potential that stem cells have for treating disease. This experience led me to do a PhD at the University of Manchester and a postdoc at Mount Sinai in New York.

What was your childhood like?
I grew up in Italy and lived in different regions—the beautiful Calabria, where my dad is from; and Tuscany, where my mum is from. As a family, we travelled a lot and thanks to my parents, I discovered the beauty of art everywhere, whether it was in a gallery in a big city or in the streets of a small town. Art really shaped my upbringing.

Does science satisfy your artistic side?
Science is creative and artistic. The most obvious artistic aspect relates to communicating your findings, which often involves schematics and drawings. I love drawing and working out ways to visually communicate our findings to the public.

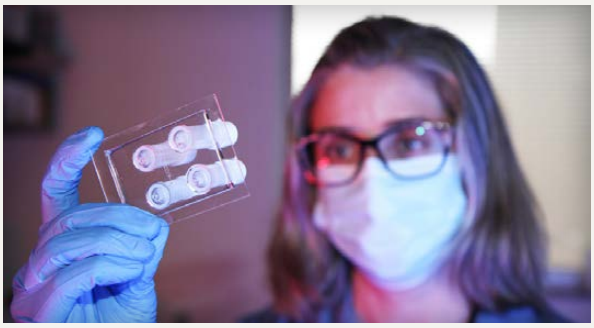
Any advice for those considering science?
Science requires passion, curiosity and resilience. We often repeat experiments many times to test a hypothesis, so it also takes determination. It's important to have a network of people with whom you can discuss your data, look at your results with fresh eyes and learn at each step.

Research Highlights

MATURE CELLS, BETTER OUTCOMES

A technical discovery by postdoctoral researcher Dr. **Wahiba Dhahri** (left) in the lab of Dr. **Michael Laflamme** (right) revealed a way to produce mature heart muscle cells in the lab. This approach overcomes a hurdle to experimental cell therapies, which currently use immature heart muscle cells. Using mature cells to restore lost heart muscle led to better functional recovery without unwanted side effects such as arrhythmia, or irregular heartbeat. *Full Story* / *Scientific Article*

HELPING CELLS TAKE ROOT



A study co-led by Drs. **Nostro** and **Vasconcelos** (above) showed that transplanting tiny blood vessels with pancreatic cells reversed diabetes in laboratory models. "When co-transplanted with microvessels, stem cell–derived pancreatic cells started to normalize blood sugar levels seven weeks after transplantation, while the cells transplanted alone did not," says Dr. Vasconcelos. Also, the transplants retained up to four times more cells after three months than those without microvessels. *Full Story* / *Scientific Article*

Princess Margaret Cancer Centre

307
principal investigators

413
students and postdocs

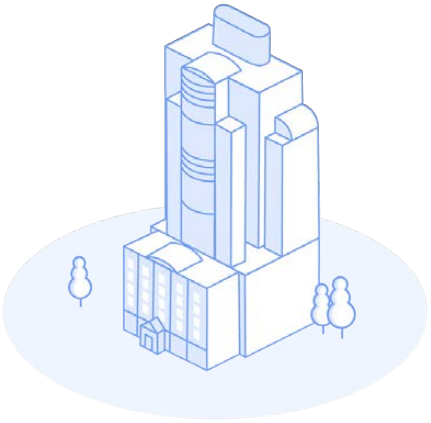
104 postdoctoral researchers

212 graduate students

97 other students

299.2K
sq. ft. research space

$241M
funding

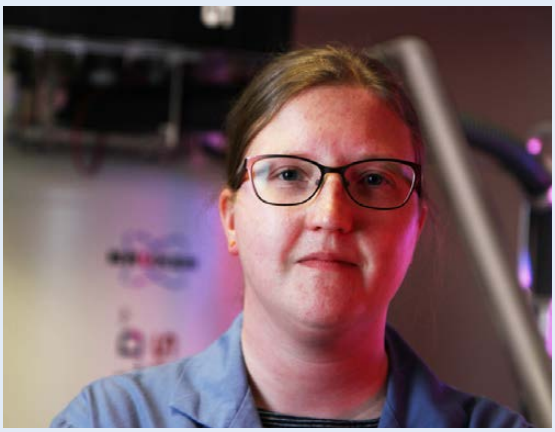


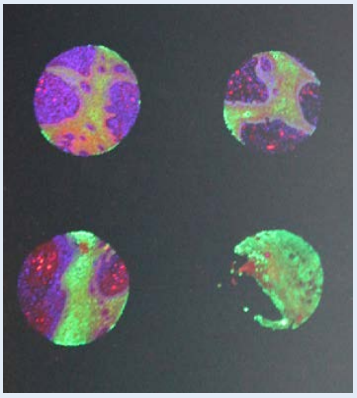
925
staff

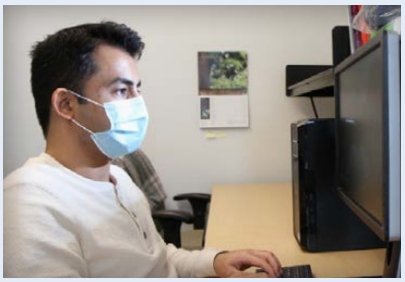
- Cancer Biology and Imaging
- Computational Biology
- Genetics and Epigenetics
- Immuno-Oncology
- Protein Structure and Function
- Stem Cells
- Supportive Care

1,271
publications

Research Team at PM 1,645







Outsmarting Cancer

Two findings reveal new combinations of therapies that could prevent recurrence of acute myeloid leukemia

ABOUT THE RESEARCH TEAM

Two recent studies from the lab of Dr. Steven Chan span fundamental science, often called 'basic' research, and preclinical work, which paves the way to clinical trials. "The over 20 individuals who contributed to this research represent diverse teams, organizations and industry partners that came together to make a difference," says Dr. Chan.

KEY FINDINGS

The two studies focused on acute myeloid leukemia (AML), a blood cancer. The first answered an important question: 'why does AML sometimes recur?' The team focused on experimental anticancer drugs known as NAMPT inhibitors. Although these drugs can be effective, often the cancer returns after treatment. To address this problem, the team identified a second class of drugs—SREBP inhibitors. The team found that when used in combination, these drugs are even more effective. Both drugs are being tested clinically and are approved for use in humans.

The second study found that the combination of two drugs—enasidenib and venetoclax—can effectively treat AML after it returns in an experimental model. A clinical trial is now underway. "Building on years of basic research, this preclinical study was an important last step before we moved to the clinic," says Dr. **Severine Cathelin**, first author of the study.

Study 1: Cell Stem Cell. 2021 Oct 7. doi: 10.1016/j.stem.2021.06.004. Supported by the Ontario Institute for Cancer Research, the Leukemia Research Foundation, the Canadian Institutes of Health Research and The Princess Margaret Cancer Foundation. Study 2: Leukemia. 2022 Mar. doi: 10.1038/s41375-021-01468-y. Supported by Celgene and AbbVie.

Q&A Severine Cathelin

Can you tell us about yourself? What got you interested in science?
I grew up in France. When I was young, I was always connected with nature and was inspired by biology. This interest eventually led me to complete a PhD in molecular and cellular biochemistry at the University of Burgundy.

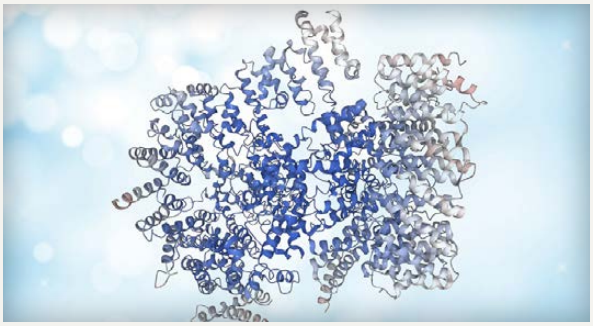
What might people not realize about working in medical research?
Science is not an easy field. Every day you face challenges. And every day you learn something about yourself. Because of this, I believe that working in science makes you a better person. As they say, adversity breeds character, excellence, and resilience.

How did the pandemic affect your routine?
When the pandemic hit, I changed my lifestyle quite a bit. To avoid public transportation, I decided to ride my bike to the lab. That trip is about an hour each way. This has kept me fit and gives me time before my work day to think about all the great science that's going to happen!

What do you enjoy doing outside of work?
I love art and I paint [the background of the photo above is an example]. Right now, I'm painting about what I do in the lab. I am inspired by urban artists and use analogies to express how proteins signal through the cell and impact cancer.

Research Highlights

THE STRUCTURE OF DISEASE



A team led by Dr. **Cheryl Arrowsmith** used a multi-pronged approach to reveal—at near atomic detail—the structure of two proteins (pictured above) involved in Huntington disease. Known as HTT and HAP40, the two proteins co-evolved and bind to each other, which is thought to stabilize them in the cell. The findings shed light on the co-dependence of the proteins and provide new footing for the future discovery of treatments for Huntington disease. *Scientific Article*

DETECTING IMMUNE CELLS

A study led by (L-R) Drs. **Barbara Grünwald** and **Rama Khokha** provided insights into what is known as the tumour microenvironment. Rather than being a uniform ball of cells, tumours contain discrete regions where cancer cells associate with normal cells and blood vessels. Focusing on an aggressive type of pancreatic cancer, the team identified three distinct microenvironments. Each responded differently to anticancer treatments—a finding that could enable the development of targeted therapies. *Full Story* / *Scientific Article*

Techna Institute for the Advancement of Technology for Health*

63
principal investigators

65
students and postdocs

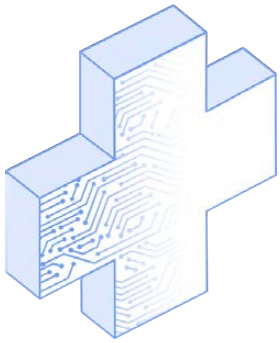
10 postdoctoral researchers

37 graduate students

18 other students

33.5K
sq. ft. research space

$13.5M
funding

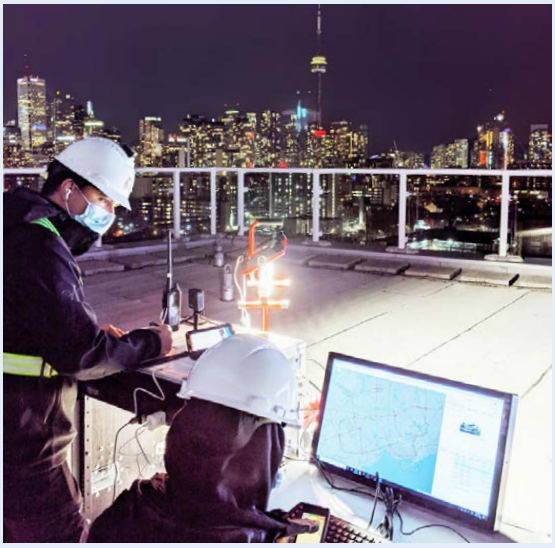


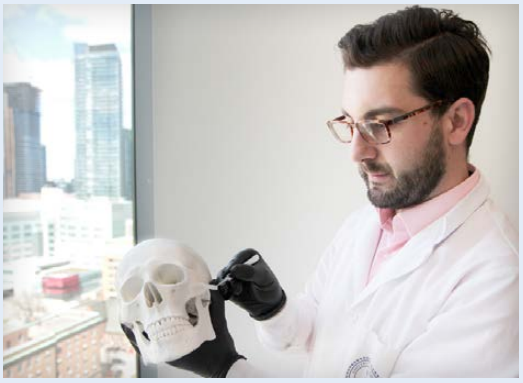
88
staff

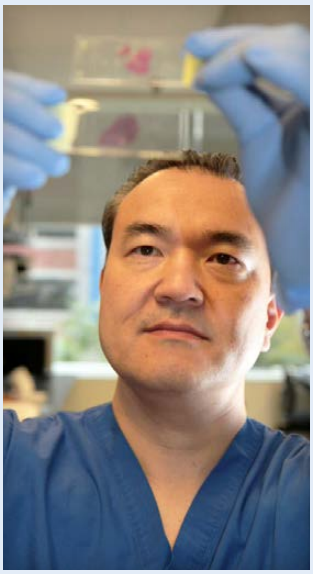
Technology Development and Translation
Surgical Innovation
Radiopharmaceuticals
AI and Data

350
publications

Research Team at Techna 216







**Starting April 2022, Techna initiated a strategic transformation from a research institute into a technology accelerator platform. For more information, see 'Techna 2.0' on page 23.*

Taking Flight

Test flights lead to world's first successful autonomous drone delivery of donor lung for transplantation

A COLLABORATIVE EFFORT

The world's first drone delivery of a donor lung for transplantation was led by Techna's *Surgility program* at UHN. The team, which focuses on overcoming hurdles to technology use in health care, worked closely with an array of partners:

- Canadian biotechnology aviation companies *Unither Bioelectronics* and *Aurora Aerial*;
- UHN facilities, security and legal departments, which provided operations support;
- *HighCloud Solutions Télépilotées,* which shared their expertise in operating drones in complex urban environments;
- the *Trillium Gift of Life Network*, which oversees organ and tissue donation in Ontario, and provided funding for the project; and
- the Ontario Ministry of Health, Transport Canada and NAV CANADA.

DRONE LUNG DELIVERY A WORLD FIRST

"This milestone took a lot of brilliant minds and behind-the-scenes teamwork," says **Jimmy Qiu**, Engineering Manager at Techna's Surgility program. His team oversaw the successful delivery of a donor lung from Toronto Western Hospital to Toronto General Hospital, where it was transplanted into a patient—who happens to be an engineer and drone enthusiast—in September 2021.

This achievement was a culmination of over two years of test flights, planning and logistics. "Many times, we lose a life-saving organ because we can't get to it in time, or we can't get it back before the organ deteriorates and is no longer suitable for transplant," explains Ajmera Transplant Centre Medical Director, Dr. **Atul Humar**. The success of this project paves the way for faster, more efficient and environmentally friendly organ delivery.

Q&A Stephanie Williams

What brought you to UHN?
My passion is engineering. After completing a Bachelor's degree in biomedical engineering at the University of Guelph, I applied for a job in the Surgility program and joined during the pandemic.

During your childhood, what got you interested in science?
I had a great childhood. Both of my parents are engineers, so they always challenged me and my sister to learn. An unconventional game that they devised for road trips involved asking math questions, where the right answer won you a potato chip.

How would you describe what you do to someone without a scientific background?
I discover new things by applying science and math to the real world. It's not as far-fetched or as difficult as one might expect.

Why engineering?
Every day is an adventure. A typical day for me could involve computer coding, 3D modeling and testing of our designs. In short, we design, build, test, often fail, and repeat until it works.

How do you stay positive when a design fails?
There is always a silver lining to failure. When setbacks force you to try a different approach, you can often find solutions that are even better than what you had originally hoped for.

Research Highlights

TECHNA 2.0

In 2022, Dr. **Shaf Keshavjee** was appointed as Techna Scientific Director and Chief of Clinical Innovation at UHN. These roles will advance UHN's commitment to translating world-class discoveries into treatments and technologies. The appointments follow Dr. Keshavjee's 12-year tenure as UHN's Surgeon-in-Chief. Under his guidance, Techna will be transformed from a research institute into a technology accelerator platform. *Full Story*

AUGMENTED REALITY FOR SURGERY

(L-R) Drs. **Jonathan Irish** and **Axel Sahovaler** found that augmented reality can serve as a powerful tool to help guide surgeons. Current image-guided surgical systems require surgeons to look back and forth between the patient and a computer screen. Using augmented reality enables the image to be projected directly on the patient. When augmented reality was added to a surgical navigation system, the error rate in a simulated surgery dropped from 1.2% to 0%. *Full Story* / *Scientific Article* / *Podcast Interview*

The Institute for Education Research

60
principal investigators

24
students and postdocs

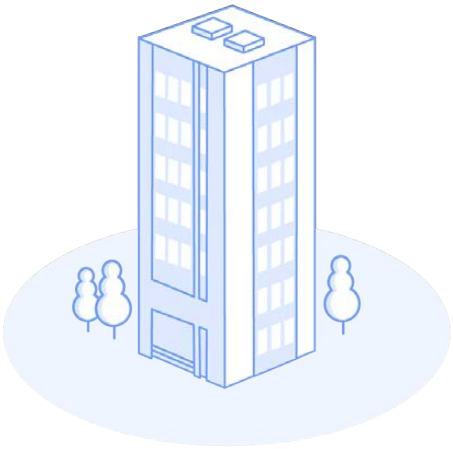
1 postdoctoral researcher

16 graduate students

7 other students

176
publications

$2.8M
funding



48
staff

Education Research
Teaching, Learning and Practice
Health Systems and Social Structures
Technology, Innovation and Simulation

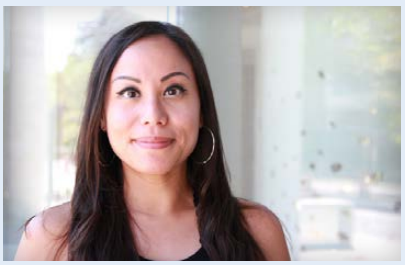
Space

Dedicated dry lab space, including access to 20K sq. ft. of state-of-the-art simulation labs at the Michener Institute of Education

Research Team at TIER 132

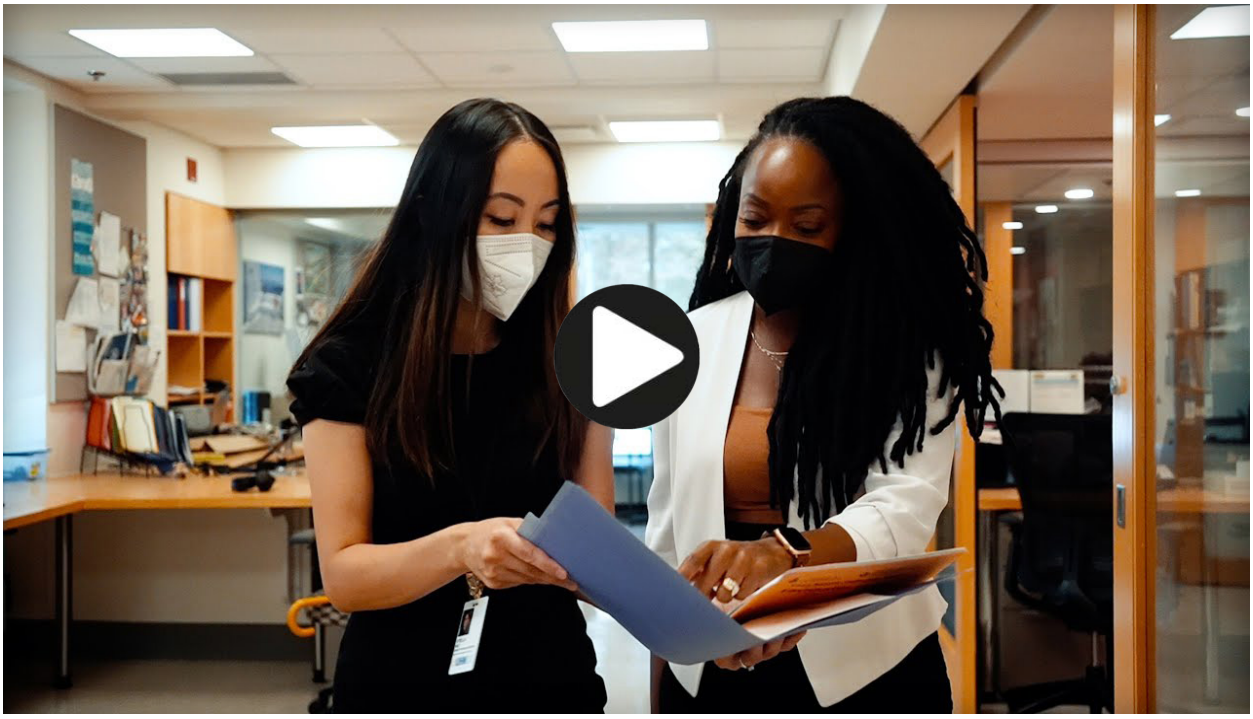





Seeing Critically

Teaching critical reflection can help health care workers to become better advocates for their patients



ABOUT THE RESEARCH TEAM

"The most exciting aspect of this project was the team," says Dr. **Nicole Woods**. "We had critical pedagogy theorists, statisticians, students and cognitive psychologists. Everyone brought a different lens." Dr. **Stella Ng** adds, "These different perspectives led us to use an innovative approach. Other studies on critical pedagogy do not test hypotheses in real-life settings. This is not common in the field, so our approach really speaks to how interdisciplinary our team is."

KEY FINDINGS

The results revealed that teaching critical reflection can shift the focus of health care professionals towards more collaborative, compassionate and equitable ways of thinking. The team tested the approach in a group of students from various health care professions. The students attended an online module focusing on social determinants of health, followed either by a reflective or a critically reflective dialogue exercise. The study revealed that those who took part in the critically reflective exercise were more likely to dig deeper and consider how a patient's unique situation, systemic barriers or relationships affect care.

Adv Health Sci Educ Theory Pract. 2022 Jan 1. doi: 10.1007/s10459-021-10087-2. Supported by the Arrell Family Chair in Health Professions Teaching, an Ontario Early Researcher Award, and Women's College Hospital Centre for Ambulatory Care Education.

Q&A Stella Ng

Why education research?
As a kid, I liked all the school subjects, so I always wanted to blend the arts and sciences. This area of research does that, with the added benefit of enabling me to make positive changes to how health care is taught and ultimately practiced.

What was your childhood like?
I grew up in Timmins, Ontario. Compared to Toronto, it was definitely cold, yet the winters were beautiful because the snow would fall...then it would stay. No slush. I have fond memories of blue skies and snowshoeing during gym class.

Can you tell us about a role model?
While growing up, my sister was my role model. From the age of three, she wanted to be a veterinarian. And that is what she is now. Her dedication and hard work towards achieving her goal really inspired me.

How did you find your way to research?
My journey has had a lot of twists and turns. I started working in a lab that was developing tools to help kids with hearing loss. This piqued my interest in becoming a clinician, so I became a pediatric audiologist. Then, I started to confront challenges in the healthcare system and ended up going back to school because I wanted to help solve those problems. I really did find my dream job—one that enables me to improve health care and make it more compassionate and collaborative.

Research Highlights

BREAKING DOWN BARRIERS

To address health care labour shortages, Canada encourages the immigration of internationally trained professionals. However, barriers faced by these individuals are hindering them from achieving their full potential in Canada.

A study led by Drs. Tim Mickleborough and **Tina Martimianakis** reveals how systemic racism is being fuelled in the healthcare system.

The team used an approach called spatial analysis, which can define how social and cultural norms affect interpersonal dynamics. They uncovered the following barriers:

- foreign-trained knowledge and practices are often seen as less valid than local equivalents;
- visible minority groups, particularly those with foreign accents, often contend with impressions that they are less competent;
- after completing relicensing—an important process for ensuring quality and safety in the Canadian health care workforce—health professionals continue to experience stigma.

"These practices create workplace hierarchies that are highly racialized," says Dr. Martimianakis. "Only when we understand how health care spaces are culturally and socially produced will we be able to make the evidence-based changes necessary to truly meet our goals of supporting diversity and inclusion," says Dr. Mickleborough.
Full Story / *Scientific Article*

The KITE Research Institute

127
principal investigators

181
students and postdocs

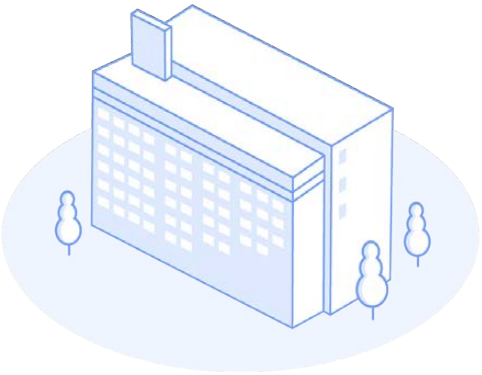
27 postdoctoral researchers

121 graduate students

33 other students

56K
sq. ft. research space

$26.8M
funding

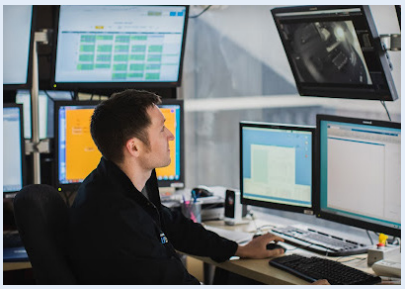


174
staff

Rehabilitation Science
Brain Health and Neural Engineering
AI, Robotics and Simulation
Mobility and Cardiorespiratory Fitness
Optimization of Care
Sleep and Swallowing Science

757
publications

Research Team at KITE 482



Feeling Better

Computer-assisted training program improves confidence

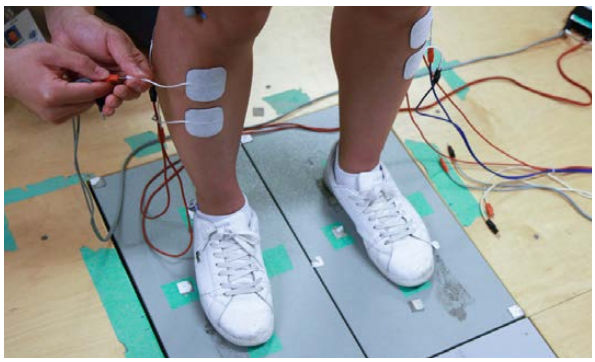
ABOUT THE RESEARCH TEAM

Dr. Kristin Musselman's team, led by her past Master's student **David Houston**, provided expertise in rehabilitation for individuals with spinal cord injury. Dr. Kei Masani's lab provided the know-how for the computer-assisted engineering and movement tracking.

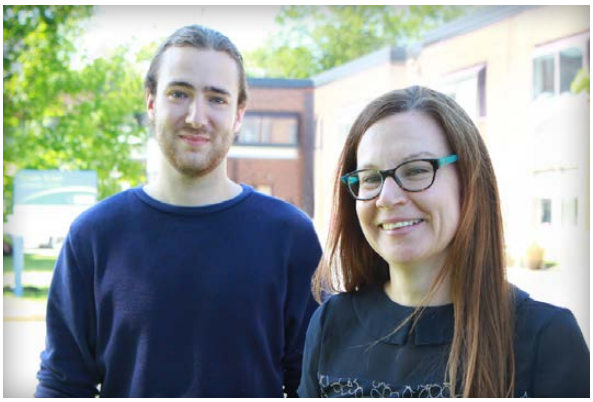
KEY FINDINGS

The team developed a balance training program for individuals recovering from 'incomplete' spinal cord injury (when the spinal cord is not entirely cut and recovery can occur). The four-week program involved balance exercises combined with feedback displayed on a computer monitor. During the exercises, the ankle muscles were electrically stimulated to induce contractions (pictured right). Electrical muscle stimulation, when timed correctly and paired with exercise, is known to promote recovery by retraining the nervous system. The researchers interviewed five individuals who completed the program. "We found that participants gained confidence in their abilities, became more willing to try new activities and were motivated to continue with balance training," explains Dr. Musselman.

J Neuroeng Rehabil. 2021 Apr 1. doi: 10.1186/s12984-021-00861-z. Supported by the University of Toronto EMHSeed Program and UHN Foundation.



Q&A David Houston



(L-R) David Houston and Dr. Kristin Musselman.

What was most exciting about this project?
This project approached rehabilitation from a unique perspective—one that brought together physical therapists and engineers. My background is kinesiology and rehabilitation sciences. I don't have a lot of experience with engineering or the technical side of things, so being able to collaborate with people who have that expertise from Dr. Masani's lab really brought this project to the next level.

Describe a memorable day that you had while working on this project.
One of the best days was when a participant in the balance training program told us how he was able to stand up and play catch with his grandson. He could do this because he felt better sensation in his feet and gained the ability to use his calves through the training. Seeing our work benefit someone in such a real way was very rewarding for me.

Did anything surprise you about this work?
Before this project, most of my experience was with quantitative science—where you measure something using clinical assessments. However, this project incorporated the patient perspective through interviews. This approach took some getting used to, but it really enabled us to connect more closely with patients and it showed us things that we would have missed using assessments alone.

Research Highlights

GETTING A GOOD GRIP

Dr. **Cesar Marquez-Chin** and his team re-engineered a brain-computer interface for the rehabilitation of upper limb function in individuals with stroke or spinal cord injury. Current systems have long setup time, while the new system only takes around 10 minutes to get started. The interface can sense an individual's intent to move, then deliver electrical stimulation to their muscles to move the limb and retrain the nervous system. *Full Story* / *Scientific Article*

AVOIDING THE SUGAR CRASH

A research team—including (L-R) Drs. **Laura Banks** and **Tracey Colella**—found that individuals with type 2 diabetes need to consider when they exercise relative to when they take certain medications. "Exercise has an effect similar to that of diabetes medicines. It lowers blood sugar levels by increasing the capacity of the muscles to take up glucose," explains Dr. Colella. "If blood sugar levels become too low, hypoglycemia can occur." *Full Story* / *Scientific Article*

Toronto General Hospital Research Institute

425
principal investigators

453
students and postdocs

78 postdoctoral researchers

223 graduate students

152 other students

151.9K
sq. ft. research space

$113.6M
funding

473
staff

Cardiovascular Diseases
Diabetes, Kidney and Liver Disease
Respiratory Diseases
Infectious Diseases
Transplantation
Health Care Services

1,743
publications

Research Team at TGHRI 1,351

The Future Now

Two studies offer a sneak peek into the future of organ transplantation

ABOUT THE RESEARCH TEAMS

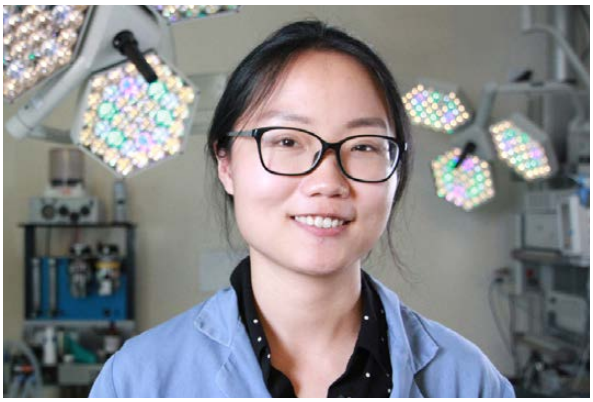
The two studies featured here were led by former postdoctoral researcher Dr. **Aadil Ali** and research associate Dr. **Aizhou Wang** in the lab of Dr. **Marcelo Cypel**. Both authors closely collaborated with a wide range of experts, such as pathologists, hepatologists and immunologists. Key collaborators included: Dr. **Ana Andreazza**, a mitochondrial metabolism expert at the University of Toronto; Dr. **Lori West**, a cardiologist and transplant immunologist at the University of Alberta; and Dr. **Stephen Withers**, a biochemist at the University of British Columbia.

KEY FINDINGS

The first study, led by Dr. **Aadil Ali**, could have wide-reaching effects on donor organ availability. The team found that storing lungs at 10 °C, rather than the 4 °C 'gold standard' storage temperature, doubles the time that they can be safely preserved. This new standard could provide the precious time needed to transport and transplant the organ. The second study, led by Dr. **Aizhou Wang**, revealed a way to change the blood type of donor organs—an important step towards creating universal organs that would be compatible with all patients. The study made use of the made-in-Toronto *Ex Vivo* Lung Perfusion system, which pumps nourishing fluids through donor organs outside of the body before transplant.

Study 1: Sci Trans Med. 2022 Feb 16. doi:10.1126/scitranslmed.abm7190. Study 2: Sci Trans Med. 2021 Sept 15. doi: 10.1126/scitranslmed.abf7601. *Both studies were supported by UHN Foundation and Ajmera Transplant Centre. The first study was also supported by the Di Poce Transplant Fund, the Canadian Institutes of Health Research, the Natural Sciences and Engineering Research Council of Canada and the Toronto General Hospital Research Institute. The second study was also supported by Latner Thoracic Surgery Research Laboratories. M Cypel holds a Tier 2 Canada Research Chair in Lung Transplantation.*

Q&A Aizhou Wang



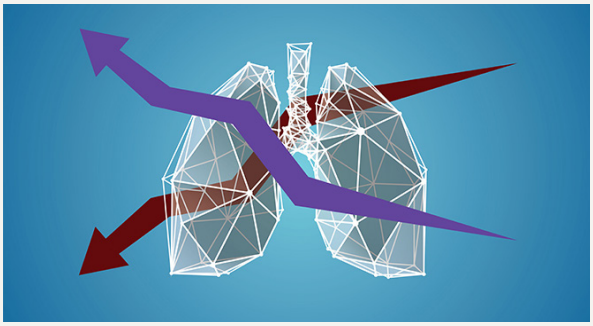
If your younger self could see what you do now, would they be surprised?
I grew up in Chongqing, China, which is a mountain city in the centre of the country. When I was a kid, my dream job was a bus driver. It sounds funny, but I really did love how the bus driver helped so many different people get to where they needed to go. So, yes, I do think it would be a big surprise.

What led you to a career in medical research?
Although my parents were both meteorologists and involved in science, they let me choose my own path. What they did help foster in me was a curiosity and general interest in science. I think that I really made the leap and chose science in high school because of a really great biology teacher that I had. This led me to choose a major in health science in university.

What do you enjoy doing outside of work?
I love bicycling. I would consider myself a cycling enthusiast—a passion that I picked up when I joined the lab. I bike to work most days and, as a lab, we do cycling events, including 100 km 'century rides'. I also love fixing bikes. Before rides, I am often the bike doctor and the one doing tune-ups for the team. Curiosity is something that drives me: figuring out how to fix a bike is in a way like what we do in the lab when we explore how to repair lungs.

Research Highlights

FORECASTING COMPLICATIONS



A research team led by Drs. **Ana Konvalinka** and **Tereza Martinu** identified protein markers that can predict which transplant recipients will experience a potentially deadly complication called chronic lung allograft dysfunction (CLAD). Using machine learning, the team examined the protein levels in lung tissues from healthy individuals and those with CLAD. The algorithm had an accuracy of 97% for predicting who would develop CLAD. *Full Story* / *Scientific Article*

ADDED BENEFITS OF DIABETES DRUG

A clinical trial with participants from over 500 sites in 34 countries revealed the long-term effects of the recently approved type 2 diabetes drug ertugliflozin on the kidneys. Study investigator Dr. **David Cherney** (pictured) explains, "We found that patients treated with ertugliflozin experience a 34% reduction in overall risk for negative kidney outcomes." Remarkably, the team also found that treatment with ertugliflozin improved the ability of the kidneys to prevent the leakage of protein into the urine. *Full Story* / *Scientific Article*

Awards and Distinctions

Selected honours awarded to UHN researchers

Dr. Jacqueline Bender
2021 Early Career Investigator Award, Canadian Association of Psychosocial Oncology

Dr. Mamatha Bhat
2021 Basic Science Career Development Award, American Society of Transplantation
Early Researcher Award, Government of Ontario

Dr. Venkat Bhat
2021 Research Fellow in Compassion and Artificial Intelligence, Associated Medical Services

Dr. Sandra Black
2021 Margolese National Brain Disorders Prize, University of British Columbia Faculty of Medicine

Dr. Scott Bratman
2021 Inventor of the Year, University Health Network

Dr. Yvonne Buys
Mel Mitzel Research Excellence Award, Glaucoma Research Society of Canada
International Scholar Award, American Glaucoma Society

Dr. Vincy Chan
2021 Deborah L. Wilkerson Early Career Award, American Congress of Rehabilitation Medicine

Dr. Angela Cheung
2021 Best Health Women of the Year, Reader's Digest Magazines

Dr. Ki Jinn Chin
Presidential Scholar Award, American Society of Regional Anesthesia and Pain Medicine

Dr. Catharine Craven
Fellow, Canadian Academy of Health Sciences

Dr. Michael Crump
2021 Dr. Joseph Pater Excellence in Clinical Trials Research Award, Canadian Cancer Trials Group

Dr. Daniel De Carvalho
2021 Inventor of the Year, University Health Network
Tier 2 Canada Research Chair in Cancer Epigenetics and Epigenetic Therapy (renewal)

Dr. John Dick
AACR Award for Outstanding Achievement in Blood Cancer Research, American Association for Cancer Research

Dr. Eleanor Fish
Member of the Order of Canada

Dr. Dafna Gladman
2022 Women Who Lead Award, National Psoriasis Foundation

Dr. Breffni Hannon
2021 Research Fellow in Compassion and Artificial Intelligence, Associated Medical Services

Dr. Nigil Haroon
President, Canadian Rheumatology Association

Dr. Siba Haykal
2021 Canada's Top 40 Under 40™, Caldwell

Dr. Margaret Herridge
Fellow, Canadian Academy of Health Sciences

Dr. Brian Hodges
President-Elect, Royal College of Physicians and Surgeons of Canada

Dr. Mansoor Husain
Fellow, Canadian Academy of Health Sciences

Dr. Elizabeth Inness
Medal of Distinction, Canadian Physiotherapy Association

Dr. Kevin Kain
Fellow, International Society of Travel Medicine

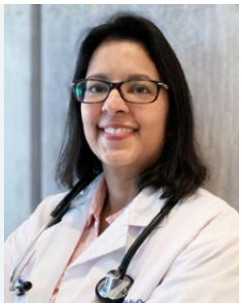
Dr. Moira Kapral
2021 Osler Award, The Canadian Society of Internal Medicine

Dr. Gordon Keller
2021 Scientific Grand Prize, Lefoulon-Delalande-Institut de France Foundation

Dr. Shaf Keshavjee
President, Board of Directors, American Association for Thoracic Surgery
2021 Flance-Karl Award, American Surgical Association
2021 F.N.G. Starr Award, Canadian Medical Association

Dr. Thomas Kislinger
Tier 1 Canada Research Chair in Cancer Precision Medicine (new)

Dr. Deepali Kumar
President-Elect, American Society of Transplantation



Dr. Michael Laflamme
Tier 1 Canada Research Chair in Cardiovascular Regenerative Medicine (new)

AWARDS AND DISTINCTIONS SELECTED HONOURS

Dr. Andres Lozano
Dandy Medal, Walter E. Dandy Neurosurgical Society

Dr. Sonya MacParland
Early Researcher Award, Government of Ontario
Tier 2 Canada Research Chair in Liver Immunobiology (new)

Dr. Alex Mihailidis
Fellow, Canadian Academy of Health Sciences

Dr. Tatyana Mollayeva
Fellow, Global Brain Health Institute

Dr. Sarah Munce
2021 Research Fellow in Compassion and Artificial Intelligence, Associated Medical Services

Dr. Kristin Musselman
Medal of Distinction, Canadian Physiotherapy Association
Tier 2 Canada Research Chair in Multi-morbidity and Complex Rehabilitation (new)

Dr. Faiyaz Notta
Early Researcher Award, Government of Ontario

Dr. Amit Oza
Fellow, Canadian Academy of Health Sciences

Dr. York Pei
2020 Medal for Research Excellence, The Kidney Foundation of Canada

Dr. Quynh Pham
2021 Research Fellow in Compassion and Artificial Intelligence, Associated Medical Services

Dr. Milica Radisic
Tier 1 Canada Research Chair in Organ-on-a-Chip Engineering (advancement)

Dr. Yoga Raja Rampersaud
2021 Chiropractic Champion Award, Ontario Chiropractic Association

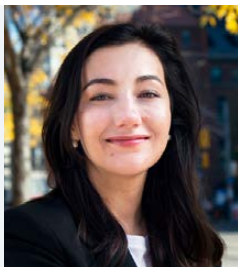
Dr. Linda Rapson
2021 Dr. Rogers Prize for Excellence in Complementary and Alternative Medicine

Dr. Nancy Salbach
Medal of Distinction, Canadian Physiotherapy Association

Dr. Aaron Schimmer
2021 Harrington Scholar-Innovator, Harrington Discovery Institute
Fellow, Canadian Academy of Health Sciences

Dr. Walter Swardfager
Tier 2 Canada Research Chair in Clinical Pharmacology of Cognitive Neurovascular Disorders (new)

Dr. Anastasia Tikhonova
2020 Gilead Research Scholar in Hematologic Malignancies, Gilead Sciences, Inc.



Dr. Zahi Touma
2021 Lupus Canada Catalyst Award, Lupus Foundation of America

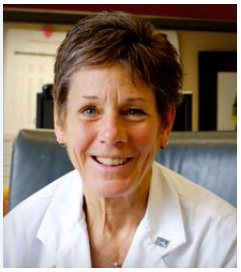
Dr. Wendy Tsang
2022 Escalator Award—Research, Women as One

Dr. Ming-Sound Tsao
Fellow, Canadian Academy of Health Sciences

Dr. Alex Vitkin
2022 G.G. Stokes Award in Optical Polarization, The International Society for Optics and Photonics

Dr. Thomas Waddell
2021 Earl Bakken Scientific Achievement Award, The Society of Thoracic Surgeons

Dr. Sharon Walmsley
Fellow, Canadian Academy of Health Sciences



Dr. David Wiljer
2022 Dave Davis Research in Continuing Medical Education Award, Society for Academic Continuing Medical Education

Dr. Nicole Woods
2021 Canada's Most Powerful Women: Top 100 Award, Women's Executive Network

Dr. Brad Wouters
2021 CCRA Award for Exceptional Leadership in Cancer Research, Canadian Cancer Research Alliance

Dr. Azadeh Yadollahi
2021 Research Fellow in Compassion and Artificial Intelligence, Associated Medical Services

Dr. Gelareh Zadeh
2021 Ab Guha Award, Section on Tumors of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons, Society of Neuro-Oncology

Empowering Research

Donors fuel innovation and discovery in the quest to conquer cancer

Our passionate community of supporters has continued to show their commitment to the vision of *Conquering Cancer In Our Lifetime*. Through their support, The Princess Margaret Cancer Foundation delivered a record-breaking $161 million to further life-saving cancer research and patient care. A few of our major milestones are highlighted below.

$50M CLOSER TO OUR GOAL

A transformational $50 million gift from La Fondation Emmanuelle Gattuso and The Slaight Family Foundation is helping scientists at the Princess Margaret Cancer Centre to continue making world-changing breakthroughs in cancer research. Their gift enabled the establishment of the *Allan Slaight Breakthrough Fund*, which will support innovative, unconventional and creative approaches to cancer research. The gift was made in honour of the late business legend and philanthropist **Allan Slaight** by his wife, **Emmanuelle Gattuso**, and his son, **Gary Slaight**. The funds will also enable the Princess Margaret Cancer Centre to launch the *Allan Slaight Breakthrough Forum*, an annual event that will bring together the world's leading cancer scientists to promote collaboration in cancer discovery. As part of this, $1 million in collaborative research funding will be awarded annually to other leading cancer researchers in Canada.

MINING FOR DEEP INSIGHTS

Yamana Gold Inc. made a generous $4 million gift to create the *Yamana Gold Research Acceleration Fund*, which provides seed funding for high-risk, high-reward research projects with the greatest potential to help patients. The fund was created alongside the *Yamana Gold Discovery to Impact Grant* and two *Yamana Gold Cancer Research Fellowships*. The first recipients of the inaugural annual *Yamana Gold Discovery to Impact Grant* are Senior Scientists Drs. **Rama Khokha** and **Thomas Kislinger**, and Clinician Investigator Dr. **Hal Berman**, whose research explores new strategies to prevent breast cancer in high-risk patients by targeting fatty acid metabolism.

LOTTERIES RAISE MILLIONS

The *Princess Margaret Home Lottery* and the *Princess Margaret Cottage Lottery* raised $91.7 million to fuel life-saving cancer research.

RIDE TO CONQUER CANCER

The 2021 *Enbridge® Ride to Conquer Cancer®* was a hybrid event. It raised $9.4 million and 4,000 people participated in the ride.

THE PRINCESS MARGARET HOME LOTTERY TO CONQUER CANCER

ENBRIDGE RIDE TO CONQUER CANCER PRINCESS MARGARET CANCER CENTRE

Allan Slaight
Breakthrough Fund

Yamana Gold
Discovery to Impact Grant

Funding from La Fondation Emmanuelle Gattuso and The Slaight Family Foundation enabled the creation of the Allan Slaight Breakthrough Fund. Pictured above (left panel, L-R) are Emmanuelle Gattuso and Gary Slaight. The winners of the inaugural Yamana Gold Discovery to Impact Grant are (right panel, L-R) Drs. Rama Khokha, Thomas Kislinger and Hal Berman.

INVEST IN RESEARCH This program supported research into blood tests for lung cancer (Dr. **Natasha Leighl**), evolving treatment approaches for prostate cancer (Dr. **Shane Harding**) and the effects of an extra chromosome on leukemia initiation in children with Down syndrome (Dr. **Eric Lechman**).

THE WALK TO CONQUER CANCER Raising over $3 million, thousands of Canadians walked alongside friends, family and coworkers for the virtual *Weekend to Conquer Cancer* (now known as *The Walk to Conquer Cancer*).

THE PRINCESS MARGARET
WALK
TO CONQUER CANCER

Navigating Change

Building resilience, flexibility and strength in the face of global challenges

Over the past year, our community faced global crises, uncertainty and change. Despite these challenges, UHN Foundation rose to the occasion by fundraising $156 million and contributing $112.4 million to UHN. This support is enabling our exceptional medical staff, trainees and researchers to advance care and discovery. With over 109,000 donations this year, many of us, including patients whose lives have been touched by these efforts, are humbled and grateful. Below we highlight just a few of the unwavering donor commitments and how they are transforming care:

• Two new investments made by **Walter and Maria Schroeder** build on their historic $25 million donation in 2020 that established the Schroeder Arthritis Institute. These investments enabled the launch of two centres. **The Schroeder Arthritis Advanced Therapy Centre** ($6 million) will enable researchers Drs. **Sowmya Viswanathan**, **Christopher Kim** and **Christian Veillette** to track the outcomes of every patient that receives advanced osteoarthritis care at the Institute. The data will be used to fuel the development of personalized therapies. **The Schroeder Pain Assessment and Rehabilitation Research Centre** ($7.2 million) will be based at the KITE Research Institute and led by Dr. **Dinesh Kumbhare**. It will enable world-class chronic pain research to be integrated into care for the first time in Canada.

• **Donald K. Johnson** made an extraordinary $50 million investment to his namesake Donald K. Johnson Eye Institute—the largest gift to vision research in Canada. His donation will provide long-term funding so that the Institute can continue to attract world-class talent, accelerate vision research and improve patient care.

• **Helga and Antonio De Gasperis** continued a long tradition of supporting UHN with a new $10 million gift to advance care, education and research to improve outcomes for patients suffering from acute and chronic disease in the areas of arthritis, spinal disease and cancer.

GRAND CRU

The 17th annual *Grand Cru Culinary Wine Festival* raised $5 million through four events at homes in Toronto. The funds supported the work of Dr. **Tirone David**.

CAR KARAOKE FOR STEM CELLS

Participants recorded karaoke performances and shared them to raise over $600,000 for cardiac stem cell research led by Drs. **Gordon Keller** and **Michael Laflamme** at the McEwen Stem Cell Institute.

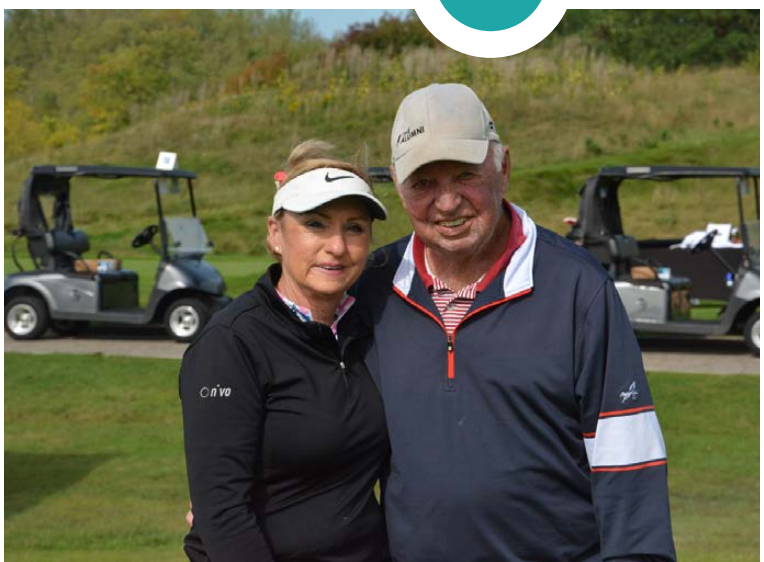
A landmark $50 million donation from Donald K. Johnson (left) is enabling world-class vision researchers, including (clockwise from top right) Drs. Philippe Monnier, Karun Singh and Valerie Wallace, to translate research insights into sight-saving treatments.

TORONTO REHAB GOLF CLASSIC

The fifth annual event enabled participants to golf with NHL legends **Ron Ellis** and **Dennis Hull**. Presented by Scotiabank, the event raised over $100,000 to support the *Hull-Ellis Concussion and Research Clinic* at the Toronto Rehabilitation Institute.

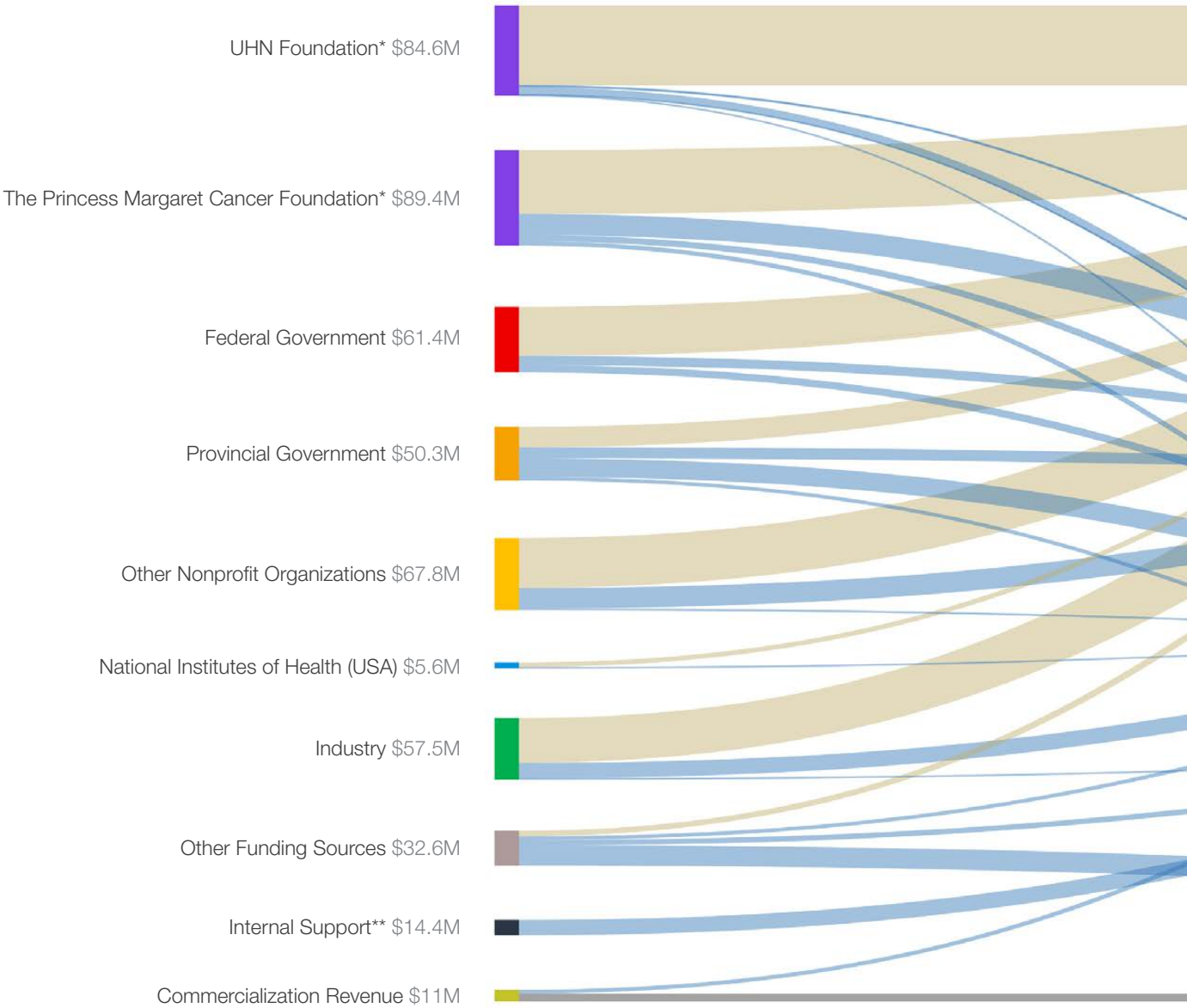
GOLF TO LIVE ON

This inaugural event included a demonstration of a new surgical education tool and organ drone delivery system (see also page 22). Presented by GFL Environmental, the event raised $360,000 for UHN's *Ajmera Transplant Centre* and the *Centre for Living Organ Donation*.

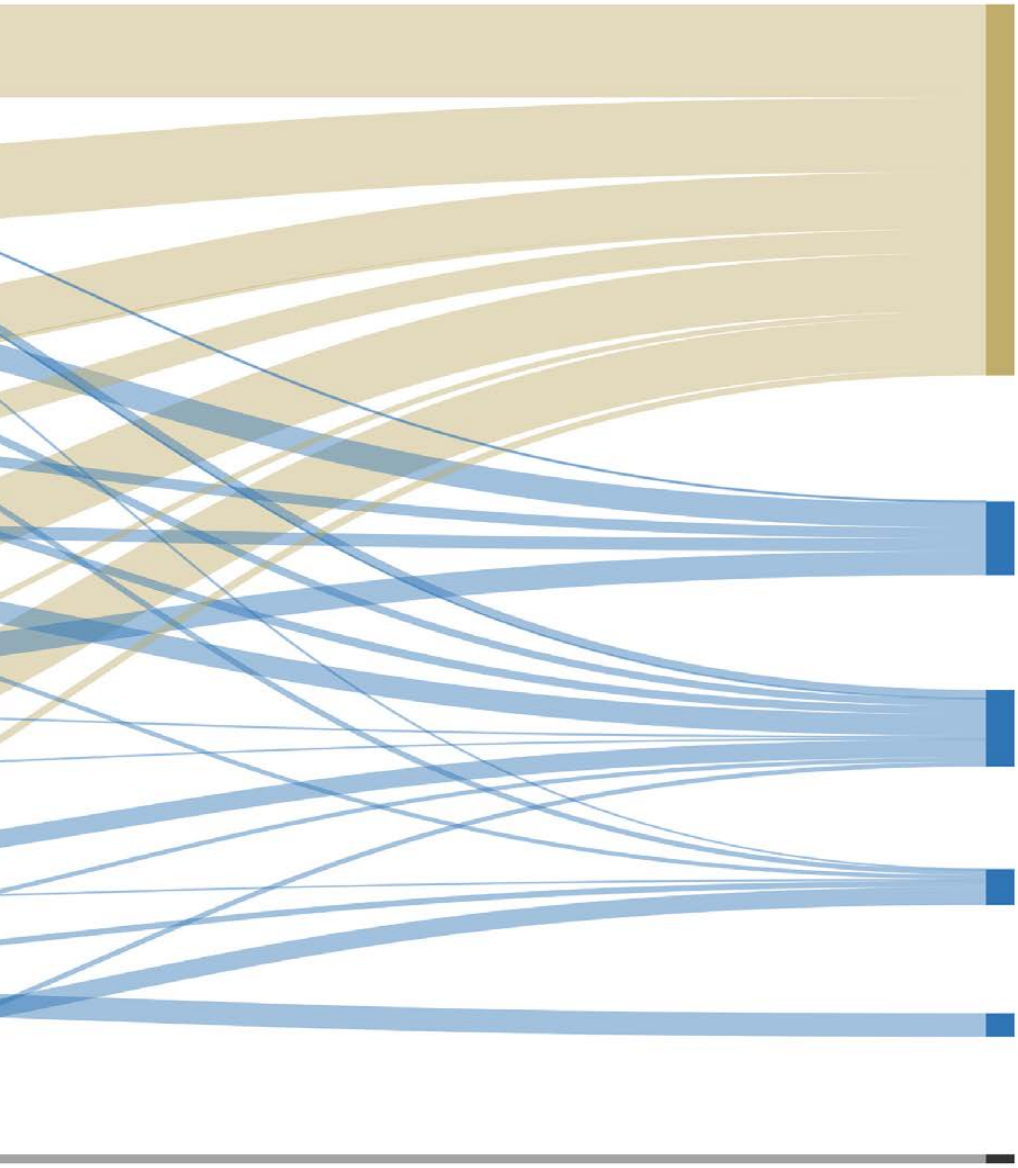


Financials

Flow of research funding by source for the 2021/2022 fiscal year



TOTAL $474.6M



Research Projects $298.4M

Scientist Salaries and Institute Operations $59.4M

Research Solutions & Services, and Strategic Initiatives $61.7M

Space $28.9M

Depreciation $18.9M

Commercialization Return Reserve $7.3M

TOTAL $474.6M

*The above diagram shows how research funding was used towards UHN's research mission for the fiscal year ending on March 31, 2022. Values are rounded to the nearest $100,000. *These values are based on expenses incurred at UHN and categorized according to research-specific spending; note that on April 1, 2021, the Toronto Rehab Foundation and the Toronto General & Western Hospital Foundation were amalgamated into UHN Foundation. **These funds do not originate from the Ontario Ministry of Health or the Ontario Ministry of Long-Term Care. For UHN's audited financial statements, please visit www.UHN.ca.*

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Disclaimers: *All data is accurate as of March 31, 2022. Publication data is reported for the previous calendar year. Financial data is reported for the 2021/22 fiscal year ending on March 31, 2022.*

Research Snapshot Metrics *reported for UHN and individual research institutes include data for all Principal Investigators (PIs). PIs either have a formal appointment at a UHN research institute or are aligned to a UHN research institute as either a Clinician Scientist or a Clinician Investigator. PIs affiliated with two or more institutes are included only once in the total snapshot for UHN.*

Principal Investigator *and* **Publication Data** *provided by UHN Research Analytics. Publications include articles, reviews and proceeding papers indexed in the Web of Science Core Collection that were published in the previous calendar year with at least one UHN PI in the author list. Publications authored by more than one UHN PI are included once in the UHN and institute snapshots.* **Staff, Trainee and Postoctoral Researcher Data** *provided by UHN People & Culture (formerly Human Resources). Trainee and Postoctoral Researcher values reflect the number of personnel with primary supervisors appointed at UHN.* **Space Data** *provided by UHN Facilities Management - Planning, Redevelopment & Operations (FM-PRO). Institute space values include institute-specific space only. UHN space values include all institute space, as well as core research facilities, Research Solutions & Services (RSS) space, and external companies and programs on UHN premises.* **Financial Data** *provided by UHN Research Financial Services. See disclaimer on page 45. Research institute external funding data are calculated based on the institute affiliations of PIs.*

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Parent.
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To see more of Dr. Nigil Haroon's photography visit his **instagram**.

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