



UNITY HEALTH TORONTO

RESEARCH PRIORITIES & RESOURCES



This document collects and summarizes Unity Health Toronto (Unity Health)'s research priorities, and the resources available to principal investigators at Unity Health. Its content can be used as a source of information for grant/award applications and letters. When adapting the content to describe your research environment, be sure to include how your research program fits into Unity Health's research priorities, and provide details of the services and/or equipment that support your research.

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Overview of Research at Unity Health Toronto

Unity Health Toronto (Unity Health) is one of Canada’s largest Catholic healthcare networks serving patients, residents and clients across the full spectrum of care, spanning primary care, secondary community care, tertiary and quaternary care services to post-acute through rehabilitation, palliative care and long-term care, while investing in world-class research and education. Unity Health is comprised of St. Joseph’s Health Centre (SJHC), St. Michael’s Hospital (SMH), and Providence Healthcare. Unity Health’s commitment to anti-racism, equity and social accountability is essential to our ability to provide exceptional care experiences and to drive research and academic excellence, while our deeply held values of human dignity, compassion, excellence, community and inclusivity drive us to continuously nurture an inclusive environment.

Unity Health fosters an environment in which inter-professional teams collaborate to bring established best practices and research discoveries to patients’ bedsides faster than ever before. Unity Health’s world-class research is done within the Li Ka Shing Knowledge Institute (LKSKI) and the Keenan Research Centre for Biomedical Science (KRCBS). Within both, leading researchers, educators and clinicians, and dedicated professionals make new scientific discoveries, generate novel therapies, develop innovative training programs, and translate knowledge into practice.

Snapshot of Research in FY 2020-2021	
No. Principal Investigators (March 2021)	252
Scientists	111
Investigators	141
No. Trainees	413
Graduate Students	173
Post-Doctoral Fellows	65
No. Research Staff	964
Research Spending (April 2020 - March 2021)	\$91.5 M
Tri-Council Funding	\$23.0 M
New study submissions to REB	351
Active studies	1,544

Unity Health researchers are from a wide variety of disciplines and methodologies, including basic and clinical research, global health, inner city health, health services, and knowledge translation, and work together to generate knowledge about:

- The application of fundamental research to improve the understanding and treatment of human disease.
- The best methods of preventing disease and providing health care.
- The social, economic and policy determinants of health.
- The best methods of partnering with the community to generate policy relevant research and ensure greater health equity.

Researchers also work closely with educators, clinicians, and community members to generate and transfer knowledge that will improve the health of patients and of the community.

The majority of research occurs at Unity Health’s SMH site, with some research led from Providence Healthcare and St. Joseph’s Health Centre, including investigations focused on long-term care, rehabilitation, and clinical trials.

Research space at Unity Health totals ~200,000 sq. ft. Of this space, ~140,000 sq. ft. is located within the modern LKSKI research building at the SMH site, with an additional ~55,000 sq. ft. of research space at off-site locations nearby. The LKSKI research building also houses modern and multifunctional event space that exudes innovation, creativity, inspiration and collaboration - perfect for meetings or corporate events. Unity Health, along with its catering and accommodation partners, can design customized meeting packages. Areas available include: 17 small seminar rooms, two board rooms, five classrooms, and an auditorium for 200 people. In addition, there are ample common areas that can be used for receptions, break-out zones, lounge areas, exhibition space, etc.

Unity Health Toronto's Research Strategic Plan: 2021-2026

At Unity Health, we launched a bold new strategic plan for research. Our new plan ensures we will be well poised to be a world-class leader in science and research through pivotal times in science in our local and global community. We are excited to share the new Research Strategic Plan with you, which you can view/download below. Our new strategic plan, built in consultation with our internal and external stakeholders, will be our compass for the next five years. It will ensure we are focused on our purpose, pillars and strategic enablers.

Our purpose

World-class research and innovation that transform patient care and population well-being.

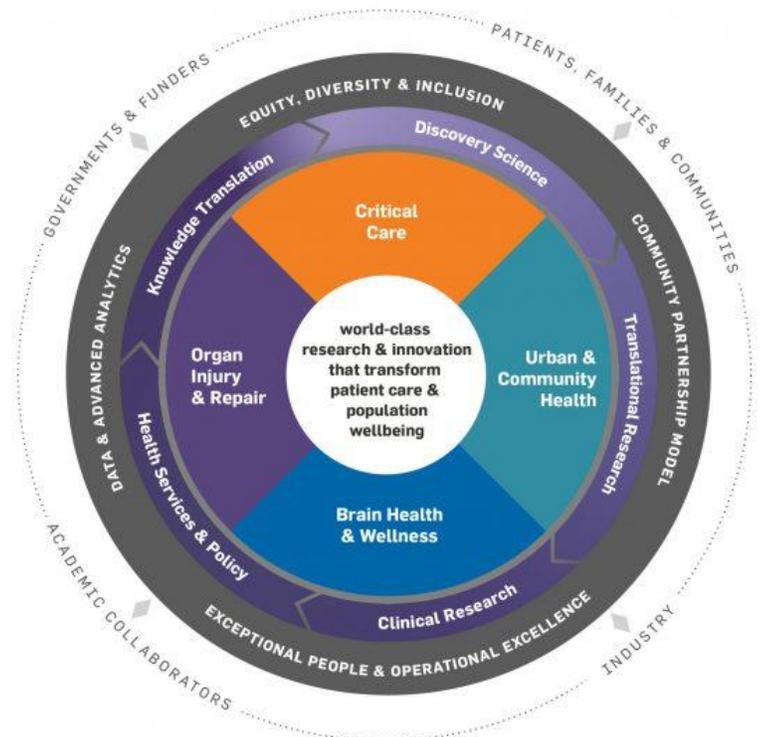
Our five-year goal

Build pillars of world-class research & innovation, distinct to Unity Health.

A distinctive component of our success in Research and Innovation at Unity Health is our multi-faceted research ecosystem.

In the next five years, we will build on our historic strengths, bolster our distinct ecosystem and take advantage of our blended clinical and research milieu to establish four pillars of world-class research and innovation:

- Critical Care
- Urban and Community Health
- Organ Injury and Repair
- Brain Health and Wellness



Download a PDF of the strategic research plan here: [Link](#).

Our enablers will help us achieve our goal

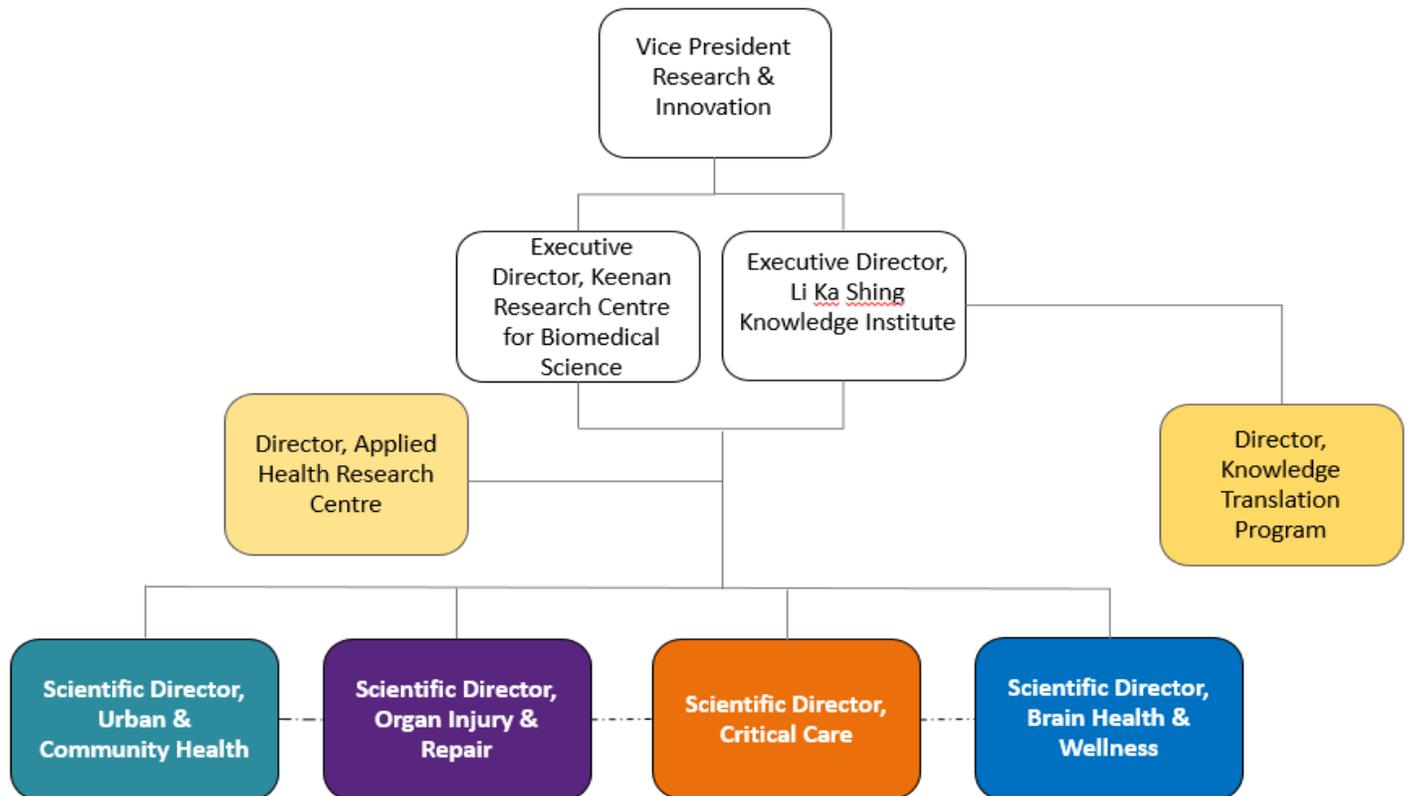
We will invest in and commit to the following strategic enablers to reach our five-year goal:

- Support the health and wellbeing of our research community members and empower their growth and success
- Embed Equity, Diversity and Inclusion as a core value
- Establish a robust patient, family and community partnership model
- Integrate data and advanced analytics as a driver
- Achieve excellence in research operations

Organizational Structure & Governance

Organizational Structure

The Research Strategic Plan: 2021-2026 introduced the organizational structure illustrated below, with inclusive programming built on scientific pillars of research excellence. This structure allows others to visually recognize and cultivate the vibrant spectrum of the research Unity Health conducts, as well as highlights Unity Health's outstanding body of researchers.



The Vice President Research & Innovation (VPRI) holds overall accountability for research at the hospital and reports to the President & CEO of Unity Health Toronto. The Director of the LKSKI is responsible for all “non-basic science” programs and centres, and the Director of the KRCBS is responsible for all basic/translational research activity. All of our Scientists have a primary affiliation with one of four research pillars, or are part of our world-class knowledge translation program. Moreover, some research programs may cross over multiple pillars (e.g. traumatic brain injury may be both Brain Health & Wellness and Critical Care). A description of the LKSKI, KRCBS, and of each pillar can be found below.

The Li Ka Shing Knowledge Institute (LKSKI)

Executive Director: Dr. Patricia O’Campo

The LKSKI runs clinical trials, and specializes in research on health services and policy, population health, global health and knowledge translation research at Unity Health. Its focus is on conducting research and disseminating knowledge that is relevant for the healthcare system and important to Unity Health’s patients. There are ~200 clinical and dry bench researchers working within the LKSKI.

Keenan Research Centre for Biomedical Science (KRCBS)

Executive Director: Dr. Kim Connelly

Housed in the west wing of the LKSKI research building, the KRCBS is home to basic science and translational research at Unity Health. KRCBS' mission is to generate new knowledge relating to fundamental mechanisms of organ dysfunction, with a major focus on translation into patients. The ~45 basic and translational researchers who work within the KRCBS target common and high burden illnesses that are important to patients and strive to make discoveries that will improve patients' lives.

Unity Health's Research Pillars

Urban & Community Health

Interim Scientific Director: Dr. Patricia O'Campo

Key areas that fall under this pillar include social determinants of health, health equity, homelessness and housing, global health, youth and Indigenous health, women's health, child health, mental health and addictions, healthcare access, public health, drug policy, social policy and patient safety.

MAP Centre for Urban Health Solutions (MAP)

Led by Dr. Stephen Hwang

MAP is a world-leading research centre dedicated to creating a healthier future for all. Through big-picture research and street-level solutions, MAP's scientists tackle complex community health issues — many at the intersection of health and equity. Internationally recognized for groundbreaking science and innovation, MAP has changed the way the world understands the health consequences of social inequality in Canada.

MAP research is defined by scientific excellence, a focus on rapid scale-up, and long-term community and policy partnerships. MAP's clinician-scientists represent the fields of family medicine, internal medicine, emergency medicine, pediatrics, and neuropsychology. Their research disciplines include health geography and economics, population health, program evaluation, and social epidemiology. Together with our community and policy partners, MAP is charting the way to the world's healthiest cities: places where people, communities, and the political, economic, social, environmental, and health infrastructures come together so that everyone can thrive.

Website: www.MAPhealth.ca.

MAP Survey Research Unit (SRU)

Led by Dr. Tatiana Aratangy

Part of MAP, the SRU was created in July 2009 to consolidate, mobilize and expand MAP's considerable expertise in health equity research data collection and in recruiting and interviewing diverse populations. SRU provides full research management services, including project management, recruitment and follow-up, interviewing, instrument development and programming, secure data hosting and data entry, quality control, and data analysis and reporting.

SRU's clientele predominantly comprises researchers and program development staff based in hospitals, universities, research centres and third sector organizations. Some of their recent projects explore the subjects of housing, violence, quality of life, access to healthcare, health policy, health equity, community engagement, and program satisfaction.

Website: <https://research.unityhealth.to/research-programs/urban-health-solutions/survey-research-unit/>.

Centre for Global Health Research (CGHR)

Led by Dr. Prabhat Jha

The CGHR is an independent, not-for-profit organization co-sponsored by Unity Health and the University of Toronto. Founded in 2002 on the principle that effective health initiatives must be supported by reliable, evidence-based research, CGHR was created to conduct large-scale epidemiological studies in developing countries. CGHR's mission is to lead high-quality public health research that advances global health for all, with particular attention to the world's poorest populations. Current projects at CGHR are designed to generate and disseminate evidence of the major causes of premature mortality among the global poor. Research areas include maternal and child health, tobacco control, health policy and economics, and gender inequalities.

CGHR has offices in Toronto, Bangalore, and New Delhi. Funding is provided by grants from the Canadian Institutes of Health Research, the US National Institutes of Health, the Bill and Melinda Gates Foundation, Unity Health/SMH, and the University of Toronto.

Website: <https://www.cghr.org/about/about-cghr/>.

Organ Injury & Repair

Interim Scientific Director: Dr. Kim Connelly

Key areas that fall under this pillar include biology and mechanisms of organ injury and repair; cardiovascular disease, diabetes, organ fibrosis, lung disease/injury, inflammation, cancer, blood disorders, autoimmune disorders, and wound healing.

Scar Wars: Centre for research and therapeutic development in fibrotic diseases

Almost half of our hospital's patient population suffer from diseases that are characterized by fibrosis (i.e., chronic organ or tissue scarring), be it chronic kidney disease, heart failure, pulmonary interstitial fibrosis, cirrhotic liver disease, myelofibrosis or arthritis. Scar Wars will not only develop new strategies for investigating the causes and pathobiology of fibrosis-related diseases, but will also pioneer new ways of assessing and treating these major causes of morbidity and mortality in our community. Currently, the Scar Wars team is focusing its efforts on some notable projects including establishing a clinical-research interface. The vision for this project is to link the PIs researching fibrosis with the clinicians who see patients with diseases caused by it. With this model, clinicians will be able to directly contribute to research and the PIs will have a much-needed clinical perspective on what they are doing. There is also work underway to develop the world's first biobank of fibrotic tissues where clinical information will be merged with the molecular information derived from tissue samples. This theme also aims to target and discover new therapeutics using information derived from the molecular interrogation of fibrotic tissues. This information will then be used to develop new interventions that specifically block those pathways. One of the other aims of the Scar Wars program is to assess the extent of fibrosis by using advanced imaging techniques such as MRI. That way, patients can be tested to assess the extent of organ fibrosis and their response to anti-fibrotic therapies.

CardioLink

Led by Dr. Subodh Verma

CardioLink is the first large-scale national research program that focuses on clinical trials in heart and vascular surgery and care in order to generate hard evidence that leads to better treatments and patient outcomes. The CardioLink group led nine key trials to address critical issues for high-risk heart patients. Among them were studies that sought to understand why strokes sometimes occur after cardiac surgery; the best way to protect blood flow to patients' brains during open-heart surgery; and whether inexpensive and simple treatments could have positive impacts for patients with diabetes, heart disease and peripheral artery disease. St. Michael's Applied Health Research Centre (AHRC) coordinated the trials, which were

undertaken in partnership with a network of cardiac centres across the country to enable large-scale research. Their mission was both to improve care and to build scientific capacity in this critical area — not just at St. Michael’s but around the world.

Critical Care

Scientific Director: Dr. Andrew Baker

Key areas that fall under this pillar include critical illness; acute illness; trauma; sepsis; intensive care unit (ICU)-acquired injuries and disorders, including ventilator-induced lung injury (VILI); surgical complications; surgical innovations; emergency medicine; and resuscitation science.

Centre of Excellence in Mechanical Ventilation

Led by Dr. Laurent Brochard

Critically ill patients admitted to the Intensive Care Unit (ICU) with acute respiratory failure or other critically ill conditions are connected to a mechanical ventilator to support their breathing until they recover from their illness. Mechanical ventilators help the lungs inflate by forcing air into the lungs using positive pressure to facilitate gas exchange. Based on the severity of a patient’s condition, clinicians adjust the ventilator to deliver specific types of breathing patterns according to the volume of the breath, the frequency of the breath, and the amount of effort required by the patient to initiate the breath. The Toronto Centre of Excellence in Mechanical Ventilation (CoEMV) at St. Michael’s Hospital leads in personalized and evidence-based mechanical ventilation through collaborative practice, education, research, and innovation. Their research interests include: acute respiratory failure, Acute Respiratory Distress Syndrome, mechanical ventilation, including noninvasive ventilation, patient-ventilator interaction, extubation and weaning from mechanical ventilation. Their research approaches include simulation, experimental and engineering collaboration, applied physiology at the bedside and clinical trials.

Brain Health & Wellness

Scientific Director: Dr. Tom Schweizer

Key areas that fall under this pillar include traumatic brain injury, mental health, suicide and depression, stroke, aneurysm, brain tumours, multiple sclerosis, neurodegenerative diseases, neuroimaging and other biomarkers.

Neuroscience Research Program (NRP)

Led by Dr. Tom Schweizer

The Neuroscience Research Program works to unravel the mysteries of the brain and brain health by mobilizing researchers in the areas of fundamental neurobiology, neuroimaging, clinical trials and knowledge translation. The NRP spans basic and clinical research, and is built on the well-established clinical excellence of St. Michael’s in the areas of neurotrauma, suicide and depression, multiple sclerosis and other neurodegenerative diseases. By mobilizing researchers in the areas of fundamental neurobiology, neuroimaging, clinical trials and knowledge translation, this program works to unravel the mysteries of the brain and brain health.

The NRP is comprised of a number of research groups:

- Neurotrauma (NT) research group conducts research in traumatic brain injury, stroke, and neuro-oncology through the use of animal models, clinical trials, cognitive assessments, and knowledge translation.
- The Suicide and Depression (SD) group facilitates research and clinical initiatives, leading to a greater understanding of the causes and prevention of suicide. Through clinical research, scientists with the program are currently investigating neuroimaging or molecular biomarkers of suicide risk and suicidal ideation, links between traumatic brain injury and suicide risk, and neuroimaging of reward circuitry and the relationship to suicide risk.

- Neurodegenerative (ND) studies involve both basic science and clinical applications. The team works on identifying the basic mechanisms that lead to these diseases, improving diagnostic procedures and pharmacological management. In terms of Alzheimer’s disease and Parkinson’s disease, our scientists are interested in neuropathology, neuro-optics, neuroimaging, neuropsychiatry and clinical drug trials. With the hospital having the largest Multiple Sclerosis centre in the country, the NRP has a large concentration of patients that facilitates clinical drug trials and research in this population.

Centre for Depression and Suicide Studies

Led by Dr. Sidney Kennedy

The Centre for Depression and Suicide Studies at Unity Health is dedicated to discovering better outcomes for people with depression and suicidal thoughts through improved understanding and treatment options. Although most closely aligned with the pillar of Brain Health & Wellness, mental health impacts all areas of health, including the pillars of Critical Care, Urban & Community Health, and Organ Injury & Repair. Researchers within the Centre use innovative tools including digital health technologies, functional and structural neuroimaging, extensive clinical phenotyping, and emerging pharmacological treatments. They are also passionate about education and outreach to the broad community of healthcare professionals, people with lived experience, and the general public with an equitable and inclusive reach. We partner with research networks and industry leaders locally, nationally, and internationally. The Centre is home to the Arthur Sommer Rotenberg (ASR) Suicide & Depression Chair at St. Michael’s Hospital and the University of Toronto, and is also the coordinating data centre for the Canadian Biomarker Integration Network in Depression ([CANBIND](#)), sponsored by the Ontario Brain Institute (OBI) with additional support from the Ontario Research Fund (ORF), the Canadian Institutes for Health Research (CIHR) and other granting agencies.

Cross-Pillar Programs

Knowledge Translation Program (KTP)

Led by Dr. Sharon Straus

The goals of the program are to improve the quality of care by working with diverse stakeholders to develop, implement, evaluate, and sustain strategies that bridge the ‘know-do’ gaps, and to create new knowledge that contributes to the evolving science of KT. The KT program offers a wide range of consultation services and expertise in: (a) knowledge synthesis; (b) the implementation of high-quality evidence, evaluation, patient and stakeholder engagement; and (c) capacity building in KT. Patient engagement initiatives focus on investigating patient experience and identifying the best mechanisms to include patients in the evaluation and research of healthcare policy. These initiatives aim to improve clinical outcomes and the overall patient experience. Some of the capacity building courses currently offered through the KT Program include; Practicing Knowledge Translation (PKT), Online Introductory Course to Systematic Reviews and Meta-Analyses, End of Grant KT, Foundations in KT, Pragmatic KT trials, KT summer institute, and a national KT seminar series.

Website: <https://knowledgetranslation.net/>

Applied Health Research Centre (AHRC)

Leader to be determined

The AHRC is an Academic Research Organization (ARO) with expertise in clinical study design, pragmatic methodology, and biostatistics. The AHRC has grown to a team of ~60 people and have managed or are managing more than 100 multi-site, national, and international clinical trials, observational studies, and qualitative studies. The centre employs industry-leading, web-based secure database technology, which incorporates advanced data validation and reporting tools. The AHRC has grown to be one of the largest AROs in Canada, and is a one-stop service for patient-oriented clinical research. The AHRC’s priorities are to continue serving as a leading provider of methodological support, which includes quantitative and qualitative study design, statistical design, and protocol development, in addition to study, site and/or data coordination. A quality-driven

ARO, the AHRC seeks to lend its expertise in pragmatic clinical trials to improve patient outcomes and impart policy changes at all levels of government.

Research Equity, Diversity and Inclusion (REDI) Task Force

The [Research Equity, Diversity and Inclusion \(REDI\) Task Force](#) is an advisory group with a mandate to provide guidance to the Research Leadership Committee on the EDI-related barriers that exist in research, recommend initiatives and practices aimed at removing these barriers, and promoting fairness, mutual respect, and an unequivocal sense of equity, diversity, and inclusion among our research community. REDI membership includes representatives from Unity Health Toronto's scientists, trainees, and research employees. Unity Health's research community can contact researchedi@unityhealth.to to ask institutional EDI questions, share EDI initiatives and events, or get in touch with REDI. Research EDI webpage: [Link](#). Research Strategy and EDI Intranet (accessible to Unity Health employees): [Link](#).

Students and Trainees

Research Training Centre (RTC)

Led by Dr. Katalin Szaszi and Dr. Janet Parsons

The Research Training Centre (RTC) provides support for Masters' and Doctoral-level graduate students, and Postdoctoral Fellows (PDFs) who are supervised by Unity Health principal investigators. Every year, >250 of these trainees and their Unity Health supervisors receive operational support from the RTC. The RTC aims to develop trainees' scientific expertise, and deliver a suite of professional skills and learning opportunities designed to help advance their careers. The RTC is committed to providing strong mentorship, financial support, and advice/guidance on career development.

RTC Services & Activities

Educational Activities

- **Orientation for New Trainees:** Organized by the RTC each September, this event connects new trainees to the RCT.
- **Trainee Seminar Series:** These monthly seminars are a way for trainees to share their research within the broader Unity Health community, and hone their presentation and science communication skills.
- **RTC Essentials in Experimental and Clinical Research Workshop Series:** This annual series of interactive workshops offers research skills training for trainees across a range of disciplines. Sessions begin each fall, and include topics such as research design, literature reviews, research ethics, data analysis, data presentation, and patient and community engagement in research.
- **Annual Research Day:** This full-day event showcases the work of Unity Health's research trainees. The event features oral and poster presentation competitions, as well as keynote presentations by leading experts in clinical and wet bench research.
- **Professional Training and Transferable Skills Development:** Workshops and courses that the RTC organizes focus on the development of professional skills that are transferrable to various career paths. Topics include writing and presentation skills, time and project management, peer reviewing, and leadership. The RTC also keeps trainees apprised of other training opportunities offered in-house (e.g. RCF's hands-on technical courses, Health Sciences Library Workshops, Student Association events) and training programs at the University of Toronto, Toronto Metropolitan University, and other RTCs in the Greater Toronto Area.

Financial Support

- **Awards and Scholarships:** Unity Health principal investigators can apply for \$50,000 in salary support for a PDF under their supervision through the 'Keenan Postdoctoral Scholarship' competition. This funding is renewable for one-year based on a progress review. The RTC also offers an annual set of 'Travel Awards', which provide up to \$1,000 for trainees to present their research at national/international conferences. Unity Health also recognizes outstanding leadership and community-building by trainees with the annual Holmes-McInnes Award.
- **Other Funding Sources:** The RTC also supports trainees with applications for external funding, cataloguing and sharing information on upcoming opportunities, and by supporting with the application process for specific competitions. For example, the RTC coordinates our Institute's annual CGS-D application process to CIHR.

Operational Support & Advocacy

The RTC provides support to trainees and their supervisors throughout a trainee's time at SMH. This includes support with registration, connecting trainees with HR, providing an orientation for new students, day-to-day support, and keeping a trainee registry. The RTC also advocates for trainees and training issues in all of our programming.

Communication, Collaboration & Community Building

The RTC provides up-to-date information for trainees and supervisors, and promotes collaboration within and outside our institute. We actively tailor our offerings in order to meet the diverse needs of our trainees and PIs across the institution and to communicate with our larger community.

- **Website:** The RTC's website includes a comprehensive set of continuously updated resources including events, funding opportunities, job postings, registration info, etc.
- **RTC's *Staying Connected* Newsletter:** Our newsletter is distributed weekly to trainees with updates on research operations, as well as information on upcoming events, workshops, seminars and funding opportunities. Trainees are added to our contact list when they register with the RTC.
- **Greater Toronto Area (GTA) RTC Network:** The RTC is part of the GTA RTC Network, connecting RTCs across the Toronto Academic Health Science Network (TAHSN) hospitals. The GTA RTC Network provides access to shared events and other resources/opportunities available to all trainees across the affiliated research institutes.

St. Michael's Hospital Research Student Association (SRSA)

Led by Zoya Tawhidi (2022-23 Academic Year)

St. Michael's Hospital Research Student Association is a graduate student-run organization committed to representing the research students at St. Michael's Hospital. We strive for this by promoting collaboration amongst our community, advocating for student needs, and working cooperatively with administrative and executive bodies with the goal of enriching the learning experience.

In order to promote communication amongst the hospital community, the association organizes social, academic, community outreach and equity events which allow students to meet peers from other departments as well as staff, scientists and faculty members.

SRSA Internal Peer Review Program

The SRSA Internal Peer Review Program is a new initiative launched by the St. Michael's Hospital Student Research Association (SRSA) which provides St. Michael's Hospital trainees with an opportunity to receive a full peer review of their scholarship applications prior to submitting to the granting agency. The program is confidential, collegial and 100% trainee-run.

This program aims to:

- i. Provide trainees the opportunity to receive feedback on their scholarship application to improve it and increase their chance of success.
- ii. Give trainees the opportunity to get grant reviewing experience.
- iii. Promote a collaborative environment amongst trainees throughout the research institution.

Peer to Peer Trainee Mentorship Program

This program allows incoming graduate students to be paired with a more senior graduate student. Benefits include:

- Guidance for new trainees from more senior graduate students: A key objective of the mentorship program is to provide incoming students with guidance to help them integrate into the Institute, discover the resources available, advise them about the best ways to get started with their training, and help them navigate various aspects of being a research student.
- Building mentorship skills: Trainees who volunteer for the program will benefit from the opportunity to hone their mentoring skills. They will be able to provide insight and advice to mentees stemming from their own personal experiences. This also encourages self-reflection and aids in the development of communication skills.
- Encourage inclusion among students at different career levels: The feeling of isolation is a common complaint among research trainees, especially during the pandemic. We hope that this mentorship program will introduce trainees to their fellow graduate students, and help to develop a supportive community. Such networking would provide everyone involved with professional development opportunities and encourage social interactions.

Life Sciences Career Symposium

The St. Michael's Research Student Association (SRSA) holds an annual Life Sciences Career Symposium in July which aims to connect trainees to professionals with diverse careers in the field. Each year, we select a theme and invite distinguished speakers to deliver a keynote presentation and participate on a panel where trainees can network, ask questions and get advice.

Keenan Research Summer Student (KRSS) Program

Led by Dr. Fahad Razak

The [Keenan Research Summer Student \(KRSS\) Program](#) provides opportunities for undergraduate and medical students to conduct research in a laboratory and/or clinical setting at Unity Health's SMH site under the supervision of a principal investigator (scientist and/or MD). Students will also participate in various educational opportunities such as seminars, networking and a poster competition. Starting in 2022, a Black, Indigenous and People Of Colour (BIPOC) stream within the KRSS Program was developed to ensure representation of these historically marginalized populations.

Office of the Vice-President, Research & Innovation (VPRI Office)

Vice-President, Research & Innovation: Dr. Ori Rotstein

Research and Innovation support services within the VPRI Office are split into five divisions, organized as illustrated below and described as follows.

Office of Research Administration (ORA)

Led by Mr. Dalton Charters

The [Office of Research Administration \(ORA\)](#) provides a full suite of administrative services to researchers and research staff. ORA coordinates and manages all aspects of research operations at Unity Health, including leadership and assistance with research finance, research contracts, research appointments and research staff employment, and grant applications. The ORA monitors and controls all funding and expenditures related to research projects to ensure compliance with Unity Health's financial policies and funding agency requirements, including the submission of financial reports.

Staff in the ORA draft and review research contracts and agreements with external organizations / parties, under the direction of a legal advisor for research. ORA manages the internal peer review program, conducts review and approval of budgets, ensures adherence to sponsor guidelines, and submits completed applications to funding agencies.



Internal Peer Review (IPR) Program

To ensure that the highest quality grant and award applications are submitted to external sponsors, the ORA implements and manages an [Internal Peer Review \(IPR\) Program](#). IPR is a process where two or more expert reviewers are matched, according to expertise and availability, with a Unity Health investigator(s) who is preparing a grant application for a specific competition. The reviewers and investigator(s) work together to review and refine the application. The IPR Program's purpose is to increase the success rate of any grant that is submitted by Unity Health investigators. It is also an important element of cohesion and an important contribution to collegiality in the Unity Health research community. A number of institutions that have adopted a peer review process have achieved a substantial increase in the success rate (in some cases up to 30-40%) in the grant applications that their researchers submit to major sponsors.

Research Ethics

Led by Dr. Sharon Freitag

The Research Ethics Office (REO) and [Research Ethics Board \(REB\)](#) provide ethics review and ethics oversight of all research involving humans or human biological materials. They ensure that this research meets current scientific and ethical research standards for the protection of human research participants. The REB has the mandate to independently approve, reject, propose modifications to, or to terminate any proposed or ongoing research involving human participants or human biological materials, which is conducted within, or by members of Unity Health Toronto. The REB reports directly to the Research and Education sub-committee of the Board, and is supported by the REO. The REO receives >500 REB submissions per year, and has >1,500 active studies. The REO and REB provide guidance to the research community in designing and carrying out ethical research, and promote research ethics education.

Strategy & Commercialization

Led by Ms. Samar Saneinejad

The Strategy & Commercialization team focuses on organizational strategy, equity, diversity and inclusion (EDI), and research commercialization support. The Strategy team oversees the development of research strategic plans and annual objectives,

including monitoring the progress of research corporate objectives and the annual [Research Action Plan](#). The team supports the work of the Research Leadership Committee (RLC), and coordinates implementation of EDI initiatives, including those recommended by the Research Equity, Diversity and Inclusion Task Force (REDI). The [Commercialization](#) team scouts and evaluates technology developed at Unity Health; manages Unity Health’s Intellectual Property (IP; patents, trademarks, copyrights) portfolio; delivers educational resources on IP, commercialization, entrepreneurship, etc.; facilitates and supports the research commercialization process (including start-ups); and provides information on how to navigate Unity Health’s Intellectual Property Policy, how to submit an invention disclosure form, or any other commercialization-related inquiries.

Funding Strategy & Stewardship

Led by Dr. Erica Conte

The Funding & Awards Team is dedicated to increasing funding and resources to enable scientific excellence, and enhance the recognition of researchers at Unity Health. The team accomplishes these objectives by providing strategic and developmental support of funding proposals and award nominations.

The Funding & Awards Team has three major ‘buckets’ of responsibilities: Grants, Awards, and Research Stewardship. The Grants and Awards portfolios provide pre-award funding support to researchers, and the Stewardship portfolio supports fundraising for research with all three of Unity Health’s Foundations (St. Michael’s Hospital, Providence, and St. Josephs’ Health Centre).

Funding & Awards Team Supports	
Grants	<ul style="list-style-type: none"> • Find appropriate funding opportunities for research projects. • Communications to increase awareness of funding opportunities and deadlines. <ul style="list-style-type: none"> • VPRI Update — a weekly newsletter to keep our research community informed about upcoming funding and awards opportunities, events, workshops, and announcements. • Website • Edit and review (non-scientific) proposals (NOT full grant writing). <ul style="list-style-type: none"> • Most often optional; separate from Internal Peer Review • Mandatory for Institutional submissions (e.g. Canada Foundation for Innovation, Canada Research Chairs, Ontario Early Researcher Award, etc.) • Institutional support letters, and signatures from the VPRI. • Workshops on major funding opportunities. <ul style="list-style-type: none"> • CIHR Project Grants
Awards	<ul style="list-style-type: none"> • Facilitate nominations of distinguished researchers for prestigious awards and honours. • Identify and support research chair nominations, including Canada Research Chairs. • All award selections are made through the Awards and Honours Selection Committee. • Please come to us if you would like to be considered for an award nomination.
Research Fundraising and Stewardship	<ul style="list-style-type: none"> • We are the link to all fundraising through the Foundations (St. Michael’s Hospital, Providence, and St. Josephs’ Health Centre) • Angels Den — an annual medical research competition where top Unity Health scientists pitch their game-changing ideas to win funding. • Internal funding opportunities — conduct open and transparent calls for internal funding opportunities as they arise. <ul style="list-style-type: none"> • Research Innovation Council • Seed Grant Funding

Research Facilities

Led by Dr. Stephen Barker

[Research Facilities](#) (RF) supports the infrastructure, facilities, and space needs of Unity Health researchers, as well as the Animal Care Committee (ACC) and the Research Biosafety Committee (RBC). RF plans, co-ordinates, and facilitates construction, renovation projects, and relocations within research. The team also authorizes access to research areas, including the LKSKI research building, and the off-site research locations (e.g. 229 and 250 Yonge Street).

Animal Care Committee:

The Animal Care Committee (ACC) is responsible for ensuring that Unity Health's use of animals is ethical, responsible, and lawful. The ACC undertakes animal use protocol review, approval and post-approval monitoring, as well as ensuring facilities are being used, well-maintained and managed, veterinary care services are in place, continuing education and training programs are in place and occupational health, and safety and crisis management programs are in place. Its membership includes scientists with experience in animal use, an experienced veterinarian, community representation, student representation, and technical staff representation.

Biosafety Program

The RF team manages Unity Health's Biosafety Program. The Biosafety Program is designed to protect Unity Health's research community and the environment from the risks that may arise in the handling of potentially hazardous biological materials. It also ensures that all research work conforms the lab personnel and members of the public from exposure to potentially harmful biological agents, and to prevent the release of agents that may be harmful to animals or the environment. Oversight and management of the program is the responsibility of the [Research Biosafety Committee](#) (RBC), with administrative and technical support provided by the research biosafety officer.

The RBC is charged with ensuring that Unity Health's research activities involving biohazardous agents are conducted in a safe manner and in conformity with all applicable standards and guidelines. It is chaired by a senior researcher, with membership that includes principal investigators, researchers and administrators with responsibilities for, and experience in, handling biohazardous materials. The RBC ensures that all research work conforms to the regulations, standards, and guidelines set by the federal and provincial governments, and all applicable Unity Health policies and procedures.

Research Core Facilities

Through the [Research Core Facilities](#) (RCF), RF provides Unity Health's research community with access to state-of-the-art equipment and techniques, advanced expertise, robust educational programs, professional training, and scientific consultation. The RCF are located within ~27,000 sf over three floors of the Keenan Centre for Biomedical Science (KRCBS) research space in the LKSKI research building. RCF comprises Flow Cytometry, Genomics/Molecular Biology, Histology, Imaging, Microfabrication, and Vivarium.

The RCF makes available for shared use critical equipment and techniques that may not otherwise be available to individual researchers. RCF offers significant financial savings and operational efficiencies by pooling equipment into a centralized core and reducing duplication, as well as prolonging equipment lifetime through a centralized training and maintenance program. The model adapted by Unity Health is one where principal investigators donate equipment to the RCF, making it available to all Unity Health principal investigators and their teams. In turn, the equipment is properly maintained by RCF staff, without any charge to the donor. In addition, arrangements can be made for preferential scheduling arrangements for the donor principal investigator's lab members. The Research Facilities Business Management System (RFBMS) manages the day-to-day operations of RF, including: billing, access to research areas, course registration, and equipment booking. To facilitate use of the equipment, [on-line booking](#) is available.

The RCF staff includes scientific specialists. These scientific specialists hold PhD-level research experience, including in Molecular Biology, Flow Cytometry, Cell Sorting and Histology. The specialists advise on the technical design and execution of scientific experiments, and train users how to use the RCF equipment. In addition to one-on-one training, the RCF provides bi-

weekly and monthly educational series that inform the Unity Health research community on the latest equipment, facilities and scientific techniques, and runs basic methodology courses with both theoretical and “hands-on” components.

Flow Cytometry: Provides access to several flow cytometers and a cell sorter available for use by all researchers at Unity Health.

Histology Core: Provides equipment to study microscopic anatomy of tissues and cells, including special staining techniques combined with light and electron microscopy.

Genomics/Molecular Biology Core: Provides equipment and expertise to support the complete workflow of gene expression profiling (including bioanalysis, primer validation and real-time PCR), genotyping, SNP analysis, viral packaging for gene delivery, cell electroporation for gene delivery, a laser capture microdissection specialty service, and various other methods to interrogate the molecular regulation of various biological processes. The Illumina Next-Generation Sequencing (NGS) technologies available encompass techniques to query the genome, transcriptome, or epigenome of any organism at scales ranging from small, targeted genomic regions to entire genomes, including the order of nucleotides in RNA or DNA samples, as well as DNA methylation analysis.

Imaging: This ~1,000 sf facility provides access to imaging equipment for specimen and in vivo experiments, including 10 different microscope systems and three different image analysis workstations (see the [list of equipment](#)). The available imaging equipment is suitable for routine imaging of histology-stained and fluorescent samples, as well as several forms of optical sectioning, spectral imaging, live-cell imaging, photoacoustic tomography, and multimode retinal imaging. Several image analysis computers with software to analyze and prepare data for publication are also available.

Microfabrication: Provides equipment and expertise in the area of microfabrication and rapid device prototyping for biomedical applications and healthcare, including ISO Class 7 cleanroom space, 3D printers for high-definition prototype devices, photolithography and soft lithography equipment for microfluidics, and general lab equipment. Also available are group and individual trainings, expert advice on protocol development and validation, 3D modeling and device design, data analysis, and consultation services.

Vivarium: The Vivarium is a 25,000 sf state-of-the-art animal research facility located within the Unity Health research building. It is fully compliant with the Animals for Research Act (Ontario Ministry of Agriculture, Food and Rural Affairs) and is accredited through the Canadian Council on Animal Care (CCAC). Overseen by an on-site veterinarian with >30 years of experience in laboratory animal medicine, the Vivarium serves the in-vivo based research and teaching needs of its scientists, physicians, and surgeons by providing:

- Animal housing space for species including mice, rats, rabbits, dogs, pigs and zebrafish. The rooms that house these animals are modular, and can accordingly be adapted to suit the needs of researchers and/or their projects. Each animal housing suite includes an adjacent procedure room, which can be used for minor procedures (i.e., blood pressuring, blood sampling, injections, minor surgery).
- Animal operating rooms and veterinary staff, including 6 fully equipped operating rooms, 2 pre-op suites and a post-op recovery suite. Two full-time veterinary technicians are available to assist researchers with anesthesia induction and monitoring, surgical procedures, and post-operative recovery. The equipment available includes specialized instrumentation, including fluoroscopes, x-ray, laser Doppler, physiological monitors, and operating microscopes.
- Specialty areas, such as rodent breeding suites, a behavioral testing suite, containment housing, and necropsy rooms.

The Vivarium offers in-class and hands-on training to its users. The courses are intended to meet regulatory requirements, teach users new techniques, and improve the technical expertise of users, as follows:

In-Class Training: Short course on the Ethics of Animal Use in Research, Regulations Governing Animal Research.

Hands-on Training:

- General orientation to the Vivarium, including a facility tour, general procedures, and an overview of the species and basic restraint techniques.
- Working with Biohazards (BSL-2), where learners receive instruction in the proper use of biocontainment equipment, personal protective equipment (PPE), and animal handling procedures while working in a containment area.
- Animal handling and basic invasive techniques, including blood sampling, injections, anesthetic administration/monitoring and humane euthanasia. Users of the Vivarium must receive a certificate of competence which is required before their work can begin, and certificates are valid for five years.
- Rodent survival surgery, where learners are taught the essentials of aseptic technique, proper anesthetic monitoring, suturing and post-op recovery.

Education

The robust education program RCF offers includes educational seminars and formal courses. These include the [Essential Techniques in Biomedical Science \(eTIBS\)](#) program. Designed for research staff, eTIBS provides information about basic research techniques and procedures, and new and emerging technologies in a series of three courses: Core Clinics, Current Emerging Technologies, and Basic Methodology Courses (details and schedules [here](#)). RCF also delivers various [safety training](#) courses required under the Occupational Health and Safety Act.

Unity Health Biobank

Led by Dr. Valeria Di Giovanni

A facility dedicated to supporting translational research and biomarker discovery and validation through collecting, processing and annotating samples donated from Unity Health patients. The Biobank's infrastructure at St. Michael's Hospital includes a dedicated secure laboratory space on the 7th floor of the Li Ka Shing (LKS) building, featuring two biosafety cabinets, a blood processing centrifuge and equipment for sample accessioning. The Core Laboratory at St. Joseph's also features a secure biosafety cabinet and blood-processing centrifuge to support biobanking efforts from that patient population.

Sample Processing and Cryostorage: The Research Biobank can support researchers who require cryostorage of samples in either -80°C or liquid nitrogen by offering access to these freezers on the 7th floor of the LKS building as a rental service. Biobank cryostorage at -80C is also available to support research projects based at St. Joseph's Healthcare Centre. The Biobank offers technical support staff who can help investigators through the collection, processing, and accessioning of patient samples as a fee-per-use service, as well as help in creating standardized operating procedures (SOPs) and REB protocols involving biobanking.

Sample Repositories: The Biobank is working to create a robust sample archive, focused primarily on our Critical Care, COVID-19, multiple sclerosis, and Neuro-oncology patient populations, which will be available to both internal and external investigators to drive translational innovation. <http://stmichaelshospitalresearch.ca/staff-services/research-facilities/biobank/>

Human Neuroimaging Facility

Coordinated by Yangmei Li

Magnetic Resonance Imaging (MRI): Magnetic Resonance Imaging (MRI) is a painless non-invasive diagnostic procedure that allows physicians to see detailed images of the internal structures of the brain and spine without using X-rays. This technology uses a large magnet and radiofrequency energy to generate images of the body. MRI is non-invasive and does not use ionizing radiation. MRI provides truly multi-planar imaging capability and superior soft tissue contrast when compared to other modalities such as CT scans. MRI brain scans can illustrate the differences between healthy and diseased or damaged brain tissue more clearly than ever before, and can provide important information about brain function. Vascular disease can

be studied non-invasively with magnetic resonance angiography, time resolved MRA, and magnetic resonance perfusion techniques. Functional magnetic resonance imaging (fMRI) and diffusion tensor imaging (DTI) give scientists unique insights into brain structure-function correlates. There are a wide array of pulse sequences designed to show different aspects of neuroanatomy and physiology, providing a superb platform for research trials. St. Michael's Hospital's MRI department is equipped with four state-of-the-art MRI scanners. This includes two 3 Tesla (CT) Siemens Skyra, wide bore MRI scanners, one of which is dedicated 100 per cent to research (with a matching clinical system). The two 1.5T scanners are primarily designated for clinical use, but are also available for research.

Diagnostic and Therapeutic Neuroangiography: Angiography is the study of blood vessels and organs by injecting contrast media (X-ray dye) into arteries or veins, and taking X-ray images as the contrast media flows through these blood vessels. This allows for advanced diagnosis of neurovascular disease involving the brain and spine. In addition, the interventional neuroradiology team is able to treat many conditions, such as cerebral aneurysms and vascular malformations of the brain and spinal cord using minimally invasive endovascular techniques. The Medical Imaging department has a dedicated state-of-the-art bi-plane flat-panel angiography suite dedicated to neurovascular work.

Computed Tomography (CT Scan): Computed Tomography (CT) Scan is a non-invasive, cross-sectional imaging modality. CT scans use X-rays and computer reconstruction to generate axial images of the body. CT scans can provide highly-detailed images of the brain, and CT angiography provides images of the vasculature in the head and neck.

Learning Resources

Library Services (Health Sciences Library)

The [Health Sciences Library](#) (Library Services) is located on the third floor of the Li Ka Shing Knowledge Institute. It provides expansive collections, access to electronic journals, and expert services to support education, research, and evidence-based decision-making in patient care for physicians, staff, and learners at Unity Health. The health information can be found through online databases and > 3,000 electronic journals, directories, and books. Expert staff can also procure items not found in its collection (via [interlibrary loan](#)), conduct [database searches](#), offer database search [training](#), and collaborate on systematic reviews and other knowledge synthesis projects. Library Services developed extensive [online resource guides](#), which can assist researchers to examine the impact of their own research (e.g., h-index, Author Profile, Altmetrics, journal impact). Staff are available for information and assistance by email to hslibrary@smh.ca.

Allan Waters Family Simulation Centre

Much like the aviation industry uses flight simulators to train pilots, healthcare professionals use patient simulators to learn first-hand how to care for patients and respond to critical situations in a controlled safe environment. Healthcare simulation involves a range of activities that share a similar purpose: to improve the safety, effectiveness and efficiency of healthcare services. Simulation is useful for patient safety, since patients do not need to be involved in the training. Unity Health's St. Michael's Hospital site was a pioneer in simulation, opening Canada's second simulation centre in 1996. The Simulation Centre provides simulated realistic learning opportunities to prepare students, allied healthcare professionals, researchers, physicians, and surgeons for actual patient care situations that could occur in the emergency/trauma, operating room or inpatient ward environments. Simulation-based training enables healthcare teams to improve their teamwork, leadership, clinical judgment, and communications skills.

Applied Education Research Operatives (AERO)

AERO is a group of researchers from across Unity Health, who share a common commitment to doing impactful work by bridging education science and innovative education. AERO serves two main groups:

- AERO Scientists/Investigators: Education researchers who spend a large proportion of their time on research activities. AERO promotes, supports, and connects the work of this group.
- AERO Educators/Scholars: Education scholars who spend some time on research activities. Depending on fit, AERO collaborates with and coordinates efforts for this group.

AERO partners with many people and units locally, nationally, and internationally, including the Allan Waters Family Simulation Centre and the Centre for Faculty Development.

St. Michael's Hospital Learning Centre

St. Michael's Hospital offers a complete learning centre where employees can increase their personal growth and career development by taking a variety of [online and in-class courses](#).

External Partnerships

Toronto Academic Health Science Network (TAHSN)

Unity Health Toronto is part of the Toronto Academic Health Science Network (TAHSN), which is a dynamic network of academic health organizations providing leading edge research, teaching, and clinical care. TAHSN serves as a leader in Canadian healthcare and is one of the largest, most productive academic health centres in North America as evidenced on a number of dimensions, including academic standing, research activity/output, visionary collaboration, and contribution to healthcare innovation.

In order to advance its academic mission and the role of academic hospitals, TASHN actively engages in activities at the local, regional, and provincial system planning levels to promote a better understanding of the role that education, research, and academic hospitals play in providing high quality healthcare services. More information can be found on their [website](#).

Toronto Metropolitan University

In 2013, Unity Health and Toronto Metropolitan (formerly Ryerson) University (TMU) entered into a 20-year co-operation agreement to establish a joint centre for biomedical research called [the Institute for Biomedical Engineering, Science and Technology](#) (the iBEST) as well as a biomedical incubator, called the [Biomedical Zone](#) (the Zone). Under this agreement, Unity Health integrated TMU in ~14,000 sq. ft. of research space within Unity Health's research building. The iBEST and the Zone each have their own governance, and the operating budget of both is shared between Unity Health and TMU.

Institute for Biomedical Engineering, Science and Technology (iBEST)

The Institute for Biomedical Engineering, Science and Technology (iBEST) brings together TMU's engineering and science strengths with Unity Health's biomedical research and clinical expertise to translate research concepts into testable healthcare solutions. Located within the Unity Health research building, the iBEST's access to biomedical, technological and clinical expertise allows its members and partners to identify challenges and rapidly pilot, modify, and introduce biomedical discoveries and inventions to improve health. The overall goals of the iBEST are to:

- Advance collaborative health research and development, and drive innovation through the widespread dissemination of research discoveries and findings and the creation of publications, patents, products, and companies.
- Deliver results for Ontario's economy through the development of spin-off companies and the advancement of patient-centered solutions that reduce healthcare spending.
- Provide world-class training to graduate students and research trainees and develop the next generation of innovators and multi-disciplinary talent.

The iBEST has two co-Directors representing each institution. The Unity Health Co-Director is the Director of the KRCBS and the TMU Co-Director rotates annually between the Associate Dean, Faculty of Science and the Associate Dean, Faculty of Engineering & Architectural Science. The iBEST is organized into four research themes (Biomaterials Tissue Injury & Repair, Biomedical Delivery Systems, Biomedical Imaging & Therapy, and Healthcare Analytics & Applications), with a Theme Lead for each. The 50 scientists appointed to iBEST collaborate on research projects and grants, co-supervise students, and participate in networking and scientific events including Visiting Lecture series and an annual Symposium. The iBEST also offers multiple research training resources and initiatives for TMU and Unity Health students and staff, and collaborates with the Zone to deliver some training initiatives.

The Biomedical Zone

The Biomedical Zone is a physician-led, hospital-based health technology incubator in downtown Toronto. This supportive, dynamic environment allows entrepreneurs to engage with like-minded innovators, while accessing dedicated clinical expertise and entrepreneurial resources from our partnerships with Toronto Metropolitan University and Unity Health Toronto. The Biomedical Zone offers the resources needed to accelerate product development from early prototype stages to commercialization. Their aim is to create scalable, sustainable healthcare solutions with global reach.

Officially founded in 2015, the Zone is an incubator and innovation centre that helps early-stage health technology companies to validate their need-based solutions directly in a hospital setting. Part of TMU's Zone Learning program, the Biomedical Zone offers students unique experiential learning opportunities. It presently occupies ~2,000 sq. ft. of space on the 7th floor of the Unity Health research building, including shared space for 10-12 individual start-ups, collaboration/meeting space, and a micro-fabrication/3D printing facility. Among the many innovative programs run by the Zone are:

- HealthBound – Hospitals identify an opportunity for process improvement and selected start-ups work on the solution.
- The Co-Development Lab – Unity Health clinicians and TMU students have the opportunity to co-develop solutions to real world problems in the hospitals.
- Clinical Validation – Allows startups in the Biomedical Zone to design and execute focused analysis and validation of their technology. To date, Zone start-ups have engaged with >110 clinicians at hospitals across North America, with the majority of these organizations coming from Unity Health's hospital network and other hospitals in the Greater Toronto Area.