PRINCESS MARGARET CANCER CENTRE

Annual Report 2023

Message from the President and the UHN Board of Trustees

We would like to express our sincere congratulations to every member of the Princess Margaret team who continually pursues innovative approaches to care, and shows unwavering commitment to improving the journey and treatment of cancer patients. In particular, special thanks go to our nursing colleagues who are the backbone of our health system.

This year, the Princess Margaret advanced to the next level in care with innovations including early-stage cancer diagnoses through genetic testing; engaging in exciting partnerships to advance mRNA medicines to improve cancer therapies; and advancing at-home care for Allogeneic stem cell transplant patients. We are ushering in a new era of technology with robotic surgery, conducting the first robotic procedures in Canada and North America. We expanded our outreach through mobile centres, offering free prostate testing for at-risk communities, and addressed gaps in care through the Sexual and Gender Diversity Program.

The Radiation Medicine Program has added the Halcyon linear accelerator to its fleet of state-of-the-art radiation machines to deliver high-precision radiotherapy to cancer patients. Our ongoing quest to find less invasive treatment options included pioneering research in radiofrequency ablation for thyroid cancer patients; exploring the psychological benefits of psilocybin for advanced cancer patients; and using combination therapy to prolong survival in glioblastoma patients. We were extremely proud to open the Oncology Nursing Research Centre of Excellence (ONRCE), Canada's first centre devoted to supporting oncology nursing research. Our important local, regional and global partnerships will not only improve equity in cancer care but provide the opportunity to share best practices worldwide.

For the Princess Margaret Research Institute, 2023 was a year of innovation with cancer research funding reaching more than $285 million, more than 1,200 peer-reviewed publications, and numerous prestigious honours and awards to its staff and scientists.

We are extremely grateful for the generosity of our donors and the Princess Margaret Cancer Foundation, which allows PM/UHN to pursue world-class research and education, empower the world's most advanced practitioners, and train those who represent the future of health care.

Congratulations to the entire team at Princess Margaret Cancer Centre for an outstanding 2023, an exciting year of innovation and care beyond the cutting edge.

Dr. Kevin Smith
President & CEO, University Health Network

Mr. Dean Connor
Chair, UHN Board of Trustees


Dr. Kevin Smith, President & CEO, UHN


Mr. Dean Connor, Chair, UHN Board of Trustees

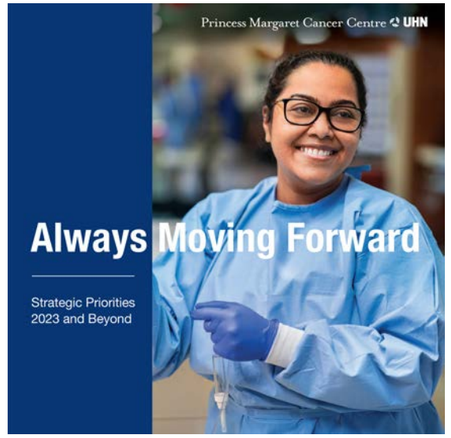
Leadership Message

We are pleased to present the 2023 Annual Report for the Princess Margaret Cancer Centre at the University Health Network (UHN).

This year has been filled with many moments, big and small, that underscore the importance of: “Why Cancer,” “Why UHN,” and why we show up with purpose every day for our patients, caregivers and families, and for one another.

We were excited to launch our Always Moving Forward strategic plan for 2023 and beyond. Developed in collaboration with patients, staff, TeamUHN, and healthcare partners, the plan is centered around three core themes: Elevate, Explore, and Inspire. Moving forward, we are renewing focus on an exceptional patient experience by ensuring patients, healthcare providers, and committed partners are confident in the care delivered and feel valued, engaged, and represented. We will accelerate research discoveries beyond the cutting edge, create novel pathways to cure, and rapidly advance safer and more effective therapeutics. By focusing on the highest-impact solutions, we will usher in a new era of progress in cancer care worldwide.

We took pride in recognizing innovation across many areas including: the arrival of new surgical robots; expanding availability of genetic testing; the launch of a UHN centre in artificial intelligence; exciting clinical trials in supportive care; planning for future particle therapy and expanded space for cellular therapies.



Among our highlights:

- We signed agreements with three additional cancer centres - Grand River Hospital, Oak Valley Health, and Newfoundland and Labrador Health Services– who joined Southlake Regional Health Centre in the PM Cancer Care Network.
- We hosted cancer leaders from 10 different countries at our inaugural PM Global Partners’ Consultation.
- We launched the Oncology Nursing Research Centre of Excellence.
- Our Quality and Cancer Digital Intelligence teams began sharing real-time patient experience data with clinical site groups.
- We opened the CCRU Convergence Centre, a dedicated clinical research facility that is the first of its kind at UHN.
- We opened the new Wharton Centre for Head and Neck Cancer, refreshed spaces for GI and GU cancers, and continued renovations to the Princess Margaret Lodge on Jarvis Street.
- Our colleagues in FM-Pro did a tremendous job delivering many major and smaller projects.

Finally, we celebrate and appreciate the brilliant team at the Princess Margaret Cancer Foundation without whom many of these innovations, capital builds, and world-leading research would not take place.

We would like to share our immense gratitude to our staff, volunteers, and learners, many from across the globe. Your optimism and dedication make a significant difference to patients, their families, and our colleagues.

A. Keith Stewart, MB, ChB,
VP Cancer, UHN
Director, Princess Margaret Cancer Centre

Pushing the Boundaries

A New Era of Innovation with Robots in Surgery

Robotic technology has fully arrived to the Sprott Department of Surgery at UHN and will pave the way for a new era of innovation and optimized care for our patients. Within the span of a few weeks, the first robotic surgical procedures in Canada and North America were successfully conducted. Patients can now return home with minimal scars and fewer days in hospital.

Robotic surgery has long been a passion for urologic oncologist, Dr. Antonio Finelli, Head, Division of Urology, Sprott Department of Surgery. “What excites me about the robot is that it allows me to be a better surgeon in general. The surgery is associated with less harm to patients and fewer side effects and hopefully getting them back to normal life as soon as possible.”

Antonio Finelli, MD, MSc, at the controls of a robot during surgery, has been a passionate advocate for the advancement of robotic technology, paving the way for a new era of innovation and optimizing care for our patients.

The potential to scale the platforms to include artificial intelligence (AI) is one of the reasons for excitement in the robotics program at UHN. “This is a magical time with respect to the robotics program,” says Dr. Thomas Forbes, Surgeon-in-Chief, UHN. “We are advancing the number of robots significantly and bringing in the most modern and up-to-date platforms. Our team-based approach to robotic surgery is very important. There has been specific training with respect to our nurses, our technicians and our surgeons, and they’re all world leaders.”

Drs. Antonio Finelli and Jason Lee, Chaya Shwaartz, Allan Okrainec and Sami Chadi, and Marcus Bernardini and Genevieve Bouchard-Fortier have all led teams that utilized the new Medtronic Hugo and Da Vinci Xi robots.

> **We can offer our patients cutting-edge technologies that may not be available anywhere else.**
>
> **Jason Lee, MD, MHPE**
> Urologist, Sprott Department of Surgery

“We have a responsibility to provide excellence and care, and to lead the charge on innovation and research,” says Dr. Fayez Quereshy, Vice President, Clinical, UHN. “We are creating a pathway to train the next generation of surgeons by adopting new technologies, and pushing the envelope.”

The Next Level in Care

Genetic Testing Leads to Early-Stage Cancer Diagnoses

Juliet Locke and her mother, Luana, both have Li-Fraumeni syndrome (LFS), an inherited condition with an almost 100 percent lifetime risk of developing cancer. This inherited condition causes changes in the TP53 gene resulting in tumours affecting the breast, soft tissue, brain, and other organs.

Cancerous cells and healthy cells release pieces of DNA into the blood and by analyzing these DNA fragments, Drs. Trevor Pugh and Raymond Kim at the Princess Margaret (PM) and Dr. David Malkin at SickKids, demonstrated that they are able to detect cancer earlier in individuals with Li-Fraumeni syndrome.

For Luana Locke and her family, early detection is invaluable and has prolonged her life many times already. Luana was diagnosed with breast cancer at age 25 and later discovered that her mother, children, and many members of her extended family carried the same TP53 genetic change. Luana has since had sarcoma, lung, thyroid, and skin cancer. Her children have regular tests and screenings to detect cancers early, and after years of scans, Luana's daughter, Juliet, was diagnosed with leukemia, a condition that may have been detected early using the new blood sample analysis.

*** Juliet Locke**

*** Luana Locke**

"By using a combination of genomic, fragmentomic and epigenetic methods to analyze blood samples at a molecular level, we were able to detect multiple different types of DNA changes in blood - a tell-tale sign that cancer was developing somewhere in the body months before cancer would show up in imaging," says Trevor Pugh, Senior Scientist at PM and Director, OICR Genomics Program. Testing blood samples for signs of cancer (liquid biopsies) is an attractive screening approach compared to other imaging methods, which require specialized machines and more invasive biopsies.

"To improve the accuracy of early-stage cancer diagnoses, such genetic tests can be used to complement other clinical screening methods, and can be performed at a higher frequency," says Dr. Kim, Medical Director, Cancer Early Detection and the PM Bhalwani Familial Cancer Clinic, as well as lead of the Ontario Hereditary Cancer Research Network at OICR.

> **"Getting more precise diagnoses earlier is the next level in care.**

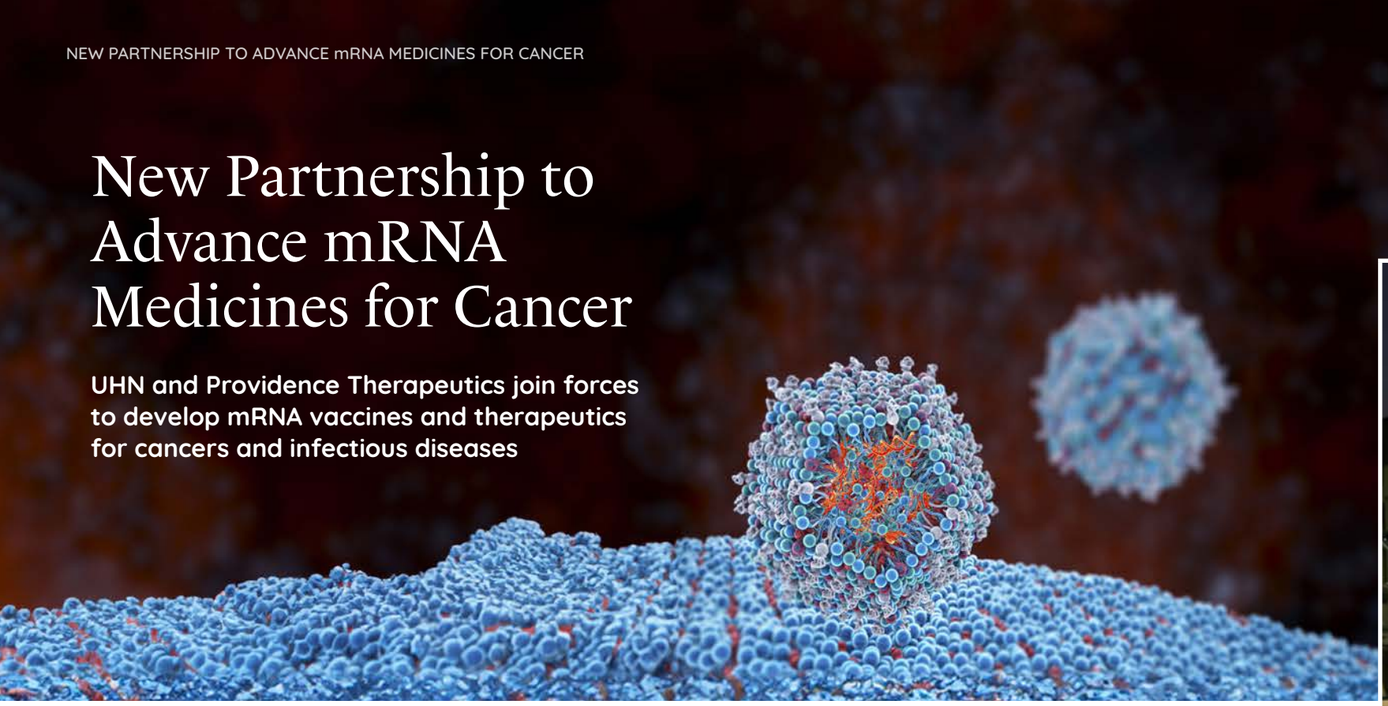
"The ability to predict when and where cancers develop would be life-changing and until now, we really didn't have good ways of conducting surveillance in children with cancer or in children with cancer predisposition," says Dr. David Malkin, staff oncologist, Senior Scientist and Director of the Cancer Genetics Program at SickKids.

"That is precision. These promising findings can be extended to all hereditary cancer syndromes to help improve the accuracy of cancer detection, especially for common tumour types."

The team will conduct a clinical trial to further test this approach and screen patients in the hope of finding their cancer earlier. These patients will include those with different types of high-risk cancer predisposition syndromes, including Li-Fraumeni syndrome, Lynch syndrome, and Hereditary Breast and Ovarian Cancer syndrome – all of which are brought under a nationwide research consortium that Drs. Pugh and Kim founded in 2017.

* Photos: Courtesy Locke Family

New Partnership to Advance mRNA Medicines for Cancer



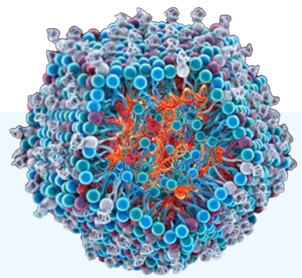
UHN and Providence Therapeutics join forces to develop mRNA vaccines and therapeutics for cancers and infectious diseases

UHN, Canada's largest research hospital and medical innovation centre, has teamed up with Providence Therapeutics, a leading Canadian biopharmaceutical company, to create new medicines based on messenger RNA (mRNA) technology.

Messenger RNA is a molecule that carries genetic instructions from DNA to the cells, where it can be used to make proteins. By designing synthetic mRNA molecules, scientists can trigger the cells to produce specific proteins that can fight diseases or enhance immunity. UHN and Providence will use this approach to develop novel mRNA-based vaccines and therapeutics for people living with hard-to-treat cancers and infectious diseases. The partnership will also help establish Ontario as a major hub for mRNA research and development.

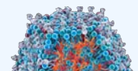
The products created through this collaboration will be made in Canada, and ensure that they are affordable and accessible for Canadian patients. This will also strengthen the country's capacity to respond to future health challenges.

"This partnership demonstrates the strength of discovery research at UHN and our potential to fuel innovative therapeutic options for patients, addressing some of today's top health concerns," says Dr. Brad Wouters, Executive Vice President, Science and Research, UHN.



"This partnership will allow us to continue to develop immunotherapy as a breakthrough strategy in cancer treatment, and pave the way for new therapeutic options for other diseases.

Pamela Ohashi, PhD
Director, Tumour Immunotherapy Program,
Princess Margaret Cancer Centre



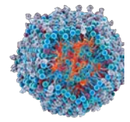
NEW PARTNERSHIP TO ADVANCE mRNA MEDICINES FOR CANCER

At a question-and-answer session following the signing ceremony, (L to R), Heman Chao, Principal, Business Development & Commercialization, the Princess Margaret; Dr. Pamela Ohashi, Director of the Tumour Immunotherapy Program, the Princess Margaret; Brad Sorenson, Founder & Chief Executive Officer, Providence Therapeutics; Dr. Brad Wouters, Executive Vice President, Science and Research, UHN; and Dr. Aleks Pastrak, Chief Medical Officer, Providence Therapeutics.

Dr. Pamela Ohashi, Director of the Tumour Immunotherapy Program at the Princess Margaret, adds that "mRNA technology is a novel and powerful tool to improve cancer therapies and we expect to be able to test initial impact of new therapeutic options in clinical trials as early as next year."

Brad Sorenson, Founder & Chief Executive Officer of Providence Therapeutics, says, "The launch of this collaboration marks an important milestone for our company, as we work with the top research hospital network in Canada to demonstrate the potential of our mRNA platform technology and develop novel cancer and infectious disease vaccines and therapeutics for patients."

"We are proud to have support from UHN as our partner and draw upon their renowned clinical research and discovery expertise and resources," he adds. "We look forward to bringing safe and effective treatment options to Canadians."



> **It's the most important thing I've experienced in my lifetime regarding the model of care and the direct impact it has on patient outcomes.**
>
> **Jonas Mattsson, MD, PhD**
> Director, Hans Messner Allogeneic Transplant Program

Innovation in Care@Home

At-home care for allogeneic stem cell transplant patients

The Princess Margaret Cancer Centre has launched an innovative and promising at-home-care program for hematologic cancer patients who receive an allogeneic stem cell transplant (ALLO).

Normally, an ALLO transplant patient spends several weeks being treated in the hospital, which can be an isolating and distressing experience after a radical procedure. The new initiative at the Princess Margaret, ALLO@Home, will allow patients to receive much of this care from the comfort of their home, a method which has been clinically proven to improve survival rates.

"It's the most important thing I've experienced in my lifetime regarding the model of care and the direct impact it has on patient outcomes," says Dr. Jonas Mattsson, Director of the Hans Messner Allogeneic Transplant Program at the Princess Margaret and leader of the ALLO@Home Program. Previously, Dr. Mattsson led a similar program in Sweden, which found patients that were treated at home had a 40 per cent improvement in survival when compared to those who remained in the hospital immediately after the transplant. Of particular interest, patients treated at home tended to eat better, sleep better, and had better physical activity – three important factors in the success of a transplant.

An ALLO transplant is used to treat blood cancers such as leukemia and lymphoma. The procedure involves collecting stem cells from a healthy donor, which are later infused after the patient receives conditioning, such as intense chemotherapy (sometimes accompanied with total body radiation) – a process which severely impairs their immune system for several weeks. This conditioning helps to create room in the bone marrow to receive the healthy stem cells, which eventually grow into mature blood cells.

While the ALLO@Home Program cannot accept patients who live more than one hour away in the event the patient needs to return to the hospital quickly, the program has been adapted to accommodate a city like Toronto. To provide equitable care, the program has enabled patients living outside the Greater Toronto Area to live in a furnished condo through Staywell.

"The ALLO@Home patients are monitored very closely by our team while receiving care at home," says Susan Clarke, Nurse Manager of the allogeneic stem cell inpatient units and the ALLO@Home Program. "Our program has developed procedures on the medical monitoring of patients by our transplant nurses every few hours, just like in hospital," Susan says. "Patients tell us they appreciate the close monitoring they are provided and deeply appreciate the ability to be at home, for as long as possible, close to loved ones during their transplant care."

A Second Shot at Life

The Hans Messner Allogeneic Stem Cell Transplant Program

When Lilac Cana was diagnosed with cancer earlier this year, she couldn't help but ask herself, "Why me?" As a life-long opera singer who found solace in her music, she never imagined having to give up something she loves.

"It was a wake-up call," says Lilac, 53, a performer with the Canadian Opera Company for five years, who was diagnosed with myelodysplastic syndrome (MDS). After her darkest moments, she found a light at the end of the tunnel.

Lilac received an allogeneic bone marrow transplant at the Princess Margaret. Since then, she's gradually built her strength and stamina enough to get her voice back, as well as her music career. "I've been given a second shot at life," Lilac says.

In the fall of 2023, hundreds of patients including Lilac gathered for the inaugural Allogeneic Blood and Bone Marrow Patient Survivorship Day in Canada.

"It's a tribute to life," Dr. Mattsson says. "I really want our team to see that the work they're doing is truly saving lives."

This celebration is an opportunity to showcase the widespread success of the life-changing program for patients, families, and their health care workers.

The Hans Messner Allogeneic Stem Cell Transplant Program at Princess Margaret Cancer Centre is the largest program of its kind in Canada and has administered more than 3,500 transplants since 1976. ALLO transplants treat not only blood cancers, but other non-malignant blood disorders.

At the signing ceremony in Rochester, Minn., (L to R), Steve Mackin, President & CEO, Mercy; Dr. Yitshak Kreiss, CEO, Sheba Medical Center; Henrique Neves, CEO, Hospital Israelite Albert Einstein; Dr. Gianrico Farrugia, President & CEO, Mayo Clinic; and Dr. Kevin Smith, President & CEO, UHN. (Photo: Courtesy Mayo Clinic)

Global Collaboration with Mayo Clinic

UHN has become a founding member of Mayo Clinic Platform_Connect, a global distributed data network designed to enable the creation of new health care solutions driven by data science and artificial intelligence (AI). Advancing AI is one of the strategic priorities of the Princess Margaret to improve patient outcomes.

“Teamwork, technology, and bold thinking are essential to transforming the ways that health care is delivered and putting patients first – goals UHN shares with Mayo Clinic,” Dr. Kevin Smith, UHN’s President & CEO, said after the agreement was signed at the Mayo campus in Rochester, Minn.

Alongside UHN, Hospital Israelita Albert Einstein in Brazil and Sheba Medical Center in Israel joined with Mercy and the Mayo Clinic in the United States as founding members. It is a first-of-its-kind global alliance among large health care systems that transcends language and other barriers.

Mayo Clinic Platform_Connect provides a solution to create secure, cloud-based access to de-identified clinical data generated by network members across three continents. The platform will enable federated learning that keeps “Data Behind Glass” in member institutions, while unlocking discovery, validation, and implementation of new data driven algorithms informed by AI.

> **By unlocking AI-enabled health care solutions while protecting patient data, this alliance will be key to accelerating the translation of discovery to practice.**
>
> **Brad Wouters, PhD, BEng**
> Executive Vice President,
> Science and Research, UHN

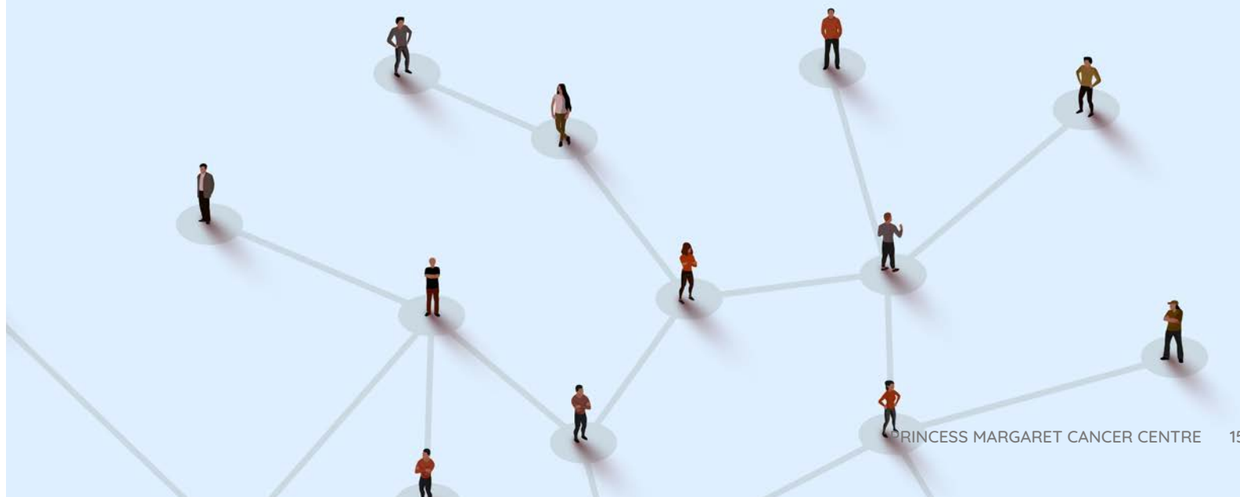
“We describe the data needed for fair, equitable AI as having depth (types of information), breadth (number of patients) and spread (heterogeneity),” says Dr. John Halamka, President of Mayo Clinic Platform. “If we are to transform health care globally, we must expand our distributed data networks for machine learning to every continent.”

“We must protect privacy, adhere to international laws/regulations, and incorporate knowledge from every language. Today, three premier medical centres in South America, Canada, and the Middle East are joining our network.”

The alliance will initially focus on discovery of new solutions to improve patient outcomes. With the combination of privacy-protected, cloud-based storage and the growth of AI and machine learning, Mayo Clinic Platform and the members of Connect will use aggregated clinical de-identified data to generate patterns to find diseases earlier and start patients on the path to be healthier faster.

“We are thrilled to be part of a collaboration of this unprecedented scale and breadth,” says Dr. Brad Wouters, UHN’s Executive Vice President, Science and Research. “This alliance is the result of UHN and Mayo Clinic’s shared vision of driving excellence in discovery and innovation to improve the lives of patients.”

“By unlocking AI-enabled health care solutions while protecting patient data, this alliance will be key to accelerating the translation of discovery to practice.”



(L to R), Calvin D'souza, Renie Kee, Dr. Keith Stewart, Jane Martin, VP, Regional Programs & Clinical Support Services, Grand River Hospital, Dr. Andrea Bezjak, Dr. Alison Martin, Hematology Medical Director, Grand River Hospital, Dr. Woody Wells, Radiation Medicine Physician Lead, Central Region of Ontario, Southlake, Meena Merali, Terri Stuart-McEwan, VP Clinical Programs and Chief Nurse Executive (CNE), Oak Valley Health, Beth Snow, Program Director, Cancer Care Program, NL Health Services, Dr. Peter Anglin, Chief of Oncology and Medical Oncology, Hematology Site Lead, Southlake, Dr. Teri Stuckless

Expanding Our Network

New Partnerships

The Princess Margaret (PM) Cancer Care Network is a collective of local, regional, and national partners committed to advancing cancer care. In 2023, the PM Cancer Care Network welcomed three new partners: Grand River Hospital in Kitchener, Ontario; Newfoundland and Labrador Health Services; and Oak Valley Health in Markham, Ontario. These new Network Partners will join us with our first partner, Southlake Regional Health Centre, in advancing our joint commitment to assist patients and healthcare providers with greater access to clinical care, clinical trials, and educational resources.

This partnership will enable care teams across participating organizations to collaborate, share information and resources, and create new opportunities for care and research for the patients we serve.

Gregory Knight, MD
Chief of Oncology,
Grand River Regional Cancer Centre

PM Cancer Care Network Initiatives

In partnership with the UHN Adolescent and Young Adults Program and Southlake Regional Health Centre, Drs. Abha Gupta and Alisha Kassam and Marlie Smith are working to enhance access to individual virtual consultations and resources that are focused on fertility, mental health, and survivorship for cancer patients aged 40 and under in Newmarket, Ontario.

The Virtual Clinical Trials Navigation (VIRTUOSO 2.0) project led by Drs. Shaqil Kassam and Lindsay Carlsson aims to enhance patient access to genomic profiling for future treatment decisions. This work will create a virtual clinical trials pipeline to improve awareness of trial opportunities for patients with advanced cancer at the Princess Margaret and Southlake Regional Health Centre.

The Princess Margaret Cancer Education Hub project led by Dr. Janet Papadakos, Tina Papadakos, Breanna McGilvray, and Sarah Ramage Lee aims to provide patients with greater access to educational resources through an integrated online learning platform.

For more information, visit our Partner Portal:
www.pmcancercarenetwork.ca

We will have more resources for multidisciplinary care and the opportunity to work with some of the brightest cancer experts in the world.

Mateya Trinkaus, MD
Medical Oncologist and Oncology Lead,
Oak Valley Health

Our staff and physicians will have access to resources so they may provide the best care possible to cancer patients in Newfoundland and Labrador.

Teri Stuckless, MD
Clinical Chief, Provincial Cancer Care Program,
Newfoundland and Labrador Health Services

(L to R), Elena Pacheco, VP and Chief Operating Officer, Oak Valley Health, Dr. Keith Stewart, VP Cancer, UHN, Director, PM (Photo: Courtesy of Oak Valley Health)

(L to R), Dr. Teri Stuckless, Clinical Chief, Provincial Cancer Care Program, Newfoundland and Labrador Health Services, Dr. Andrea Bezjak, Director, PM Cancer Care Network (Photo: Courtesy of NL Health Services)

(L to R), Neil Fleshner, MD, UHN Division of Urology and Love Chair in Prostate Cancer Prevention; Tameika Shaw, Manager, Primary Health Care, TAIBU Community Health Centre; and Anthony Henry, President, The Walnut Foundation, at the first PSA testing clinic.

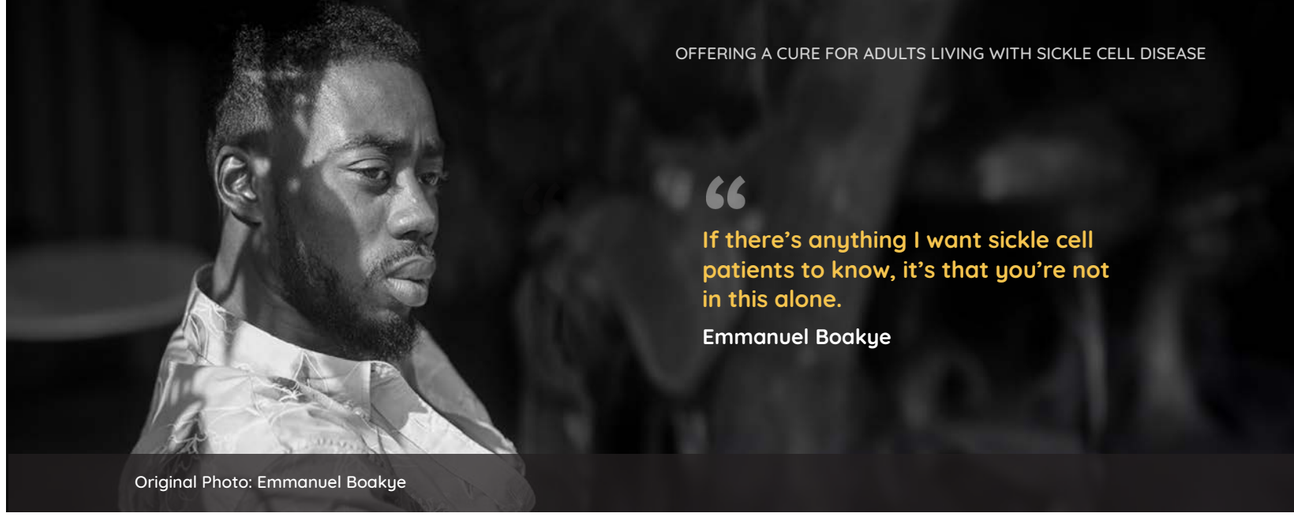
Mobile Clinic Offers Free Prostate Cancer Testing for At-Risk Communities

The Princess Margaret is tackling inequities in health care head-on by bringing the lab to the patient.

"I've been treating prostate cancer for over 30 years," says Dr. Neil Fleshner. "Too many men of colour come in too late." Dr. Fleshner, clinician-scientist at the Princess Margaret and the Love Chair in Prostate Cancer Prevention, has launched a mobile prostate cancer testing clinic in collaboration with The Walnut Foundation, a prostate cancer support group working with the Black community.

This initiative offers increased accessibility for Black men who are genetically at a higher risk of prostate cancer. In addition, Black men can face socioeconomic barriers to care, and may have lower rates of screening than other communities. Known as "PSA Detect & Protect," the clinic will travel the Greater Toronto Area providing prostate-specific antigen (PSA) testing to men who otherwise might not have access to these services.

"PSA Detect & Protect Outreach Clinic provides an opportunity to invite members of the community to participate in prostate cancer screening and research opportunities," says Dr. Fleshner. "This is important as it provides under-represented individuals an opportunity to access health and genetic services, to contribute to our understanding of cancer, and to improve patient care and early detection."



Original Photo: Emmanuel Boakye

Offering a Cure for Adults Living with Sickle Cell Disease

Sickle cell anemia is a genetic mutation that disproportionately affects Black communities. During a crisis, red blood cells physically morph into a sickle shape, not only causing extreme pain, but internal damage as they circulate throughout the body.

The Princess Margaret was one of the first hospitals in Canada to offer a cure for adults living with sickle cell disease. Dr. Rajat Kumar of the Malignant Hematology Program and the stem cell transplant team supervised the first stem cell transplant of an adult with sickle cell disease. The procedure involves removing diseased blood and replacing it with healthy cells from a donor.

Patient Emmanuel Boakye was the fifth participant in the program because his sister was a blood type match and his donor. "You never used to hear sickle cell and cure in the same sentence, but times have changed," he says.

"If there's anything I want sickle cell patients to know, it's that you're not in this alone. There are people out there who are rooting for you."

5,000+
Canadians are affected by sickle cell

100 to 150
Newborns are diagnosed with sickle cell in Canada

Members of the Radiation Medicine Program at the Princess Margaret with the new Halcyon linear accelerator.

State-of-the-Art Radiation Treatment

The Halcyon Linear Treatment Accelerator

The Princess Margaret Radiation Medicine Program (RMP) has added a new patient-centric, state-of-the-art Halcyon radiation treatment machine to its existing cutting-edge fleet of treatment machines.

The Halcyon linear accelerator stands out with benefits such as lower couch height for easier patient access, rapid high-quality imaging for accurate patient positioning, and when combined with efficient treatment delivery, this limits time on the treatment couch for seamless patient experiences.

With the ability to collect images in 15 seconds - about half the time of standard treatment machines - the Halcyon improves RMP's ability to treat many patients using precise image-guided techniques.

"We are excited to bring new technology to the Princess Margaret which facilitates the delivery of high-precision radiotherapy to cancer patients in a more comfortable visit," says Dr. David Kirsch, Head, Radiation Oncology, Radiation Medicine Program, at the Princess Margaret.

Halcyon radiation therapists describe working with the new machine as "an incredibly positive experience." Its streamlined operation allows our team to provide safe and efficient care and ensures patients and caregivers spend less time in treatment.

The Halcyon will usher the Princess Margaret into a new era of progress in cancer care worldwide.

AI Innovation in Cancer

The Princess Margaret (PM) continues to leverage the power of artificial intelligence (AI) to advance discovery and innovation in cancer care through the newly formed UHN Data Science and AI Collaborative Centre (AI Hub).

"Health care is becoming increasingly data-driven, and AI plays a pivotal role in extracting valuable insights from large datasets," says Dr. Bo Wang, inaugural Chief AI Scientist and co-lead of the UHN AI Hub with Dr. Shaf Keshavjee, Chief of Clinical Innovation at UHN and Director of the Toronto Lung Transplant Program.

"AI has the potential to revolutionize health care by improving patient outcomes, increasing efficiency, and reducing costs. We will spearhead the integration of AI technologies into clinical practice, ultimately leading to more personalized and effective health care for Canadians."

In line with the PM strategic priority to harness AI for future healthcare delivery, PM clinicians have begun comprehensive training to understand how to implement AI in novel and ethical ways in cancer care. Furthermore, unique collaborations were fostered by bringing together clinicians, researchers, and data scientists at the forefront of AI innovation to share their expertise at the Augmented Human Intelligence in Cancer Symposium hosted by the Cancer Digital Intelligence program.

> **AI has the potential to revolutionize health care by improving patient outcomes, increasing efficiency, and reducing costs.**
>
> **Bo Wang, PhD**
> Chief Artificial Intelligence Scientist

(L to R), Michael Glogauer, DDS, PhD, and Erin Watson, DMD, MHSc.

We want to ensure patients maintain a good quality of life for five years, ten years and more down the line.

Erin Watson, DMD, MHSc
Deputy Chief of Dentistry, Dental Oncology & Maxillofacial Prosthetics Clinic,
Princess Margaret Cancer Centre

Changing Lives, One Tooth at a Time

Eating and enjoying meals with family and friends is such an important part of human existence," says Dr. Erin Watson. "Losing that has a significant impact on a patient."

Poor oral hygiene can have a dramatic impact on your health in the future – particularly for patients diagnosed with cancer.

"People overlook the fact that the mouth is part of the body, so dentistry often gets overlooked in a patient's medical journey," says Dr. Michael Glogauer, Chief of Dentistry, UHN, and Head, Dental Oncology Clinic at the Princess Margaret Cancer Centre.

Dr. Glogauer says underlying tooth infections and gum disease can become a significant complication for immunocompromised or head and neck cancer patients. The Princess Margaret provides specialized dental care to patients as part of their cancer therapy, to protect them from oral health complications that can potentially impair their quality of life.

Dr. Erin Watson, Deputy Chief of Dentistry at the Princess Margaret's Oncology & Maxillofacial Prosthetics Clinic says that while 60 to 70 percent of Canadians go to the dentist, many still have chronic mouth infections and don't know it, which can pose a significant risk to patients requiring radiation, chemotherapy or a transplant.

"This can affect the trajectory of a patient's treatment," Dr. Watson says.

"This is why these dental surgical procedures are done in specialized units like ours, where we understand the risks and complications that can occur with cancer treatments," Dr. Glogauer says.

Shaping the Future

To educate future dental care providers, Drs. Glogauer and Watson are leading the only Dental Oncology Fellowship program in Canada at the University of Toronto, as well as a cancer and transplant-specific dental management night clinic for U of T Faculty of Dentistry students.

Dental oncology is a specialized field of dentistry described as "a real art form." Every year, the Dental Oncology and Maxillofacial Prosthetics Clinic provides care to 1,600 new patients. Some cancer treatments can cause problems with the teeth and mouth, leading to the need for preventative or restorative care.

CHANGING LIVES, ONE TOOTH AT A TIME

"One of our goals here is to educate dentists about the importance of being aware of their patients' whole medical history, and to get the word out about how preventative dentistry can improve quality of life in cancer survivors," Dr. Glogauer says.

Wisdom Dentistry

Dental clinics at the Princess Margaret and Toronto Rehab are the first in Canada to implement Epic's Wisdom Dentistry module, a customized software to connect dental patient records to other clinics. Epic is UHN's health information system to ensure a seamless journey for our patients.

"Wisdom Dentistry is a game-changer for the dentistry clinic at the Princess Margaret," Dr. Erin Watson, co-Chair of the Wisdom Dentistry Working Group. "We have customized the Epic module to meet our unique needs and are now able to easily connect the care we give patients with the rest of their care journey."

This important work will be submitted to Epic's Canadian and American Foundation Systems for inclusion in a future release of the Wisdom module, which will help other organizations.

"We are paving the way for other organizations in Canada to start adopting specialized modules of Epic while maintaining UHN's reputation as an innovator and leader in Canadian health care," says Sarah Muttitt, Vice President and Chief Information Officer.

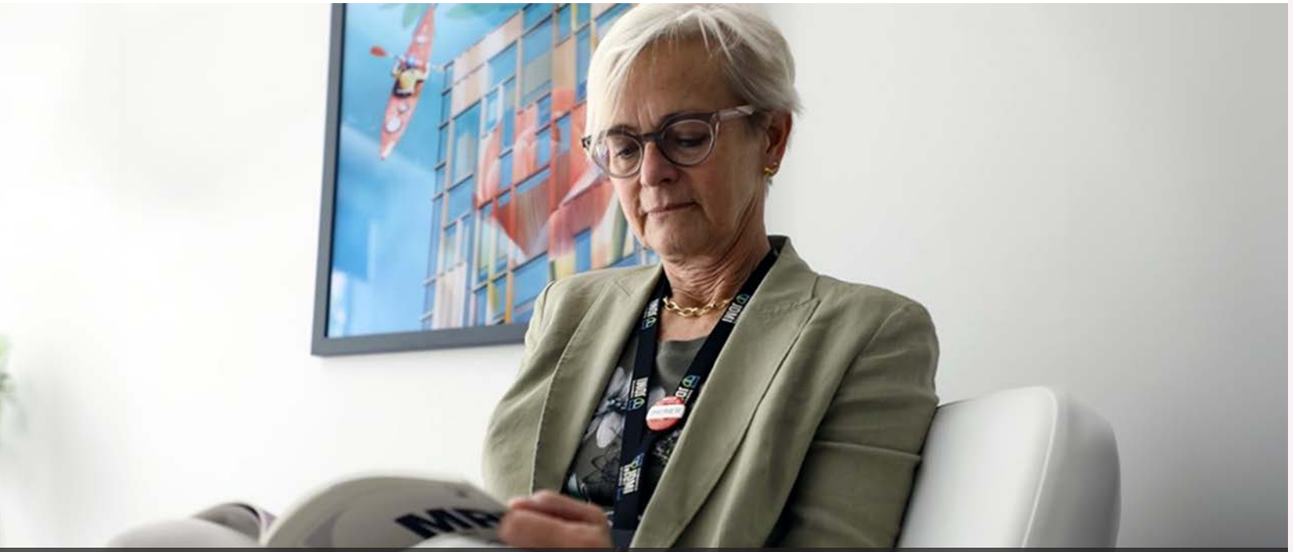
Lifesaving Benefits of Early Lung Cancer Detection

A Clinical Success Story

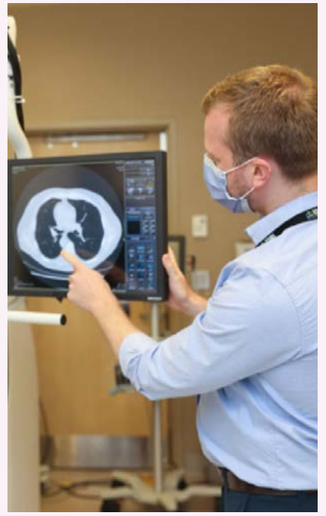
Lung cancer is the leading cause of cancer death in Ontario but a one-minute scan can detect the disease in its earliest stages. The Ontario Lung Screening Program (OLSP) at UHN detects an average of nearly one new case of lung cancer every week. This detection rate highlights the evolution of the OLSP from pioneering research to a vital clinical practice.

Lung cancer screening with low-dose computed tomography (LDCT) has a long history spanning two decades, from infancy as an early research study to a fully operational program. Dr. Heidi Schmidt, Program Medical Director and Department Head of the Joint Department of Medical Imaging (JDMI), was one of the earliest driving forces behind the program's remarkable success and expansion.

"I am proud that our work in the early 2000s has translated into a successful program, saving lives of many individuals at risk," says Dr. Schmidt.



Heidi Schmidt, MD, Program Medical Director and Department Head, JDMI is a dedicated leader in the fight against lung cancer.



The Lung Cancer Screening Team (L to R), Adam Koskie, patient navigator; Micheal McInnis, MD, thoracic radiologist; and Nya Mitchell, appointment scheduler.

From 2002, the lung cancer screening program evolved into the largest research study of its kind at the Princess Margaret, with an impressive 4,782 participants by 2009. "We felt safe closing the study because there was a lot of literature indicating that sooner rather than later, lung cancer screening would become a clinical tool," says Dr. Schmidt. In June 2017, Cancer Care Ontario initiated the Ontario Lung Cancer Screening Pilot for People at High Risk, making it the largest study of its kind in Canada with over 13,000 individuals recruited. In 2021, the pilot became a program.

Dr. Schmidt played a pivotal role in ensuring quality control, low-dose protocols, radiologist training and reporting templates. "Lung screening is an amazing tool, but it's important to get the right people into the program and make sure there's a proper risk assessment," says Dr. Schmidt.

"The navigators for the lung cancer screening program make it very easy for our referrers," says Dr. Micheal McInnis, thoracic radiologist, JDMI and a leader for OLSP. "It creates a seamless experience for participants and ensures we're operating in a uniform way."

The success of OLSP is underlined by its expansion, with recent growth extending from Toronto General Hospital to Women's College Hospital, increasing capacity by 50 per cent.

"It's been truly remarkable to watch this program expand," says Dr. Schmidt. "Early detection is the key to our battle against lung cancer, a disease often concealed in asymptomatic silence until it reaches advanced stages. With over two decades of specialization in this field, we have the knowledge to identify those at risk, treat patients sooner and provide improved outcomes."

Learn more at uhn.ca/lungscreening

Quitting Smoking Today Can Buy More Time for Future Lung Cancer Patients

It is well-known that smoking is the number one risk factor for lung cancer, but it's hard for smokers to kick the habit.

New research, led by Drs. Wei Xu and Geoffrey Liu of the Princess Margaret has found that lung cancer patients who managed to stop smoking for at least one year can live longer than those who still smoked at the time of diagnosis. "Before this study, we could not give a concrete recommendation to current smokers on the benefits of quitting," says Dr. Liu, Senior Scientist at the Princess Margaret. "Now we can say that if one stops smoking, even if they develop lung cancer in the future, they can still enjoy a longer life than those who do not." This study relied on international research collaboration through the International Lung Cancer Consortium, which provided a large data set for the researchers to draw a definitive conclusion.

Many individuals continue smoking because they don't believe it will make much of a difference since they are already at a higher risk for developing cancer. There is also a misconception that it will take many years of willpower to produce any positive impact.

"We needed a more concrete and definitive message to motivate people to quit smoking," says Dr. Liu. "From this study, we can say that if you quit today, you can still live longer if you are diagnosed with lung cancer in your next year's screening. The major result we got from this study is that the average survival time improves by eight per cent to 15 per cent for former smokers, compared to current smokers at the time of diagnosis."

"It doesn't matter if you smoked more or less or what stage of lung cancer you end up developing, you will benefit if you quit today," says Dr. Xu, a principal biostatistician and clinician scientist at the Princess Margaret.

"Quitting for as little as one year can already make a difference for improving overall cancer survival.

Wei Xu, PhD

Geoffrey Liu, MD

Sexual and Gender Diversity Program Addresses Major Gap in Cancer Care

At the Princess Margaret, the Sexual and Gender Diversity in Cancer Care (SGDc) Program is developing innovative strategies and solutions to improve the health care experience of members of 2SLGBTQIA+ communities. In the case of cancer, that can mean less likelihood of being screened for the disease or treated for it.

Sexual and gender-diverse communities have a history of experiencing discrimination in health care. Every time a patient is misgendered, addressed with incorrect pronouns, or sexually stigmatized in a health care setting, they are less likely to attend future appointments creating a gap in care.

The SGDc Program is working towards creating a more inclusive environment, educating health care providers about best-care practices and inclusive communication, and conducting primary research for SGDc communities. Such improvements aim not only to increase the survival rates of sexual and gender diverse cancer patients in Canada but to set an example globally.

A new educational module was launched to improve communication, engagement, and inclusivity in the cancer centre and focuses on pronouns, gender identity, sexual orientation, and relationship diversity in cancer care.

"These modules enable providers to apply their learning and practice communication with a virtual avatar, which will serve as a great first step towards achieving inclusive care," says Margo Kennedy, oncology social worker and Clinical Lead of the SGDc Program at the Princess Margaret.

"The SGDc team is committed to ensure cancer care is equitable for all patients in their intersectional identities, regardless of their race, ethnicity, income, ability, gender identity, and sexual orientation. We are deeply aware of historical barriers in accessing cancer care and we work tirelessly towards making measurable improvements.

Christian Schulz-Quach, MD, MSc, MA
Director and Co-founder of the SGDc team

Taking the Lead with Pioneering Research

Psilocybin as a Therapy Model for Advanced Care

“For patients with advanced cancer, it can be challenging to demonstrate improvements in psychological well-being over time,” says Dr. Sarah Hales, psychiatrist in the Princess Margaret Department of Supportive Care.

Psychedelic drugs have been considered as a potential breakthrough treatment for a range of mental illnesses, with their benefits promoted by everyone from celebrities to venture capitalists. However, medical research on their efficacy is still in the preliminary stage.

Dr. Hales received a grant, as principal investigator, of $1 million from the Canadian Institutes of Health Research (CIHR) to study the therapeutic potential of psilocybin, the active compound in “magic mushrooms,” in combination with psychotherapy.

Dr. Hales, a co-creator of CALM (Managing Cancer and Living Meaningfully) and Co-PIs Drs. Emma Hapke and Daniel Rosenbaum, adapted principles of CALM to design a new therapy called PEARL (Psilocybin-assisted Existential, Attachment and Relational Therapy). Their study will investigate whether PEARL therapy reduces rates of depression and other distress outcomes among this patient group.

TAKING THE LEAD WITH PIONEERING RESEARCH

There is an enormous push around psychedelics right now from the public interested in new mental health treatments to private industry that see a potential gold mine.

Sarah Hales, MD, PhD
Psychiatrist, Department of Supportive Care

“Timing is everything in research,” says Dr. Hales. “The CIHR grant was tailor-made for our group because one of the funding call areas was advanced cancer and specifically emphasized the importance of the psychotherapeutic approach to be paired with psilocybin.” Psilocybin induces an altered state of consciousness that is thought to increase emotional openness and empathy, and, to enhance the brain’s ability to reorganize neural connections. The accompanying psychotherapy helps patients integrate insights from their experience.

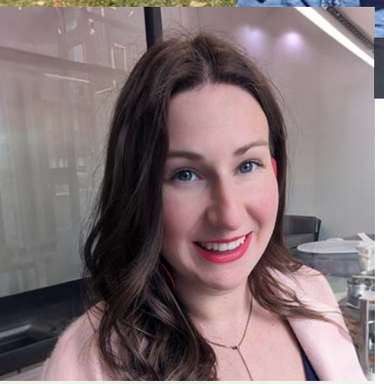
Working in collaboration with psychosocial oncology and palliative care specialists embedded within the Princess Margaret, Mount Sinai Hospital’s Temmy Latner Centre for Palliative Care, and Sunnybrook Health Science Centre’s Odette Cancer Centre, the researchers aim to ensure that participation in the trial is ultimately safe as well as beneficial for patients and their families.

Working in a developing field with a limited evidence base is not new to Dr. Hales. She specializes in understanding the patient and family experience at the end-of-life, which was an emerging field of academic inquiry in the early 2000s.

“There is an enormous push around psychedelics right now from the public interested in new mental health treatments to private industry that see a potential gold mine,” says Dr. Hales. “People want access and I think at UHN we are trying to walk that line of being innovative and, at the same time, cautious.”

A SENSE OF COMMUNITY FOR YOUNG PEOPLE WITH CANCER

High Park Event for the Adolescent and Young Adult (AYA) Program.



Joanna Kirsh, 32, went through treatment for cervical cancer in 2022 at the Princess Margaret where she joined AYA. (Photo: Courtesy of Joanna Kirsh)

A Sense of Community for Young People with Cancer

When Joanna Kirsh was diagnosed with cervical cancer at the age of 31, she recalls feeling her entire life fall away from her in an instant. “I remember thinking: I’m too young for this,” she says.

As Joanna’s appointments piled up, she felt overwhelmed by the onslaught of medical information coming her way. Fortunately, she was referred to the Adolescent and Young Adult (AYA) Program at the Princess Margaret (PM), a unique program that offers patients under the age of 39 a chance to connect, form a community and reduce the stress of going through cancer at a young age. The AYA program includes monthly meetings where patients share their experiences and talk through difficult topics. Through counseling sessions and meetups, patients work through many unique concerns, including navigating school and work during cancer treatment, fertility, sexual health, and body image.

“Our goal is to help young people recognize they have a community even when they’re sitting in the waiting rooms surrounded by much older people,” says Marlie Smith, Interim Clinical Nurse Specialist. A cancer diagnosis is traumatic for so many individuals, and she personally reaches out to young adults at the beginning of their cancer journey to bring them into an environment where they no longer have to feel alone.

“With such physically demanding treatments, patients often don’t have much time or capacity to unpack the various psychological effects of their diagnosis and treatment,” says Marlie. “The AYA and psychosocial oncology programs help with this.”

> **I try to become the support for others that I was looking for in my own journey.**
>
> **Joanna Kirsh,**
> Survivor

Joanna, like many cancer survivors, continues to participate in AYA program meetups and events. Recently, she joined the AYA Committee, a group dedicated to understanding how the hospital can continue to provide support to this unique group of cancer patients. “I’m excited to be able to provide a patient care perspective as someone who has been through treatment,” Joanna says. “I try to become the support for others that I was looking for in my own journey.”

Marlie Smith will join the Stronach Regional Cancer Centre at Southlake Regional Health Centre, part of the PM Cancer Care Network, where she will develop a similar AYA program for patients in the Vaughan/ Newmarket region.

Canada's First Oncology Nursing Research Centre of Excellence

The Princess Margaret Oncology Nursing Research Centre of Excellence (ONRCE) is Canada's first centre devoted to support oncology nursing research. The centre aims to support nurse scientists conduct rigorous, externally-funded cancer research that will enhance the quality of care across every step of the cancer journey, from diagnosis and treatment, to follow-up and end-of-life care.

"Our vision is to improve patient and family outcomes and enhance the experience of those living with cancer by supporting oncology nursing research and scholarly activities," says Anet Julius, Director of Professional Practice at PM, who co-leads the centre with Dr. Samantha Mayo, RBC Financial Chair in Oncology Nursing Research, and clinical nurse specialist Lara Cooper.

Research Message

2023 was an outstanding year as we reached new heights in discovery and pushed the envelope in innovation. As we emerged from COVID restrictions, we celebrated our rich legacy of science and research that propels the Princess Margaret beyond the cutting edge.

This year, our institute received more than $285 million in external funding, granted to our award-winning researchers, who collectively created 1,246 peer-reviewed publications in high-impact journals such as Nature Medicine, Cell, the Lancet, Science Advances, New England Journal of Medicine and many more.

New research led by Dr. Shane Harding shed light on how radiation and chemotherapy can stimulate the immune system to recognize and kill cancer cells.

Dr. Michael Glogauer identified a way to predict the likelihood of complications in patients undergoing stem cell transplants.

Drs. Farshad Nassiri and Gelareh Zadeh conducted a clinical trial that suggests an immune therapy can prolong survival for patients with recurrent glioblastoma.

New discovery led by Dr. Linda Penn has uncovered a potential protein target, Topoisomerase I, for the treatment of specific cancer types.

A new partnership with Providence Therapeutics will allow us to develop immunotherapy as a treatment option and to lead the way for therapeutic options for cancer and other diseases.

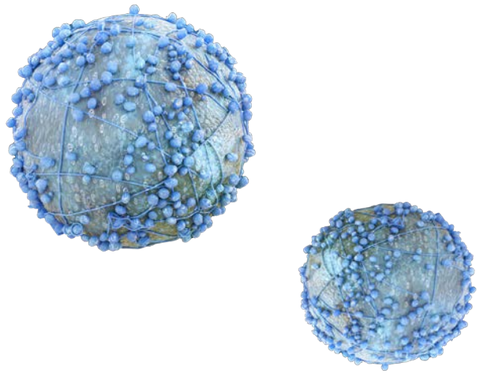
Many of our researchers received significant awards and recognitions including:

- Dr. John Dick, Inductee in the Canadian Medical Hall of Fame
- Dr. Tak Mak, Pezcoller AACR International Award for Extraordinary Achievement in Cancer Research
- Dr. Gelareh Zadeh, Gairdner Momentum Award
- Dr. Frances Shepherd, Lifetime Contribution Prize from Canadian Cancer Society
- Dr. Amit Oza, O. Harold Warwick Prize from Canadian Cancer Society
- Dr. Hansen He, Bernard and Francine Dorval Prize from Canadian Cancer Society
- Dr. Lillian Siu, Fellow elected by Canadian Academy of Health Sciences
- Drs. Amit Oza and Aaron Schimmer, Elected Fellows of the Royal Society of Canada

We celebrated the opening of Canada's first Oncology Nursing Research Centre of Excellence under the co-leadership of Anet Julius, Dr. Samantha Mayo and Lara Cooper.

What a year we have had! I want to extend my profound thanks to our scientists, research staff and trainees for always moving forward, pushing the boundaries of their imagination, and working towards a better world.

Aaron Schimmer, MD, PhD,
Research Director, Senior Scientist
Princess Margaret Cancer Centre



Pancreatic Cancer Research Project Receives $7.5 Million

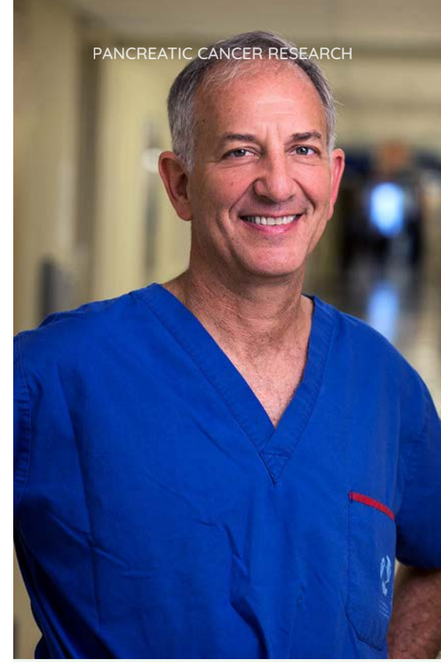
In Canada, almost 7,000 people are diagnosed with pancreatic cancer every year but on average only 10 per cent will be alive five years after their diagnosis. The inability to improve survival has been attributed to late-stage diagnosis and rapid spread of pancreatic cancer, combined with resistance to chemotherapy, radiotherapy, and immunotherapy. Detecting this cancer earlier, when it's easier to treat, could change outcomes and help save patients' lives.

Dr. Steven Gallinger, clinician scientist at the Princess Margaret, is leading a $7.5 million project to advance pancreatic cancer research, one of the deadliest forms of cancers due to the rapid spread of the disease and resistance to treatment.

The project, funded by the Canadian Cancer Society, involves a multi-disciplinary team of more than 20 leading researchers from three provinces as well as patient advocate, Libby Znaimer.

"It has the potential to improve survival rates for patients with pancreatic cancer," says Dr. Gallinger, who is also Head of Clinical Translation at the Ontario Institute for Cancer Research.

"Stage III pancreatic cancer is poorly understood," Dr. Gallinger says. "Our research team aims to advance early detection through the development of a blood biopsy screening tool. We also aim to participate in international early detection initiatives, drug testing, and new clinical trials."



> **Our research team aims to advance early detection through the development of a blood biopsy screening tool. We also aim to participate in international early detection initiatives, drug testing, and new clinical trials.**

Steven Gallinger, MD, MSc
Clinical Scientist,
Princess Margaret Cancer Center

(L to R), Jesse Pasternak, MD, and Samantha Wolfe, MD, perform radiofrequency ablation procedure.

First-in-Canada Milestone

Pioneering Research in Radiofrequency Ablation (RFA) for Thyroid Treatment

For patients with thyroid tumours, surgery can be intimidating, invasive and, in some cases, even life-altering.

An innovative procedure called radiofrequency ablation (RFA) could offer patients a less invasive option that doesn't require surgery and reduces the potential for undesirable side effects. This procedure was performed for the first time in Canada by Dr. Jesse Pasternak, a surgeon in the Endocrine Clinic at the Princess Margaret and UHN's Sprott Department of Surgery.

RFA is commonly used for chronic lower back pain, neck and arthritic joints, and its use is currently approved to remove large or cancerous thyroid nodules. Dr. Pasternak is conducting a clinical trial to support the use of this procedure on small, suspicious nodules.

"The goal of this research is to get this treatment approved to provide the least invasive options to the most patients," he says.

> **The goal of this research is to get this treatment approved to provide the least invasive options to the most patients.**
>
> **Jesse Pasternak, MD, MPH**

FIRST-IN-CANADA MILESTONE

Jesse Pasternak, MD, MPH
Section of Endocrine Surgery, Division of General Surgery
UHN Sprott Department of Surgery

A thyroidectomy, the surgery that often removes nodules, can lead to a number of undesirable side effects, such as loss of thyroid function and cosmetic concerns for patients with post-thyroidectomy scarring. Dr. Pasternak has been exploring minimally invasive removal options for decades and is motivated by the desire to offer patients options that allow more flexibility in their treatment. The RFA procedure preserves thyroid function and leaves the patient without a scar.

The first RFA procedure for a thyroid nodule in Canada was completed in April, 2023 on Deborah Guitmann Mutchnik. She had been monitoring a thyroid nodule for seven years which had started to become worrisome. When she found out she was eligible for this study, she jumped at the opportunity. "I don't like surgery, so this was a perfect alternative."

"For patients who are not candidates or don't want surgery, radiofrequency ablation is a potential solution to directly target the nodule with no negative effects to the thyroid," Dr. Pasternak says.

The study seeks to find whether the RFA procedure can entirely eliminate smaller nodules. It also would allow patients to have suspicious nodules treated before they have the chance to grow into something more dangerous. Dr. Pasternak and his team hope their pioneering research will allow this procedure to become widespread in Canada to provide more options to patients everywhere.

(L to R), Dr. Keith Stewart, Vice President Cancer, UHN, Director, the Princess Margaret (PM); Dr. Gelareh Zadeh, Senior Scientist, PM and Co-Director, Krembil Brain Institute, UHN; MP Jean Yip; Dr. Trevor Pugh, Senior Scientist, PM, Director, Genomics, Ontario Institute for Cancer Research; Dr. Viviane Poupon, President and Chief Executive Officer, Brain; MP Julie Dzerowicz; Dr. Brad Wouters, Executive Vice President, Science and Research, UHN; and Dr. Aaron Schimmer, Research Director, PM.

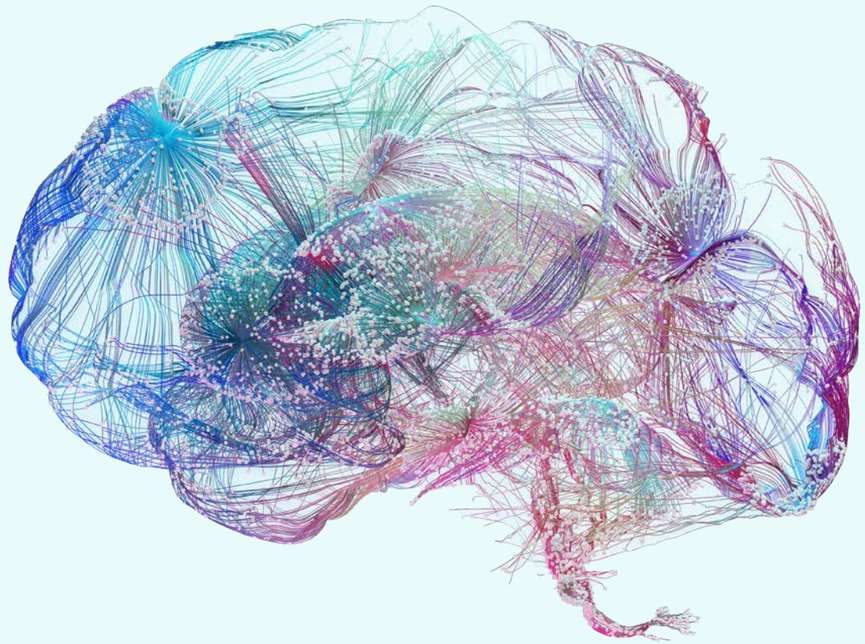
Investment Enables Advancements in Brain Health

Brain Research Receives Funding Boost

Dr. Trevor Pugh, Senior Scientist at the Princess Margaret and Director, Genomics, at the Ontario Institute for Cancer Research, is leading a $5-million project through Health Canada to advance brain research with the potential to benefit Canadians who suffer from brain diseases, including cancer, Alzheimer's, Parkinson's, and epilepsy.

Dr. Pugh's "Brain Single Cell Initiative" will help develop a Canadian national core facility dedicated to making single-cell genomics technologies available to brain researchers. The project has the potential to improve the health outcomes of Canadians by advancing our knowledge of the brain and promoting a better understanding of how diseases develop within cells and how the brain repairs itself.

Dr. Keith Stewart, Vice President Cancer, UHN, and Director of the Princess Margaret, said Dr. Pugh's project helps lay the groundwork to expand access to novel cancer treatments, advanced technologies and early supportive care, and ultimately helps to provide earlier and more equitable care.



This important investment will allow Dr. Pugh and project co-leads Drs. Gary Bader and Troy Ketela, to support scientists from across Canada in the generation and computational analysis of data from single brain cells. "The opportunity here is to integrate different approaches to understanding the brain, from neurodevelopment to cancer. This investment is timely as data sharing enables us to take lessons learned from one domain to make progress in another," says Dr. Pugh.

"Supporting the neuroscience community and brain research plays a critical role in increasing our understanding of brain health conditions," the Honourable Minister Jean-Yves Duclos said in a news release. "By investing in projects like these, we are supporting innovation in neuro-technology leading to advancements in brain health in Canada to improve health outcomes for patients."

> **Healthy cells are all alike. Unhealthy cells are all different in their own way. Now we have the technology to tell the difference.**
>
> **Trevor Pugh, PhD**

Trevor Pugh, PhD, Senior Scientist, Princess Margaret Cancer Centre Director, Genomics, Ontario Institute for Cancer Research

Translational Research Innovation

Moving Treatments for Glioblastoma Forward

An illustration of an oncolytic virus and an anti-PD-1 antibody working together to defeat cancer cells. (Original Photo: Tal Bavli)

Glioblastoma is a notoriously difficult-to-treat primary brain cancer. Despite aggressive treatment, the cancer often returns at which point treatment options are limited. However, a new international study shows great promise for patients with glioblastoma.

Neurosurgeons Drs. Farshad Nassiri and Gelareh Zadeh, have published the results of an innovative therapy which combines the injection of an oncolytic virus (a virus that targets and kills cancer cells) directly into the tumour, using intravenous immunotherapy. They discovered that this combination therapy can eradicate the tumour in select patients, with evidence of prolonged survival. In addition, they found a new genetic signature that has the potential to predict which patients with glioblastoma are most likely to respond to treatment. “The oncolytic virus creates a more favourable tumour microenvironment, which helps to boost anti-tumour immune responses.” says Dr. Zadeh, Co-Director of the Krembil Brain Institute at UHN and Senior Scientist at the Princess Margaret.

The results, published in Nature Medicine, show that this combination therapy is safe, well tolerated with no major unexpected adverse effects and extended patient survival on average by 12.5 months. “We’re very encouraged by these results which clearly signal that this can be a safe and effective approach,” says Dr. Nassiri, a senior neurosurgery resident at the University of Toronto.

This study, published in Nature Medicine, has been a five-year journey for Drs. Farshad Nassiri (L) and Gelareh Zadeh (R).

“I believe this translational work, combining basic bench science and clinical trials, is key to moving personalized treatments for glioblastoma forward,” says Dr. Zadeh.

This is one of the few clinical trials with favourable results for glioblastoma over the last decade, and it was truly a team effort. The next steps are to test the effectiveness of the combination therapy against other treatments in a randomized clinical trial.

Our goal, as always, is to help our patients. That’s what motivates us to continue this research.

Farshad Nassiri, MD, PhD
Neurosurgeon

Nanogenix: Using Nanotechnology to Target Pancreatic and Skin Cancer

A new UHN-spinoff biotechnology company, Nanogenix, was launched in 2023 to test an emerging photo-immune treatment for pancreatic and skin cancer. The company’s core technology is based on the work of Dr. Gang Zheng, a Senior Scientist and Associate Research Director at the Princess Margaret.

In 2011, Dr. Zheng and his team discovered porphysomes, the naturally occurring lipid-based nanoparticles that can interact with light and oxygen to carry out specific functions in the body. Porphysomes can be used to directly target and kill cancer cells and can also be used as part of image-guided interventions to track residual cancer cells.

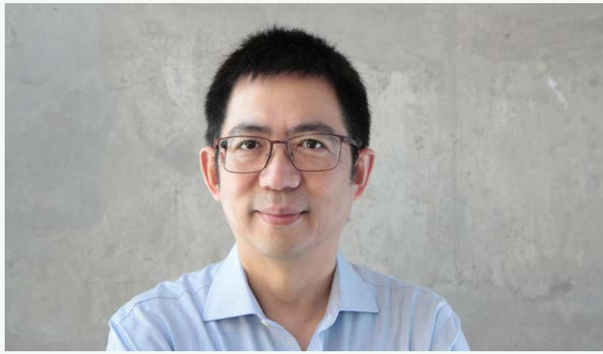
Since this discovery, Dr. Zheng’s team has made much progress towards commercializing and translating the technology to the clinic. They have collaborated with Dr. Brian Wilson, a Senior Scientist and world expert in laser biophysics and optical technologies for cancer detection and treatment. Dr. Wilson has helped develop a medical lighting device that is required to activate the therapeutic effect of porphysomes. Another key collaborator is Michael Valic, the project manager and a PhD student in Dr. Zheng’s lab. He has played an instrumental role in driving the translation of the porphysome technology since 2017.

To launch the company, Commercialization at UHN recruited an Entrepreneur-in-Residence (EIR), Glenn Kutschera, now the CEO of Nanogenix. Glenn has years of market, regulatory, product launch and business development expertise in the field of photodynamic therapy.

Nanogenix is currently focused on treating pancreatic and skin cancer, two cancers that can be easily accessed by light and have a well-established patient population. One limitation is that patients become photosensitive after current treatments and must avoid light for up to five weeks. When Glenn contacted Dr. Zheng’s group, he asked the team to test whether porphysomes might have a shorter light sensitivity window; he also wondered about its efficacy compared to current therapies. The findings were encouraging.

Both Glenn and the research team were elated to discover that porphysomes provide an improved therapeutic effect with a light sensitivity of only eight days in experimental models. Moreover, the therapy can also stimulate the immune system to fight cancer.

“We are very impressed with these preclinical results to date, and we look forward to our first clinical trial next year,” Glenn says.



Porphysomes provide an improved therapeutic effect with a light sensitivity of only eight days in experimental models.

Gang Zheng, PhD
Senior Scientist & Associate Research Director,
Princess Margaret Cancer Centre

Unlocking New Ways to Treat Breast and Ovarian Cancer

Researchers have discovered a potential new way to target cancers that bear mutations in the BRCA1 gene. Genetic mutations in BRCA genes - known as BRCA1 and BRCA2 - are associated with an increased risk for breast and ovarian cancers.

When our DNA becomes damaged, BRCA1 is crucial for its repair; however, when it's mutated, it loses its function and is unable to repair the damaged DNA. BRCA1-mutated cancers are difficult to treat because they are more aggressive and are resistant to chemotherapies.

The study led by Dr. Razqallah Hakem, Senior Scientist at the Princess Margaret, focused on a concept called synthetic lethality, which is when the simultaneous loss of function of two genes leads to cancer cell death.

The absence of only one of these genes is not enough to promote cell death - the cancer cells can still survive if one of the genes remains functional.

To take advantage of this concept, the team sought to find synthetic lethal partners of BRCA1 by using sophisticated genetic tools. They discovered that the loss of a gene called methylphosphate capping enzyme (MEPCE) resulted in the death of BRCA1-mutant cancer cells. Further, they found that the deletion of MEPCE results in a highly unstable genome in BRCA1-mutant breast and ovarian cancer cells. Loss of MEPCE also impaired the ability of the cells to copy and replicate DNA, and exposed other molecules involved in these processes as potential therapeutic targets.

Our findings provide new insights into the molecular mechanisms underlying the synthetic lethality of BRCA1 mutations and identify new class of therapeutic targets for treating BRCA1-mutant tumours that have become resistant to standard therapies.

Razqallah Hakem, PhD
Senior Scientist,
Princess Margaret Cancer Centre

Solving Structure of Drug Targets at High Resolution

Fatty acid synthase (FASN) is a promising drug target in various human diseases, including cancer. Yet, how anti-cancer drugs like Denifanstat interact with the FASN complex to create an anti-cancer effect has remained largely unknown, hindering the creation of novel FASN inhibitors with similar mechanisms.

To date, no study has defined the structure of the specific region of FASN where therapeutic inhibitors bind, including the clinically available Denifanstat inhibitor. This knowledge is required to advance drug testing and development.

In their latest research, Dr. Mohammad Mazhab-Jafari and his team uncovered the three-dimensional structure of a key region of FASN in the presence of an anti-cancer drug, Denifanstat, using advanced high-resolution imaging technology. By doing so, they revealed a previously unknown mechanism of inhibition by the drug.

To determine the structure, they engineered a proteolytically cleavable human fatty acid synthase that enabled high-resolution studies of the protein. With these new high-resolution images, they constructed an atomic model of the modifying region of the multienzyme complex, which allowed them to characterize the variability in folding of the protein.

Our research has unraveled the structural intricacies of the FASN enzyme and provided crucial insights into its behavior. With this knowledge, we are now equipped to design drugs specifically targeting FASN with greater precision to combat a variety of diseases.

Mohammad Mazhab-Jafari, PhD
Senior Scientist,
Princess Margaret Cancer Centre

Illustrated below is the molecular structure of a human enzyme.

Understanding Why Some Blood Cancers Respond Differently to Treatment

Scientists have identified different subtypes of a form of blood cancer called BCR-ABL1 lymphoblastic leukemia (B-ALL), which improves our understanding of how patients respond to treatment.

The study was co-led by Dr. Faiyaz Notta, Scientist at the Princess Margaret, and Dr. Jaeseung Kim.

BCR-ABL1 fusion, the first gene fusion to be discovered in cancer in the 1960s, causes two types of blood cancer - CML (chronic myeloid leukemia) and B-ALL (B-cell acute lymphoblastic leukemia). CML patients have good outcomes after treatment with tyrosine kinase inhibitors (TKIs) against this fusion, but B-ALL patients do poorly despite access to this drug.

Resistance to treatment is mostly due to mutations in the fusion that develop during treatment, but some patients relapse without mutations. The latter problem is not well understood.

The team genetically analyzed samples of BCR-ABL1 B-ALL from 53 patients and discovered three different subtypes of the disease. Each subtype showed unique biological traits and varied responses to treatment. They defined these subtypes based on the stage of development of blood cells when they turned cancerous, spanning from Early-Pro, Inter-Pro, and Late-Pro.

While all patients treated with TKIs were initially thought to have an equal opportunity to develop drug-resistant mutations, this study uncovered that the majority of the mutations belonged to patients with the Early-Pro subtype.

They further found that several patients without mutations, but whose cancers also developed drug resistance, belonged to the Early-Pro subtype. This finding sheds light on the long-standing question of why certain patients experience relapse despite the absence of mutations.

Identifying high-risk patients, particularly those in the Early-Pro subtype at the time of diagnosis could impact treatment strategies.

“These findings can help clinicians track therapy resistance in patients suffering from this devastating disease,” says Dr. Notta. “The identification of these subtypes may open up opportunities for targeted therapies for patients suffering from this aggressive leukemia.”

The identification of these subtypes may open up opportunities for targeted therapies for patients suffering from this aggressive leukemia.

Faiyaz Notta, PhD
Scientist,
Princess Margaret Cancer Centre

Testing a New Drug in Lung and Colon Cancer

A large international effort led by Dr. Adrian Sacher and colleagues at 35 institutions spanning 12 countries around the world has advanced the clinical potential of a new anticancer drug. The study found that the drug, which targets a mutation in a gene known as KRAS, shows minimal adverse effects in cancer patients.

Normally, KRAS is instrumental in cell growth and division; however, when mutated, it can lead to the transformation of healthy cells into cancerous ones. Despite KRAS mutations being the most commonly found mutations that drive cancer development, treatment options that directly target this molecular pathway have been limited.

Recently, a new drug called divarasib was developed by Genentech to target a particular type of KRAS mutation that is present in 12-14% of non-small cell lung cancers and a small percentage of colon cancers.

Dr. Sacher and colleagues tested the safety of divarasib in 137 cancer patients whose tumours harboured the specific KRAS mutation and found few serious reactions, with only 3% of participants discontinuing the drug because of serious side effects.

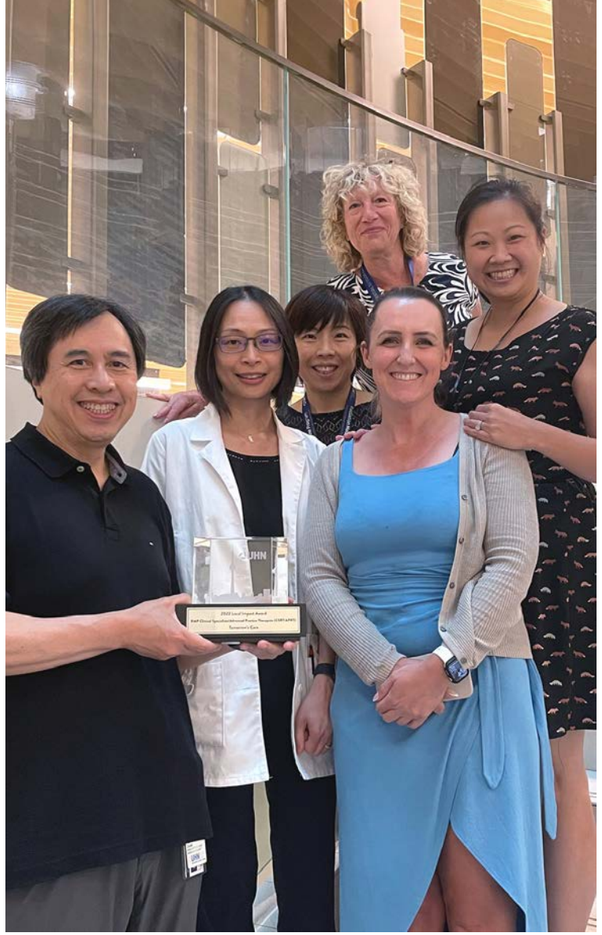
Notably, patients with metastatic non-small-cell lung cancer exhibited a positive response to divarasib, with over half displaying a favorable reaction to the treatment. Similarly, nearly a third of colon cancer patients showed a positive response.

“This study establishes divarasib’s clinical activity and tolerability in tumours with KRAS G12C mutations. We are conducting randomized studies of divarasib to confirm these results and are also exploring divarasib’s potential in combination with other anticancer drugs,” explains Dr. Sacher. “Nonetheless, divarasib has demonstrated the most promising rate among KRAS inhibitors to date.” This important study was published in the New England Journal of Medicine.

We are hopeful that this study constitutes the first step in developing new treatment strategies based around selective KRAS inhibitors that lead to new treatment options for our patients with lung, colon and other solid tumours.

Adrian Sacher, MD
Affiliate Scientist & Clinician Investigator,
Princess Margaret Cancer Centre


Always Moving Forward



JOY AT WORK


JOY
AT WORK
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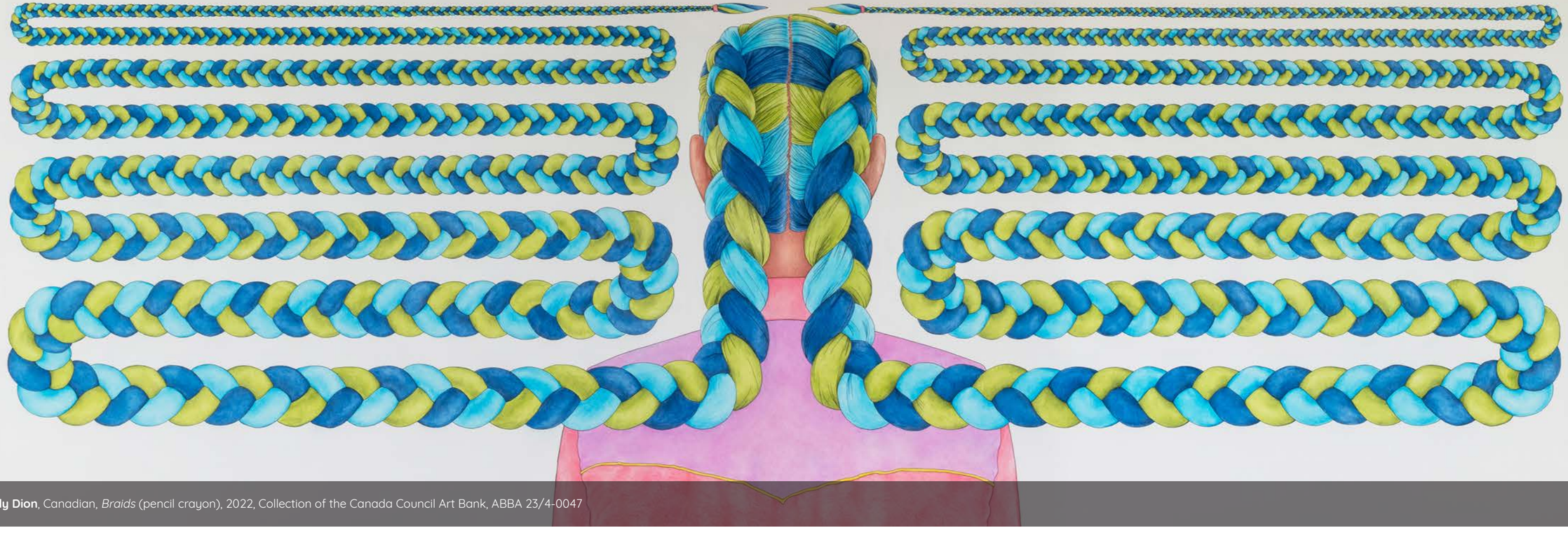
Always Moving Forward


SPIN

CANCER EXPERIENCE PROGRAM



Wally Dion, Canadian, *Braids* (pencil crayon), 2022, Collection of the Canada Council Art Bank, ABBA 23/4-0047

Cancer Experience Program

The aim of the UHN Cancer Experience Program is to support the comfort, confidence, and well-being of our patients, caregivers, and staff.

In 2023, the Cancer and the Arts program continued to bring contemporary artwork from local, regional and national artists from diverse communities. “Braids” by Wally Dion (pictured above) is part of the collection of the Canada Council Art Bank and is displayed at the University Avenue entrance at the Princess Margaret. Dion explores the personal and cultural significance of braids in this pencil drawing.

Though there are varying meanings and teachings on braids across Indigenous communities, for Dion, braids represent strength, spirituality, care, skill and companionship.

For him, the act of braiding hair is a dynamic of love and trust, and wearing braids can serve as a form of resistance and self-actualization. The vibrant colours draw inspiration from the natural environment and the interconnection between soils and plants. Dion’s paintings, drawings, and sculptures can be found in numerous collections including the Canadian Museum of History, MacKenzie Art Gallery and the Portland Art Museum.

Healing Beyond the Body (HBB) was relaunched as a virtual lay navigator program. HBB offers psychological and navigation support and education to cancer patients and caregivers at PM. There are 50 trained volunteers who are individually matched to patients and caregivers, and can deliver this service for up to six months of connection. HBB is offered in 22 different languages to ensure these connections are accessible and inclusive for all patients and caregivers who are enrolled.

Project Empathy is a series of short films created to highlight the importance of supportive communication skills for all healthcare providers. The films were developed in partnership with PM oncologists and depict real case scenarios which explore how empathic communication can assist health care providers in their relationships with patients and caregivers. “Empathy is the essential bond between patients and their healthcare providers,” says Dr. Gary Rodin, Director, UHN Cancer Experience Program.

Gary Rodin, MD
Director, UHN Cancer Experience Program

HIGH DEFINITION THERAPEUTICS

High Definition Therapeutics: Novel Treatment Approaches Beyond Traditional Chemotherapy

Led by Drs. John Kuruvilla and Stephanie Lheureux, the High Definition Therapeutics Program focuses on the support, investment, and strategic oversight of in-house activities that will uncover, trial, and expand alternative treatments that are highly effective while minimizing harmful side effects for patients.

Immunotherapy

Chimeric antigen receptor (CAR) T cell therapy genetically modifies a patient's own T cells so that they recognize and eliminate cancer cells. Drs. Naoto Hirano and Marcus Butler have developed an improved version of this, called JAK-STAT CAR T cells, which have demonstrated superior anti-tumor effects and minimal toxicity in both in vivo and in vitro assays than regular CAR T cells, signifying a new generation of CAR T cell therapy. The team published the results in Nature Medicine and patented the technique. They have since initiated first-in-human clinical trials for this treatment at the Princess Margaret.

Agnico Eagle High Definition Therapeutics Grand Challenge Awardees

Two multidisciplinary teams won the 2023 Agnico Eagle High Definition Therapeutics Grand Challenge. Drs. Laura Dawson, Jennifer Knox, Aruz Mesci and team are conducting comprehensive immune profiling to identify a predictive and prognostic biomarker signature for hepatocellular carcinoma patients. Drs. John Kuruvilla, Robert Kridel and team are the first in lymphoma to use circulating tumour DNA during standard-of-care primary treatment to modify therapy for high-risk patients with diffuse large B cell lymphoma.

(L to R), Jonathan Irish, MD, Senior Scientist, Princess Margaret Cancer Centre, Stephanie Lheureux, MD, PhD, Co-Director, High Definition Therapeutics, Gang Zheng, PhD, Senior Scientist, Princess Margaret Cancer Centre

Precision Genomics

The Re-VOLVE clinical trial, led by Dr. Stephanie Lheureux, is an innovative first-in-human pilot study to assess the feasibility and use of circulating tumour DNA screening to guide treatment where traditional therapy, Poly (ADP-ribose) polymerase (PARP) inhibitors (PARPi), is no longer effective. The study has recruited 34 patients with high-grade ovarian cancer that fail to respond to PARPi, and puts them on a personalized combination treatment regimen based on efficacy at each stage.

Dr. Amit Oza leads the UNIQUE: N of 1 Umbrella Protocol at the Princess Margaret, which focuses on tailoring treatments for recurrent cancers, particularly in gynecologic patients with limited access to other treatment options. A personalized treatment strategy is developed for every patient using comprehensive genetic profiling tests, where the treatment is matched to a specific mutation or biomarker identified in their unique cancer. This team aims to improve care for complex gynecologic cancers, potentially extend patient lives significantly.

Theranostics

Led by Dr. Gang Zheng's lab, the porphysome project has achieved significant milestones in nanomedicine in developing a first-in-class multifunctional nanoparticle. This represents a crucial step towards translating lab technologies into real-world diagnostic and phototherapeutic applications, with the plan for the first-in-human trials at the Princess Margaret. Applications are being explored in multiple disease sites: ovarian, uterine, lung, oral cavity, and prostate. The team envisions to advance precision surgery and cancer therapies beyond traditional local approaches, emphasizing a transformative shift in cancer treatment.

CANCER DIGITAL INTELLIGENCE

Applying Augmented Human Intelligence to Advance Cancer Care

Cancer Digital Intelligence (CDI) is a research and innovation program within the Princess Margaret that advances the scale and application of augmented human intelligence to continuously improve cancer care delivery, diagnosis, and research.

Alejandro Berlin, MD, MSc, CDI Medical Director, addresses participants at CDI's inaugural symposium on Augmented Human Intelligence in Cancer.

Changing the Landscape of Matching Patients to Clinical Trials

Under the leadership of Drs. Trevor Pugh and Benjamin Haibe-Kains, CDI is changing the way patients are matched to clinical trials by using an unprecedented level of automation and scalability. Clinical Trial Integrated Matching System (CTIMS) uses a patient's "digital fingerprint" to accurately and efficiently pinpoint trials for which patients may be eligible. This advancement in clinical trial matching has led to additional support from Genome Canada to expand across the Canadian Cancer Clinical Trials Network. Further development, validation, and quality control will continue through the Princess Margaret Patient Matching (PMATCH) initiative to scale up the system for research and clinical use.

Helping Patients Stay Connected to Their Care Teams

In 2023, CDI successfully launched Digital Triage in 16 outpatient clinics across the cancer centre. Digital Triage allows patients to contact their care teams seamlessly using a dynamic online form within the myUHN patient portal. Patient requests are automatically routed to the appropriate team member using an algorithm ensuring timely and efficient communication.

Developing an Automated Early Warning System

Dr. Robert Grant and CDI co-developed AIM2REDUCE, an automated early warning system at the Princess Margaret aimed at preventing undesirable cancer events. This personalized, patient-centered approach will ease the burdens of treatment and improve quality of life for patients with cancer. The next phase of this work includes evaluating the model's performance and exploring integration into clinical systems.

Benjamin Haibe-Kains, PhD, CDI Scientific Director, at the CDI symposium on Augmented Human Intelligence in Cancer.

Building a Digital and Data Enabled Cancer Centre

In 2023, CDI, in collaboration with the Cancer Care Quality & Innovation team, launched the first dashboards as part of the Cancer Command Centre, a centralized system that curates and visualizes data across the Princess Margaret. From clinic wait times data to patient experience feedback, the data will support clinic optimization, inform decision-making, and improve patient care.

(L to R), Larissa Peck, MSc, CGC, genetic counsellor, Bhalwani Familial Cancer Clinic, and Raymond Kim, MD, PhD, Medical Director, Early Detection, Princess Margaret Cancer Centre. (Photo: Melissa Tait/The Globe and Mail)

Detecting Cancer at its Earliest Stages

The Cancer Early Detection program shifts the focus of cancer treatment and research from advanced to early-stage cancers. Detecting cancer early significantly improves treatment success rates, with research indicating a five- to ten-fold increase in cure rates for certain cancers. Early Detection can also help patients avoid toxic chemotherapies and high-dose radiation with harsh side effects, thus improving the patient's quality of life.

Early Detection Initiatives Update

Liquid biopsy

The Cell-Free DNA in Hereditary And High Risk Malignancies (CHARM) study continues to make significant progress as a cancer early detection tool. Led by Dr. Trevor Pugh, findings from the first cohort on cancer detection in patients with Li-Fraumeni syndrome, which leads to a high risk of developing many cancers, have been published in Cancer Discovery. This collaboration between the Princess Margaret, Hospital for Sick Children, and the Ontario Institute for Cancer Research garnered attention from national news who ran stories highlighting the potential of the screening tool.

A Pilot Research Study: Breast Cancer Combined Visualization And Characterization Tools – novel Positron Emission Mammography system and Liquid Biopsy strives to detect breast cancer early by combining liquid biopsy and the emerging low-dose positron emission mammogram (PEM). This study is underway by breast radiology and site research lead, Dr. Vivanne Freitas.

Universal Genetic Testing for Oncology (UNIFY)

In collaboration with the breast site at the Princess Margaret, the Bhalwani Familial Cancer Clinic is offering comprehensive genetic testing to all breast cancer patients as a standard of care. This first-of-its-kind program has now offered UNIFY genetic testing to over 200 patients after only three months. Over half of the patients are tested in-house at the University Health Network Genome Diagnostics lab who have expanded testing from a 19-gene panel to a state-of-the-art 76-gene panel.

CHIP Clinic

Clonal Hematopoesis of Indeterminant Potential (CHIP) are stem-cell derived genetic changes originating in the blood. This can be a sign of early cancer risk, and we have broken ground on Canada's first CHIP clinic. Led by hematologist Dr. Aniket Bankar and medical oncologist Dr. Rob Vanner, this clinic will help us understand this new clinical entity and its impact on cancer care.

Ontario Health Update

In 2023, the Regional Cancer Program looked to advance Goals of Care conversations as part of the Annual Systemic Treatment Quality Improvement Initiative, supported by Ontario Health. Goals of Care (GOC) represent a person's overall expectations for health care, and conversations regarding these GOC should be had early with the care team. Documentation of these conversations ensure the treatment course, quality of care, and safety concerns are communicated clearly to the patient and their caregivers.

Suman Dhanju, MSc, MBA, Regional Director, Toronto Central South Regional Cancer Program

Ontario Cancer Plan

Since 2005, Ontario Health (formerly Cancer Care Ontario) has released multi-year provincial cancer plans meant to lead improvements in the quality and performance of the cancer system. Since the Ontario Cancer Plan V was released in 2019, the province has experienced growth in person centered models of care, expansion of complex malignant hematology services, and increased focus on cancer screening and prevention. In May 2023, cancer system leaders from across the province convened to discuss priorities for a new cancer plan, the Ontario Cancer Plan VI.

Set to release in 2024, the Ontario Cancer Plan VI will aim to include strategic objectives focused on stabilizing the cancer system and ensuring a strong foundation moving forward. With key objectives aimed at supporting system sustainability and improving integration of cancer services, the long term health of the cancer system represents a significant goal of the plan. Alongside this goal, patient and provider experience, equity in care, and strong patient outcomes remain priority areas. Ontario Cancer Plan VI is expected to be released in early summer, 2024.

Surgical Wait Times

The COVID-19 pandemic led to a reduction in clinical services across many areas in the health care system. Unfortunately, cancer surgery wait times experienced an increase in both volume and wait times once service levels returned to normal. With some supports available provincially to allow cancer surgery centres to operate beyond usual capacity, UHN prioritized efforts to increase surgical capacity for priority populations, including surgical oncology. The team used a multipronged approach that increased incremental surgical activity on evenings and weekends, and launched initiatives to facilitate timely discharge and enhanced care at home. Alongside these efforts to increase capacity beyond 100% of usual volumes, a task force was launched to improve data entry practices and ensure ongoing review of data quality issues and wait time performance. Through this significant effort the UHN surgical oncology team observed a 25% improvement in surgical backlog lists from May 2023 to October 2023.

Toronto Central Regional Indigenous Cancer Program

The Toronto Central Regional Indigenous Cancer Program (TCR – ICP) was the recipient of the Indigenous Health Award for the development of the Indigenous Ceremony Bundle Guidance Document (ICBGD). This award was presented by the Cancer Quality Council of Ontario (CQCO) review committee for the Quality and Innovation Awards, co-sponsored by the Canadian Cancer Society and the CQCO in partnership with Ontario Health, Cancer Care Ontario. ICBGD was developed after the TCR – ICP gifted Indigenous Ceremony Bundles (The Bundle) to each of the partner hospitals and cancer centres, for a total of 9 Bundles across the Toronto Central Region.

The Bundle contributes to access of traditional healing supports in the healthcare system and compliments patient medical treatments to improve their health and wellness outcomes. The Bundle also aids in visibly reducing the fear, physical discomforts, anxieties, and distrust many Indigenous peoples experience when they are within the hospital setting and helps ground the patient with the traditional medicine and its healing contents.

Since the introduction of The Bundle, Indigenous patients and their families have had this form of traditional healing available to them to drum, sing, and conduct ceremony. Patients and families of those who have since passed have shared testaments of how the Bundle significantly improved the quality of care during their treatment/stay. When accessed in a timely and respectful manner, every interaction with The Bundle has been positive for patients, families, and staff.

(L to R), Michael Anderson, MD, Strategic Lead, UHN Indigenous Health Program, Mohawk, Bear Clan, Tyendinaga Mohawk Territory; Clayton Shirt, Traditional Knowledge Holder/Educator, Plains Cree Nation-Saddle Lake, Alberta, Treaty Six Territory; Jenny Blackbird, Hand Drummer and Singer, nêhiyaw/Finnish Canadian; Joanna Vautour, Toronto Central Regional Indigenous Cancer Program Lead, Anishinaabe Kwe, Serpent River First Nation.

Nutrition is the Key to Health and Quality of Life for Patients

When a patient is diagnosed with head and neck, lung, esophageal or gastric-esophageal cancer, the multidisciplinary team at the Princess Margaret knows nutrition is going to be a challenge.

Radiation or chemotherapy can dramatically reduce a patient's appetite, change their metabolism, change how foods taste, cause digestive disturbance, and result in painful or troubled swallowing. The location of a tumour might also impact the ability to ingest food by mouth. Preventing and treating malnutrition is key.

"Cancer takes a huge amount of a person's energy," says registered dietician Meredith Barwin. "Early intervention with cancer patients can help to prevent severe muscle wasting and weight loss and improve outcomes."

The nutritional interventions for patients can vary. For some, a modified texture diet such as pureed or minced food or a fluid diet alone is the best option. For others, insertion of a gastric tube or G-tube, a feeding tube inserted directly into the stomach, is the preferred choice.

> **We work together with patients to help figure out what's going to make them feel the most comfortable during this difficult time.**

Meredith Barwin, RD
Registered Dietitian,
Princess Margaret Cancer Centre

Janet, a patient who was diagnosed with esophageal cancer, said Meredith had been an integral part of her care team. "At the beginning, I had no idea of the implications of radiation and chemotherapy on my nutrition," she said, noting that Meredith had made frequent visits to discuss food and medicine intake through a G-tube. Since returning home, Meredith has continued to be "a lifeline." The dietitian connected Janet with a speech-language pathologist to help monitor swallowing and liaised with her care team to ensure Janet received needed supplies of nutrition and medicine.

"Food is a very personal thing," Meredith says. "We work together with patients to help figure out what's going to make them feel the most comfortable during this difficult time."

Global Cancer Program

The Princess Margaret (PM) Global Cancer Program is committed to address disparities in cancer treatment and to improve equity in cancer care within Canada and internationally.

This year, we hosted a PM Global Partners Consultation to engage leaders in global cancer control, identify global priorities to improve cancer outcomes, and provide an opportunity for networking.

The Consultation highlighted common challenges and opportunities facing global cancer control and emphasized the importance of collaboration in improving access to cancer care. We invited leaders from 10 partner organizations for two days at the Princess Margaret to explore a range of issues from the economics of cancer care to patient engagement, clinical care innovation, and inequality in cancer care. Participants expressed their desire to continue networking and round table discussions beyond the two-day event.

Global Research Awards

Together with our partners from King Hussein Cancer Centre and Aga Khan University in Nairobi, Kenya, we awarded two grants to global research projects that prioritized implementation science and health equity. new clinical entity and its impact on cancer care.

(L to R), Akhmal Yusof, CEO, Clinical Research Malaysia (CRM); Ian Tannock; Ros Suzanna Ahmad Bustamam, Head of Service for Radiotherapy and Oncology, Ministry of Health of Malaysia; Colleen Dickie; Kate Burbury, Executive Director, Digital and Healthcare Innovations, Peter MacCallum Cancer Centre, Australia; and Tina Papadakos.

Comprehensive Cancer Centres Master Course

Organized with the UICC, the master course showcased programs at the Princess Margaret, AC Camargo Cancer Center in Sao Paulo, Brazil, King Hussein Cancer Centre in Amman, Jordan, and the Tata Memorial Centre in Mumbai, India. This online course was hosted by content experts and accredited by the ACOE.

Cancer Education Program

Global Impact Through Knowledge Mobilization

The Princess Margaret (PM) Cancer Campus serves as a global education hub by addressing critical gaps in cancer care through tailored courses. With users from over 150 countries, the PM Cancer Campus constantly evolves to support busy healthcare providers worldwide. This commitment is exemplified by the introduction of two new courses in 2023: ACTION and Older Adults with Cancer.

ACTION

A team of PM experts partnered with clinicians in Nigeria and the Cancer Education program to create a new course called **ACTION** (addressing global inequalities in breast cancer genetic testing, counseling, and management among breast cancer patients in Nigeria).

ACTION aims to empower healthcare providers in Nigeria to address genetic predispositions to cancer among their local population. The ACTION course helps to bridge local knowledge gaps by adapting content and media developed at PM, for a local audience.

Older Adults with Cancer

Older adults are often underserved in health care. Ageism in health care settings can sometimes lead to incorrect assumptions about treatment goals, treatment tolerance, and effectiveness. In collaboration, the Older Adults Clinic and Cancer Education launched the new Older Adults with Cancer course which offers providers the opportunity to learn about the specific needs and considerations for the older adult population and to provide more equitable care.

This new course has already been accessed by participants from the following countries:

The PM Cancer Campus fosters global collaboration and lifelong learning, utilizes innovative learning technologies, and studies online learner behaviours to enhance knowledge translation. With PM Cancer Campus, the Cancer Education program and collaborators empower healthcare professionals and researchers worldwide to enhance their knowledge and skills to combat cancer effectively.

Some of the ways Cancer Education is reaching learners:

PATIENT & CAREGIVERS

Patient & Family Library
21,000 visitors per year
210,000 pamphlets distributed hospital-wide

PM Cancer Classes Online Education
65,958 pageviews

PROVIDERS & TRAINEES

PM Cancer Campus
123,425 pageviews

PM Rounds
354,810 video & YouTube plays

The Princess Margaret Cancer Foundation

From the discovery of stem cells to unlocking the secrets of the tumour microenvironment to training the next generation of cancer experts and developing innovative tools and technology that can be used around the globe, the team at Princess Margaret Cancer Centre is driven by a shared goal to revolutionize cancer outcomes and improve quality of life for cancer patients and their loved ones.

Our breakthroughs are made possible by a winning combination of a uniquely collaborative research environment, a relentless commitment to cancer patients, the world-class humanity of our healthcare professionals throughout The Princess Margaret and across Team UHN and our incredible community of dedicated supporters.

Every single one of us at The Princess Margaret Cancer Foundation – including Board members, event participants, annual and major gift donors, lottery ticket buyers and volunteers - is incredibly proud to support the tremendous work of our healthcare team. We know that the funds raised each year fuel innovative breakthroughs that improve cancer care for patients at The Princess Margaret and around the world.

Among this year's highlights: researchers launched a simple, non-invasive blood test that can detect different kinds of cancer; expanded a universal genetic testing program for all breast cancer patients; launched a Nursing Centre for Research Excellence; named 14 new research chairs; and hosted the inaugural Conference for our Global Cancer Partners, bringing together leaders from cancer centres in ten countries.

Although we are making progress in our understanding of what drives this disease and how we can intercept it, cancer remains the leading cause of death, killing approximately 1 in 4 Canadians. And, of course, with an aging population, the number of new cancer cases continues to rise.

We must continue to do our part by raising even more funds for research, education and innovation. By continuing to fuel breakthroughs at The Princess Margaret, we can change standards of care and improve patient outcomes globally, moving all of us closer to a world free from the fear of cancer.

President & CEO,
The Princess Margaret Cancer Foundation


Dr. Amit M. Oza


Dr. David Kirsh


Dr. Camilla Zimmermann


Dr. Girish Kulkarni


LEADERSHIP
Anet Julius

Department Heads

Department of Medical Oncology & Hematology

Dr. Amit M. Oza, Head of Medical Oncology and Hematology

The Division of Medical Oncology and Hematology (DMOH) is dedicated to providing the most advanced therapeutic approaches to patients diagnosed with solid or hematologic malignancies. It is home to internationally recognized programs in genomic medicine, immunotherapy, myeloproliferative neoplasm, and hematology. DMOH is also home to the largest leukemia, stem cell transplant, and malignant hematology programs in Canada. We have contributed to seminal, practice-changing studies and biologic knowledge through our early phase clinical trials programs. Together, we endeavour to be global leaders in improving outcomes, and advancing care through continuous innovation and research.

Radiation Medicine Program

Dr. David Kirsch, Head of the Radiation Medicine Program

The internationally acclaimed Radiation Medicine Program (RMP) at the Princess Margaret Cancer Centre is one of the largest radiation treatment centres in North America. Our program is committed to patient-centered care focusing on quality, safety, discovery, and knowledge dissemination. We improve the quality of radiation therapy worldwide through innovative research, education, and cutting-edge radiation practices and technologies. RMP has one of the world's largest dedicated MR Programs with two MR-guided radiation therapy facilities onsite (a state-of-the-art Magnetic Resonance-guided Radiation Therapy (MRgRT) facility and an MR-Linac) and an MRI 3T simulator, as well as the world's largest deployment of the RayStation Treatment Planning System. Our program has 15 linear accelerators, a Leksell Gamma Knife Esprit unit, a Leksell Gamma Knife Icon unit, an orthovoltage unit, a PET 3T simulator, an MRI 3T simulator, three CT simulators, and two brachytherapy high dose rate (HDR) remote afterloaders. In addition, RMP offers a Pediatric Radiation Therapy Program, which delivers specialized pediatric radiation for children with cancer; and a Palliative Radiotherapy and Oligometastasis (PROP) Program, which delivers rapid access to palliative radiotherapy and specialized care for patients with oligometastasis.

Department of Supportive Care

Dr. Camilla Zimmermann, Head of Supportive Care

The Department of Supportive Care (DSC) is dedicated to relieving physical and psychological distress and improving quality of life for patients and families throughout the trajectory of illness. The DSC provides a holistic and comprehensive team-based approach to care for patients and their families. Our department is comprised of Psychosocial Oncology, Palliative Care, and Cancer Rehabilitation and Survivorship. Our interdisciplinary clinical team includes social workers, psychiatrists, psychologists, palliative care physicians, nurses, and other allied health professionals. The DSC has become an internationally recognized program for research and education, developing novel approaches to treatment, and training learners from all over the world. We have received international acclaim for programs such as the Adolescent and Young Adult Program, Geriatric Oncology Program, Caregiver Program, Sexual Health Program, Sexual and Gender Diversity in Cancer Care Program, and the Global Institute of Psychosocial, Palliative and End-of-Life Care.

Department of Surgical Oncology

Dr. Girish Kulkarni, Chief of Surgical Oncology

Surgical Oncology is committed to providing access to leading edge surgical techniques and technologies that improve patient outcomes, with a focus on delivering comprehensive, compassionate care for our patients. With 76 dedicated cancer surgeons, our multidisciplinary surgical teams offer services for central nervous system, breast, melanoma and skin, sarcoma, urology, head and neck, thoracic, hepatobiliary, colorectal, gynecologic, ocular neoplasms, oncological reconstruction, endocrine, and dental oncology. We have an internationally recognized interdisciplinary program dedicated to clinical and translational research, innovation, and education. We endeavour to meet the increasing demand for the surgical management of cancer, and we are committed to providing the best practice of care through collaboration outreach, and partnership with our community.

Collaborative Academic Practice

Anet Julius, Director of Professional Practice, Nursing and Health Professions

The Collaborative Academic Practice (CAP) portfolio is rooted in the strength and contributions that each profession brings to the whole. CAP leads the synthesis of practice, education, and research within the individual professions, and collectively integrates practice amongst the health professions. The CAP portfolio consists of 16 health professions, including: Nursing, Medical Imaging Technology, Respiratory Therapy, Occupational Therapy, Physiotherapy, Radiation Therapy, Speech Language Pathology, Social Work, Spiritual Care, Clinical Nutrition, Therapeutic Recreation, Kinesiology, Anesthesia, Psychology, Chiropody, and Personal Support Workers.

Princess Margaret Leadership

Princess Margaret Executive Committee

Keith Stewart (Chair) – VP Cancer, UHN & Director, Princess Margaret Cancer Centre

Aaron Schimmer – Director, Research

David Kirsch – Head, Radiation Medicine Program

Amit Oza – Head, Medical Oncology and Hematology

Girish Kulkarni – Head, Surgical Oncology

Camilla Zimmermann – Head, Supportive Care

Anet Julius – Director of Professional Practice, Nursing, and Health Professions

Taymaa May – Surgical Oncology Lead, Toronto Central South

Jenny Catton – Clinical Director, Cancer

Colleen Dickie – Director of Operations, Radiation Medicine Program

Lisa Tinker – Clinical Director, Malignant Hematology and Blood Disorders Program

Monika Krzyzanowska – Medical Lead, Quality

Meena Merali – Director, Strategy and Transformation

Meredith Giuliani – Medical Director, Cancer Education

Gary Rodin – Director, Cancer Experience

Zsolt Hering – Director, Finance

Erik Yeo – TGH, Blood Disorders & UHN Ambulatory Strategy

Jelena Lukovic – Jr. Faculty Member, Department of Radiation Oncology

Miyo Yamashita – President & CEO, The Princess Margaret Cancer Foundation

Clinical Practice Committee

Monika Krzyzanowska (Chair) – Medical Lead & Chair, Cancer Quality Program

Jenny Catton (Co-Chair) – Clinical Director, Cancer

Lisa Tinker – Clinical Director, Malignant Hematology and Blood Disorders

Colleen Dickie – Director of Operations, Radiation Medicine Program

Anet Julius – Director of Professional Practice, Nursing, and Health Professions

A. Keith Stewart – VP Cancer, UHN & Director, Princess Margaret Cancer Centre

UHN Program Leads

Ilan Weinreb – Division Head, Anatomic Pathology, Laboratory Medicine & Pathobiology

Ur Metser – Site Director of Medical Imaging

Medical Leads

Anne Koch – Breast Site Lead

David Goldstein – Endocrine Site Lead

Vikas Gupta – Leukemia Site Lead

Stephanie Lheureux – Gynecology Site Lead

Anca Prica – Lymphoma/Myeloma Site Lead

John Waldron – Head and Neck Site Lead

Antonio Finelli – Genitourinary Site Lead

Sami Chadi – Lower Gastrointestinal Site Lead

Laura Dawson – Upper Gastrointestinal Site Lead

Marc De Perrot – Lung Site Lead

Peter Ferguson – Sarcoma Site Lead

Normand Laperriere – Central Nervous System & Ocular Site Lead

Marcus Butler – Skin/Melanoma Site Lead

Breffni Hannon – Supportive Care Site Lead

Jonas Mattsson – Director of Allogeneic Transplant Program

Neesha Dhani – DMOH Medical Director of Inpatient Care

Alejandro Berlin – Medical Director of Cancer Digital Intelligence

Vishal Kukreti – Epic Lead

Natasha Leighl – Chair of the Systemic Therapy Committee

Patient Partners

John Hill

Martina Wendl

(L to R), Amit Oza, MD, Head, Department of Medical Oncology & Hematology (DMOH); Jocelyn Escano, Clinical Research Study Assistant, Cancer Clinical Research Unit; Vanessa Speers, Senior Manager, Correlative Studies Program; Susanna Sellmann, Program Director, Cancer Clinical Research Unit; Keith Stewart, MB, ChB, VP Cancer, UHN, Director, the Princess Margaret, at the new CCRU Convergence Centre.

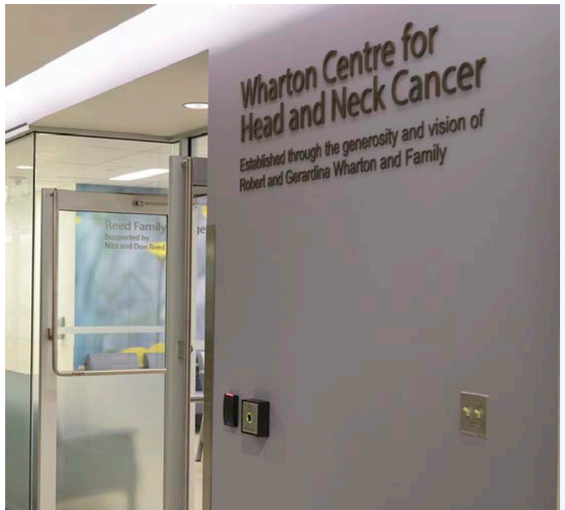
Always Moving Forward

Transforming Space and Patient Care

Transforming our spaces will enable the Princess Margaret to elevate the patient experience, explore translational research, and inspire collaboration. Featured here are two new and refreshed spaces in 2023:

The Cancer Clinical Research Unit (CCRU) Convergence Centre is a dedicated clinical research facility that is the first of its kind at UHN and will support Princess Margaret's translational medicine initiatives and clinical research enterprise. Patients are welcomed into a dedicated space in the Convergence Centre to meet with research staff, and can rest and recharge in the lounge between appointments.

The Wharton Centre for Head and Neck Cancer is recognized internationally for excellence in clinical care, research, and education. It will accommodate 24,000 patients with head and neck or thyroid tumors each year.



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