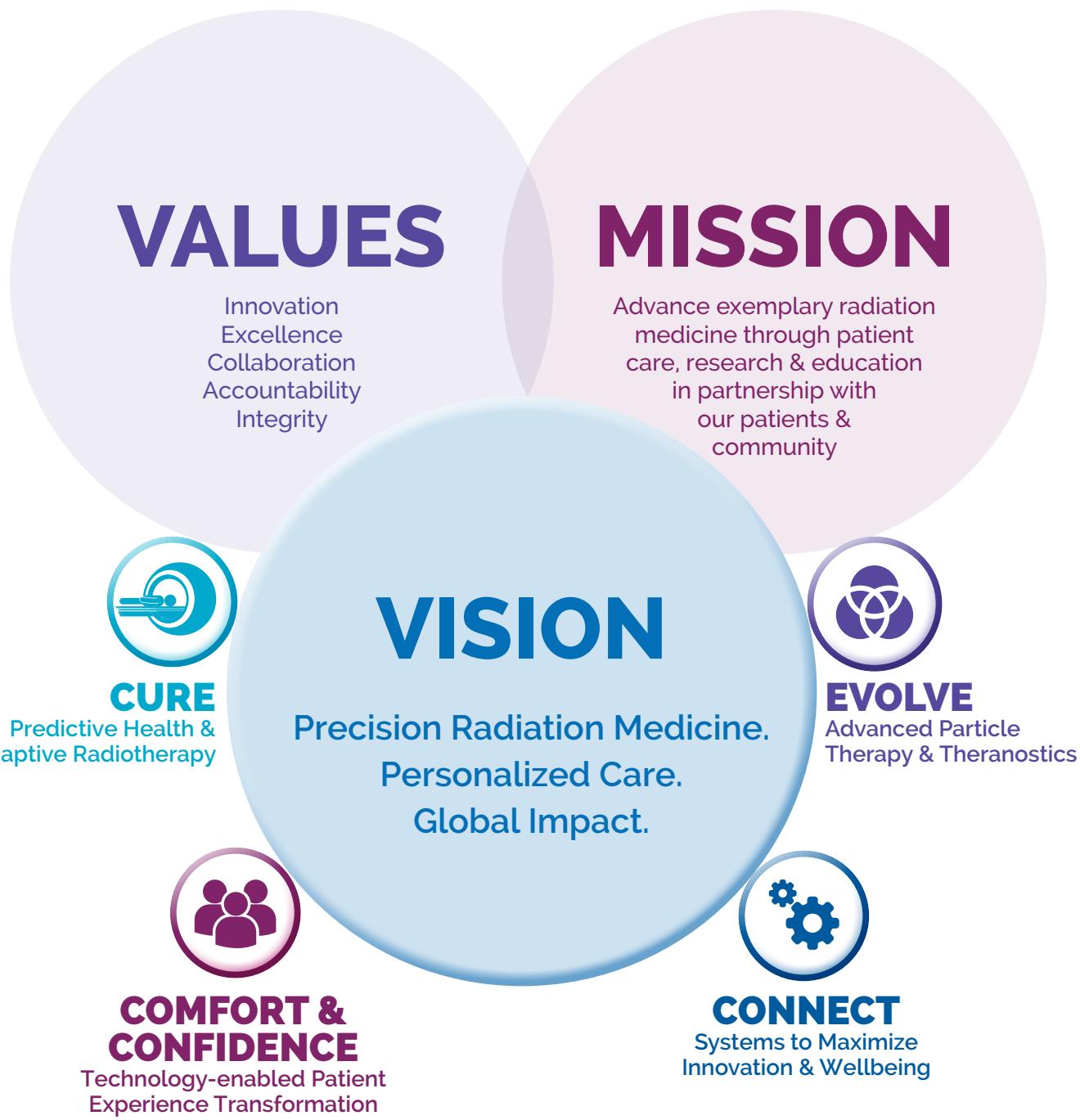




Radiation Medicine Program
**ANNUAL 2020
REPORT 2021**



CONTENTS

- 4** A Message from the Chief
- 6** Program Overview
- 7** 2020: The Year in Numbers
- 8** Strategic Roadmap to 2026
- 10** Clinical Care
- 15** Quality & Safety
- 18** Education
- 21** Research
- 26** Team RMP

A MESSAGE FROM THE CHIEF

The Radiation Medicine Program (RMP) at the Princess Margaret Cancer Centre is committed to delivering the highest standard of patient care. Over the past year, our dynamic multidisciplinary team of radiation oncologists, medical physicists, radiation therapists, administrators, and support staff have worked together to advance our vision of “Precision Radiation Medicine. Personalized Care. Global Impact.” RMP continues to uphold our foundational values of innovation, collaboration, excellence, accountability, and integrity to provide exceptional radiation care delivery for our patients. We remain the largest single-site radiation medicine program in the world, providing 8,312 patient consultations and 11,016 courses of radiation treatment in the fiscal year 2020/21.

This year challenged us in many ways, as we entered into a difficult new landscape of a global pandemic. COVID-19 introduced unforeseen challenges and required us to adapt rapidly in the way we deliver treatment, conduct research, and provide education in order to keep our patients and staff safe. With the help of Team RMP as well as our partners across the system, we implemented several new strategies including reducing on-site work traffic, installing remote access, developing a virtual care management system (VCMS), and providing virtual patient tours, to name a few. The creativity, hard work and dedication of our teams have been instrumental in shifting our program such that we can continue to deliver safe, quality care for our patients. The steps we have taken have been successful in reducing transmission and keeping our communities healthy, and I am deeply grateful for the immense collaboration and enormous courage demonstrated particularly by our front-line staff. As we continue to exercise caution in the months to come, I am confident that our actions will guide us safely through the other end of this pandemic.

Following the culmination of our Strategic Roadmap to 2020, and reflecting on the important progress we have achieved over the past five years, we launched a strategic refresh this year. I am proud to present our [Strategic Roadmap to 2026: Revolutionizing Radiation Care Through Digital Health](#). Our renewed strategy captures RMP’s ambition of becoming a transformational leader in global radiation medicine, by advancing predictive health and radiotherapy, transforming and personalizing patient journeys through digital technology, and building comprehensive programs for advanced particle therapy and theranostics. We will continue to push the boundaries of innovation and strive for the highest quality cancer care as we transition into an exciting new era of digital health. The development of our Strategic Roadmap to 2026 was made possible through the remarkable collective efforts of our team members, leaders, and researchers as well as our valued patients, partners, and stakeholders locally, nationally, and internationally. I am deeply grateful for our team’s unwavering commitment to providing world-class precision radiation medicine and look forward to all that we will achieve in the realm of digital health over the ensuing five years.

RMP’s innovative education programs continue to thrive and attract a diverse group of national and international attendees. Our award-winning Accelerated Education Program (AEP) demonstrated extraordinary resourcefulness this past year, standing strong amidst the pandemic, and continuing to provide top-level education to a broad spectrum of learners. AEP successfully administered two courses in a fully online format, deftly transforming in-person activities into engaging, multi-format virtual learning experiences. These courses were extremely well received by our trainees and early-career professionals who “zoomed in” from all around the world. In training such a diverse group of radiation medicine professionals, we are continuing to achieve our goal of global impact, improving cancer outcomes for not just our own patients, but for those around the world.

RMP continues to make its impact felt on the radiation treatment landscape through exciting innovations in Adaptive Radiation Oncology research and knowledge dissemination. For the past several years, RMP has enjoyed an upward trajectory in the number of peer-reviewed research publications and grants captured by RMP investigators, and this year was no different. In 2020, we recorded our highest number of peer-reviewed publications, at 285. A multidisciplinary team led by RMP investigators received a \$1.5M grant from Canada’s AI Supercluster Scale AI to support the development of the province’s first AI-powered radiation therapy scheduling platform; a project that bolsters our strategic objectives of becoming a leader in digital health solutions, embodying our Strategic Roadmap to 2026 ambition of Revolutionizing Radiation Care Through Digital Health.

In summary, I am delighted to share so many program accomplishments in 2020. Even in unprecedented times, RMP remains steadfast in asserting new frontiers in research, fine-tuning clinical practice, and advancing education in collaboration with our scientists, educators, partners, patients and communities. As Chief, it is my deep pleasure and great honour to be working alongside such a diverse and talented team who share a common vision and passion for delivering world-class personalized radiation medicine. I look forward to all that we will accomplish in the coming year.



Fei-Fei Liu, MD, FRCPC, FASTRO
Chief, Radiation Medicine Program, Princess Margaret Cancer Centre
Head, Department of Radiation Oncology, University Health Network

PROGRAM OVERVIEW

2020 THE YEAR IN NUMBERS

11,016 Radiation treatment courses*

8,312 Patient consultations*

4,401 Patients treated at Radiation Nursing Clinic*

\$45M Peer-reviewed funding

285 Peer-reviewed publications

391 Active clinical studies

7% New patients accrued to prospective clinical studies

19 Radiation oncology residents

25 Radiation oncology fellows

6 Medical physics residents

17 Medical radiation sciences students

16 Observers from 6 countries

*fiscal year statistics

The Radiation Medicine Program (RMP) at the Princess Margaret Cancer Centre is the largest radiation treatment centre in Canada, and one of international acclaim as amongst the top three such programs in the world. RMP is organized into the three core disciplines of radiation oncology, medical physics and radiation therapy; each supported by robust clinical, research, administrative and technical teams. Together, this multi-professional group of over 400 staff work collectively to deliver high quality and safe radiation treatment to over 8,000 cancer patients every year.

RMP has a diverse pool of talent, with many staff holding important leadership roles in patient-centered care, research and education at the local, national and international levels. Our research program, which spans from biological studies, translational biology, medical physics, clinical trials, to health services and education research, aims to innovate and advance radiation medicine practice, producing over 280 peer-reviewed publications annually.

Our interdisciplinary environment facilitates the delivery of innovative education programs covering the entire spectrum of professional learning in radiation medicine. RMP offers training at the undergraduate, graduate and postgraduate levels in collaboration with the University of Toronto and Michener Institute of Education at UHN, as well as continuing medical education through our Observership and Accelerated Education Program (AEP).

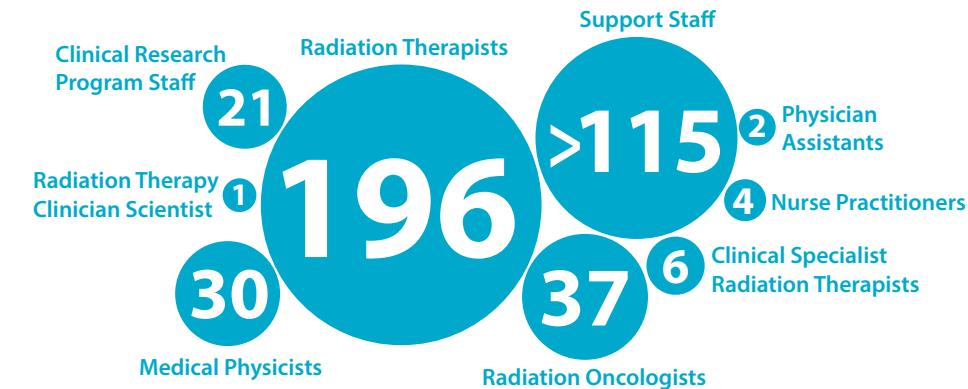
Program Structure



*As of 2020

Team RMP

Our multi-talented, inter-professional staff enables all aspects of our program to succeed. Led by the Program Chief, the RMP Steering Committee defines the principles of operation, and policies of governance for the management of clinical care, quality assurance and safety, research, educational, operational and IT activities.



State of the Art Facility

- 16** Linear accelerators
- 2** Leksell Gamma Knife Perfexion units
- 3** CT simulators
- 1** MRI 3T simulator
- 1** PET CT simulator
- 1** Orthovoltage/Superficial X-ray unit
- 2** Brachytherapy high dose rate (HDR) remote afterloaders
- 1** Magnetic resonance-guided radiation therapy (MRgRT) facility
- 1** MR-Linac facility

STRATEGIC ROADMAP TO 2026

Revolutionizing Radiation Care Through Digital Health

In August 2020, RMP embarked on an exciting strategic refresh to establish new directions and priorities to support innovation and excellence in clinical care, research, and education for the next five years. To facilitate this important planning process, an RMP Strategic Planning Executive Committee was created with members: **Fei-Fei Liu, Tim Craig, Colleen Dickie, Christine Hill, David Hodgson, Emma Ito, John Kim, Catarina Lam, Daniel Letourneau, Benjamin Lok, Michael Milosevic, Elen Moyo, and Rebecca Wong.** Together, Team RMP connected with frontline staff, researchers, leaders, patients, families and key partners to gather feedback on important aspects of radiation medicine, care, research and education. We were also guided by the strategic priorities articulated by the **Princess Margaret Cancer Centre, University Health Network (UHN)**, as well as the **University of Toronto (U of T) Faculty of Medicine.** We held extensive consultations and interviews, in addition to launching our “Big Questions” Survey to welcome diverse perspectives from our community. In September, we hosted individual sessions to provide all of our collaborators with an opportunity to share their insights and ask questions regarding RMP’s goals in future radiation medicine development and innovation. The valuable feedback from our partners helped to generate and define critical topics for RMP to explore in our next phase of planning. In November, RMP hosted intensive online “Strategy Hive” sessions open to members of Team RMP, partners, patients and families to explore key strategic themes that emerged throughout the refresh process. Bringing together internal and external stakeholders, we addressed three critical priorities:

- What is our vision for the impact of the Princess Margaret Radiation Medicine Program? Where does the Radiation Medicine Program have the potential to lead? What contributions could we make?
- How do we fine-tune the patient experience to ensure every patient receives the outstanding level of care, service and outcomes that we strive to achieve?
- What could we be doing to leapfrog towards more intelligent, efficient, and consistent systems of care, research and support?

With over 225 voices from frontline staff, leaders, researchers, partners in UHN and U of T, government and academia, as well as patients and families, RMP designed a new strategic framework to capture RMP’s priorities for the years 2021-2026. We are proud to present to you the **RMP Strategic Roadmap to 2026: Revolutionizing Radiation Care Through Digital Health.** Over the next five years, RMP will break new ground in innovation by advancing predictive health and adaptive radiotherapy, transforming and personalizing each patient’s journey through digital technology, and building comprehensive programs of excellence for advanced particle therapy and theranostics. All of these strategies will be enabled by systems that maximize the wellbeing of our patients and staff, whilst driving collaboration and innovation in research, education and clinical care.

The Strategic Roadmap to 2026 was a product of extraordinary team ingenuity, expertise, and collaboration. We are immensely grateful for the contributions of Team RMP, the RMP Steering Committee, the Potential Group, as well as our valued patients, partners, and stakeholders who provided enthusiastic and insightful feedback at all stages of the development process. Thank you everyone for your commitment in shaping the future of our program. We look forward to all that we will achieve together in the years ahead.

COMFORT & CONFIDENCE

STRATEGIC PRIORITY 2
Enhance personalized, equitable, compassionate care through a technology-enabled patient experience transformation

EVOLVE

STRATEGIC PRIORITY 3
Establish a centre of excellence in advanced particle therapy and theranostics

STRATEGIC PRIORITY 4
Elevate systems to maximize innovation and wellbeing

STRATEGIC PRIORITY 1
Empower predictive health and accelerate response-driven adaptive radiotherapy

CURE

CONNECT

CLINICAL CARE

CLINICAL TEAMS

Superteams	Tumour Site Groups
Team 1	Endocrine, eye, head & neck, skin
Team 2	Breast, lung, upper gastrointestinal (GI)
Team 3	Genitourinary (GU), gynecological (GYN), lower GI
Team 4	Central nervous system (CNS), leukemia, lymphoma, palliative, pediatrics, sarcoma

SPECIALIZED PROGRAMS

Brachytherapy	Palliative Radiation Oncology
Gamma Knife Radiosurgery	Pediatric Radiation Therapy
Oligometastases	Stereotactic Radiation Therapy

Our clinical practice encompasses all aspects of cancer care – from diagnosis to survivorship. In 2020-2021, RMP provided 8,312 patient consultations and delivered 11,016 courses of radiation treatment, with 82% of new patient consultations being conducted within the 14-day target established by Ontario Health - Cancer Care Ontario (OH-CCO). As well, there were 4,401 visits to the Radiation Nursing Clinic (RNC) for symptom and side effect management.

- Our clinical practice is integrated into four multi-disciplinary Super Teams comprised of anatomically related tumour site groups. Standardized treatment protocols that relate to evidence-based disease management guidelines are used by each site group to plan and treat patients.

In addition to site groups, a number of specialized programs exist to further support individualized care in a subset of patients. Together, our inter-professional team works collaboratively to assess, plan and deliver personalized care to our patients.



Aisling Barry, Andrea Shessel, Katherine Mulder (patient), Patricia Lindsay, Iris Wong, Cathy Rocca

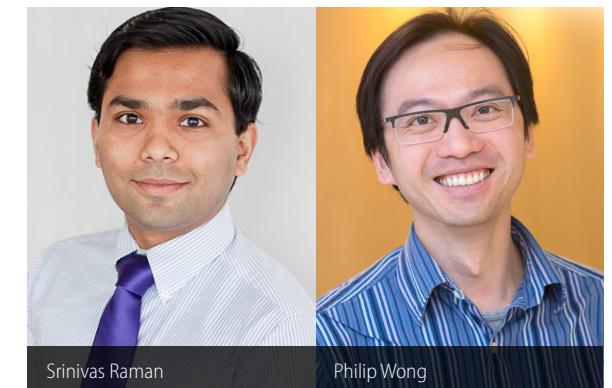
First in Canada: MRL Treatment for Pancreatic Cancer

On February 4, 2021, RMP at the Princess Margaret became the first cancer centre in Canada to complete treatment for a patient with pancreatic cancer on the MR-Linac. This was enabled by significant collaboration amongst our multi-disciplinary teams and represents a major milestone in advancing precision radiation medicine for cancer patients across the country. RMP would like to thank the MRL Pancreas team of radiation oncologists, medical physicists and radiation therapists who worked together to deliver this innovative treatment safely: **Aisling Barry, Leigh Conroy, Tim Craig, Jennifer Dang, Laura Dawson, Ali Hosni, Harald Keller, Vickie Kong, Winnie Li, Patricia Lindsay, Victor Malkov, Cathy Carpino Rocca, Andrea Shessel, Teo Stanescu, Edward Taylor, Michael Velec, Jeff Winter, Iris Wong, and Kathy Yip.**

Ontario's First AI-enabled Patient Scheduling Platform

Srinivas Raman and **Philip Wong** received a \$1.5 M grant from the Canadian Supercluster ScaleAI to support their development of an automated radiation therapy (RT) scheduling and prioritization platform in collaboration with IVADO Labs, a software development company with expertise in artificial intelligence (AI) solutions. The AI-powered RT platform will efficiently and automatically assign patients to CT-simulator and treatment appointments, while incorporating patient preferences into scheduling for compassionate care and prioritizing patients for treatment in the event of a bottleneck.

This transdisciplinary project will involve many members of Team RMP through a newly formed Advanced Analytics and Automation Working Group. The successful deployment of this platform will improve RMP's resource utilization and facilitate our management of potential patient backlogs and treatment delays caused by the COVID-19 pandemic. This project supports the objectives outlined in RMP's Strategic Roadmap to 2026 and will position RMP at the forefront of global intelligent health care solutions.



Srinivas Raman

Philip Wong

Innovations in Cancer Care



Aisling Barry and **Philip Wong** were awarded the third Princess Margaret Grand Challenges Award for Digital Intelligence for their Patient Reported Outcomes/Metrics Program Trial (PROMPT). Their project aims to personalize and improve the quality of life of patients undergoing palliative radiation by incorporating novel technologies that will assist in monitoring and supporting patient needs. Included in the project is the use of innovative and washable Hexoskin® smart shirts. Originally employed by space agencies, the Canadian technology can monitor vital signs, sleep, steps and physical activity of patients receiving palliative radiation treatment. Implementation of a remote patient monitoring system will likewise evolve support and treatment response to patients at home.

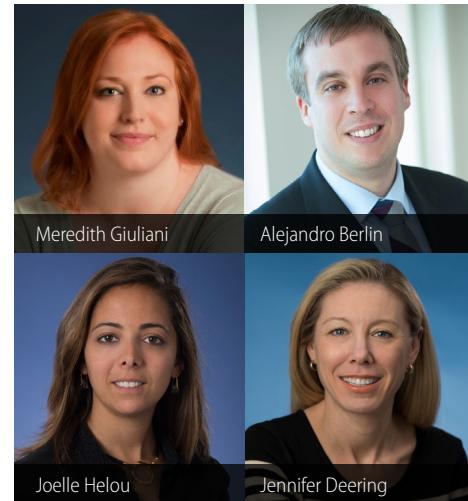
In May 2021, the Princess Margaret revealed the winners of the fourth Grand Challenge Awards: the Human Touch in Cancer Care. Members of Team RMP co-led three of the four winning projects.

Meredith Giuliani, Janet Papadakos, Sarah Hales, Rinat Nissim, **Jennifer Croke**, and Breffni Hannon are leading an interdisciplinary support program for caregivers of cancer patients. This project will provide caregivers with the education, skills, and resources to support themselves and loved ones through the cancer journey.

Stephanie L'heureux and **Alejandro Berlin**'s project aims to improve access to cancer care for patients from culturally and linguistically diverse communities in Toronto. Their project will provide technology-enabled medical interpreter services and translated documents to enhance patient support, satisfaction, and well-being.

The Building Resilience within Institutions Together with Employees (BRITE) Program developed by Mary Elliott in 2018 is dedicated to supporting the well-being of healthcare workers. **Alejandro Berlin** is working to expand its impact through the development of an iBRITE digital app. This app will enable personalized access to online resources and collect important data to respond to the increasing demand for healthcare provider support.

Other RMP Collaborators include **Aisling Barry**, **Joelle Helou**, and **Jennifer Deering**.



Excellence in Patient Care

Jennifer Croke was the recipient of the 2020 Gerald Kirsh Humanitarian Award, a special distinction that honours Princess Margaret staff or volunteers who have demonstrated outstanding commitment to providing compassionate care for our cancer patients. **Bernadeth Lao** was also nominated for the award. Previous RMP winners include **David Shultz** (2019), **Alejandro Berlin** (2017), **Sandra Scott** (2015), and **Wilfred Levin** (2008).

RMP Welcomes New Head of Medical Physics

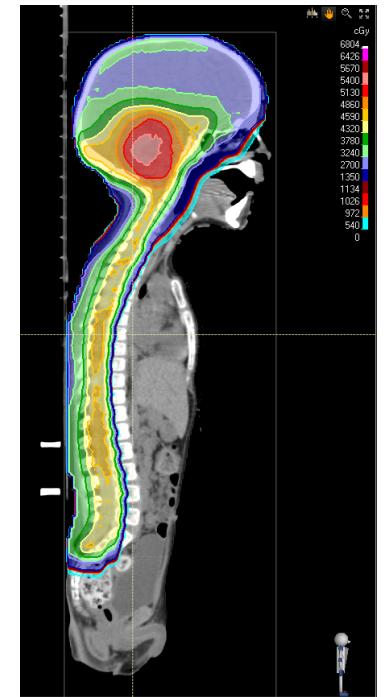
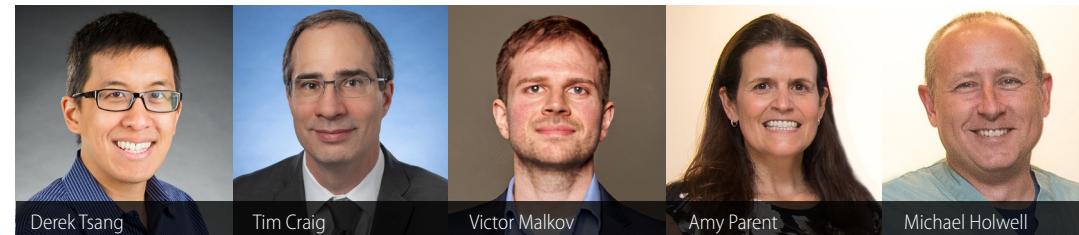


Jan Seuntjens will be appointed Head of Medical Physics, effective full-time September 2021, with a transition plan over the summer. Jan is a celebrated medical physicist, professor, and director of the Medical Physics Unit at McGill University. In this role, Jan will be leading our Medical Physics Department in clinical and technological development, research, and education of medical physics professionals. His research interests include the use of AI-powered machine learning in medical physics and radiation oncology, and the development of novel proton acceleration technologies, which strongly align with the strategic priorities of RMP. Jan will succeed **Daniel Letourneau**, who served exceptionally ably as the interim Head of Medical Physics since July 2019 following David Jaffray's departure.

Launch of Pan-Canadian Proton Therapy Consultation Service

To raise awareness among healthcare providers regarding the potential benefits of proton therapy, RMP launched a Proton Therapy Consultation Service in mid-2020. Led by a multi-disciplinary team with radiation oncology (**Derek Tsang**), medical physics (**Tim Craig** and **Victor Malkov**), and radiation therapy (**Amy Parent** and **Michael Howell**), this service generates proton treatment plans for Canadian cancer patients at the request of the patient's local oncologist. The proton plan will then inform the referring healthcare team on the potential benefits of prescribing proton therapy over photon radiation therapy, allowing for greater personalization of radiation treatment decision-making. RMP received its first proton consultation for a patient outside Ontario in June 2020. As shown in the image on the right, proton therapy was able to prevent unwanted radiation dose to the patient's oral cavity, neck, thyroid, heart, lungs, liver, abdominal organs, and bladder.

As of May 2021, the team has received 13 referrals. With the release of **Ontario Health's recommendation** to publicly fund proton beam therapy for pediatric cancers and a subset of adult cancers receiving curative radiation therapy in 2021, the team looks forward to broadening the impact of this important treatment option across the country.



Leadership Appointments



Colleen Dickie and **Benjamin Lok** have been appointed as RMP co-leads for UHN's Synapse Health Information System (HIS) implementation project, and will serve as RMP representatives for the Synapse Hematology, Oncology & Radiation Medicine (HemOncRad) Core Working Group. Working Groups are a critical decision-making body within the Synapse governance structure, responsible for approximately 80% of the decisions.



Heather Jang and **Steven Tran** have been appointed as Transition co-leads for Care Plan Development and Quality-Based Procedures (QBP)/HIS Program Alignment, effective November 2020.



Aisling Barry was appointed as the Department of Radiation Oncology (DRO) Palliative Radiation Oncology Program (PROP) Leader, effective August 2020, succeeding Laura Dawson, who held this position since 2015.



Joelle Helou was appointed as the DRO Breast Site Group Leader, effective May 2020, succeeding Anne Koch, who held this position since 2014.



John Kim stepped down as the Deputy Chief and Director of Clinical Operations, and assumed the role of DRO Director of Strategy, effective November 2020.



David Shultz was appointed as the Director of the RMP - Clinical Research Program (CRP), effective July 2020, succeeding Anthony Fyles, who held this position since 2016.



Richard Tsang was appointed as the DRO Director of Clinical Operations, effective November 2020.

Uzma Awan: Palliative Radiation Therapy Site Leader (April 2021)

Ezra Hahn: DRO Associate Director of In-Patient Care (September 2020)

Joanna Javor: Palliative Radiation Therapy Site Leader (April 2020)

Chrison Lee: CNS Radiation Therapy Site Leader (April 2020)

Derek Tsang: DRO Director of Resource Allocation (November 2020)

Philip Wong: DRO Associate Director of Ambulatory Care (September 2020)

Excellence in Performance

The RMP QC uses the standards established by Ontario Health - Cancer Care Ontario (OH-CCO), Canadian Partnership for Quality Radiotherapy (CPQR), and Accreditation Canada to guide the development and maintenance of quality in the program.

OH-CCO Performance Measures

OH-CCO monitors three key performance areas: i) referral-to-consult wait times; ii) ready to treat-to-treatment start wait times; and iii) peer review rates. RMP continues to meet or exceed the majority of the OH-CCO Performance Measures, including provincial averages for wait times, and peer review in 2020.

CPQR Program Compliance

CPQR has published a series of 19 guidelines in three categories: technical quality control, quality assurance, and patient engagement. In 2020, no audit of compliance with CPQR standards was held; compliance assessments will resume in 2021.

Referral-to-Consult Wait Time

80% 82%



Ready to Treat-to-Treatment Wait Time

85% 89%



Peer Review Rate

75% 93%



OH-CCO Target RMP Performance *calendar year statistics

QUALITY & SAFETY

The RMP Quality Committee (RMP QC) functions to monitor, analyze reports, and make recommendations on all aspects of radiation treatment quality and safety within RMP. Reporting to the RMP Steering Committee and the Princess Margaret Quality Committee, the RMP QC aims to exceed national and international safety standards, and oversees a quality-monitoring program for the department covering the following four domains:

- 1. Performance Indicators**, aimed at evaluating compliance with relevant standards
- 2. Quality Assurance**, aimed at monitoring radiation treatment quality control processes
- 3. Quality Education**, aimed at contributing to quality and safety competence through education
- 4. Incident Learning**, aimed at managing an incident learning system

TEAM RMP COVID-19 RESPONSE

The COVID-19 pandemic brought a host of challenges to RMP's delivery of timely radiation therapy (RT) for all of our cancer patients. When the World Health Organization (WHO) announced in March 2020 that the COVID-19 outbreak had acquired the status of a global pandemic, RMP quickly implemented many changes to keep patients and staff safe. These included remote work, virtual patient visits, the virtual care management system (VCMS) and virtual case review rounds, alternate dose-fractionation patterns, physical space reorganization and planning, and coordination of COVID-19 precautions patient flow, among others. The work of our multi-disciplinary teams significantly enabled these rapidly implemented changes to guide us safely through this challenging new environment.

Inspired by the "Share Your Smile" movement at Scripps Mercy Hospital and the Hospital for Sick Children, **Derek Tsang** spearheaded the "Photo Button" initiative to allow patients to see the smiles of their healthcare team and staff behind the masks and face coverings.



Lyndon Morley, Christine Hill, and Veng Chhin implemented procedures for the safe treatment of COVID patients, and also monitored and procured personal protective equipment (PPE) to ensure a full stock for front-line workers at all times.

Mary Elliott and **Aisling Barry** launched "Buddy Up" – a novel program which helps staff stay connected with each other and build a community of support while physical distancing to monitor and alleviate pandemic-related stress, and strengthen resilience.



John Kim and **Fei-Fei Liu** successfully advocated on behalf of RMP for mandatory COVID-19 swab testing for all patients prior to cancer treatment (chemotherapy and/or radiotherapy). RMP was one of the first programs to implement pre-treatment COVID screening of patients across the province.



RMP established a **COVID-19 Working Group** that incorporated RMP Steering, IPAC and ambulatory care, and various RMP departments on a regular basis to discuss the full spectrum of RMP activities, which was critically important in rapid responses and broad communications across the program.

Srinivas Raman and **Daniel Letourneau** carefully tracked RT utilization and developed a predictive model that assessed Linac utilization up to four weeks in advance. This model is helping to facilitate staff and resource planning, ensuring sufficient capacity for patients returning for treatment in 2021.



Thanks to the help of UHN Digital and **RMP's HelpDesk Team**, remote work was enabled on every staff's personal computer. The new work from home (WFH) structure successfully reduced departmental traffic and risk of workplace transmission.

RMP was instructed to reduce patient volume by 25-50% and developed a process for managing COVID-19 positive patients. In April 2020, RMP's Linac use decreased to 82% capacity, with a further 35% deduction in CT-simulator appointments.

Efforts to manage patient flow significantly reduced waiting room time for patients (a reduction from approximately 15 minutes to 10 minutes for the average patient; 55 minutes to 40 minutes for the 95th percentile of patients).

DID YOU KNOW ?

Nearly **4000 RT appointments** were delivered under COVID-19 precautions in 2020.

RMP treated **17 confirmed COVID-19 positive patients**, with **216 Persons Under Investigation (PUIs)**.

The nadir in clinical volumes occurred in May 2020, with an overall **30% decrease in the number of patient referrals**; the Breast and GI site groups experienced the greatest reductions. This recovered over the course of the year, such that by December 2020, there was only a **6.8% reduction in clinical volume** averaged across all sites.

The Ontario Health Breast cancer screening shut down completely between April-May 2020, which gradually re-opened, for a total of **4,933 screening mammograms delivered between January-September 2020**, an overall **17% decline** compared to 2019.

Many disease site groups successfully **reduced the number of treatment unit appointments** by implementing dose-fractionation changes, with minimal disruption and no reported errors.

Intentional treatment deferrals using new processes do not appear to have resulted in any unintended consequences (i.e. lost patients).

RMP maintained major initiatives such as **MRL implementation, RayStation upgrade, migration to EVOQ** and **Care Plan implementation** despite these challenges.

RECOMMENDATIONS



Mid-to-long-term clinical impact of the pandemic on radiotherapy patients would be important to monitor; perhaps addressed by each disease site group.



Continue with point of care screening in all areas for now.



Maintain swabbing of asymptomatic patients prior to simulation for now; this practice might well evolve over time.



Coordinate a post-pandemic reflection at an appropriate time to capture lessons learned.

Continue to manage virtual visits, visitor restrictions, and staff WFH to maintain reduced traffic on site. Current distancing requirements rely on these measures.



Remote work will almost certainly continue in the future; a sustainable model for RMP will need to be developed.

EDUCATION

As the largest radiation medicine program in North America, RMP provides one of the most comprehensive clinical settings for the formal training of radiation oncologists, medical physicists and radiation therapists. RMP's education portfolio is closely aligned with that of the University of Toronto's Department of Radiation Oncology (UTDRO) as a fully affiliated teaching hospital of the University. This strategic alignment enables the optimal utilization of educational expertise and infrastructure, whilst facilitating the achievement of the central education mandate of RMP and UTDRO.

The formal professional training programs include undergraduate training for radiation therapy (BSc Medical Radiation Sciences); post-graduate training programs for radiation oncology residency, radiation oncology fellowship, and medical physics residency; as well as the Strategic Training in Transdisciplinary Radiation Science for the 21st Century (STARS21) Training Program. RMP staff also teach residents and fellows from other training programs, as well as graduate students from University of Toronto Departments, such as the Institute of Health Policy, Management and Evaluation, Dalla Lana School of Public Health, Nursing, Institute of Medical Science, Institute of Biomaterials & Biomedical Engineering, and Medical Biophysics.

RMP offers interdisciplinary continuing education catering to practicing radiation medicine professionals, who seek to acquire informal or structured learning experiences at the Princess Margaret, including the RMP Observership Program; the Accelerated Education Program, which delivers in-depth structured 2-3 day courses; and the Personalized Learning Program™ (PLP™) in Radiation Medicine, which offers 3-6 months of on-site and online learning opportunities.

DIVERSE LEARNERS

UNDERGRADUATE

- 17 BSc Medical Radiation Sciences students
- 40 Undergraduate Medical Education students
- 6 Summer students

POST-GRADUATE

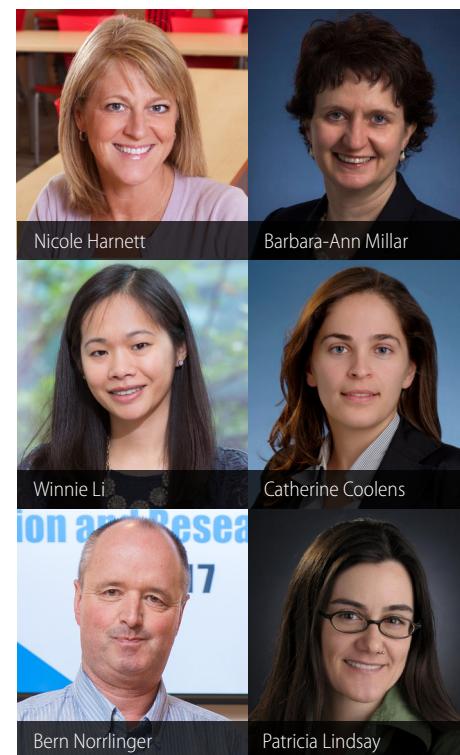
- 19 Radiation oncology residents
- 25 Radiation oncology fellows
- 6 Medical physics residents
- 5 Strategic Training in Transdisciplinary Radiation Science for the 21st Century scholars

CONTINUING EDUCATION

- 16 Observers from 6 countries
- 11 AEP external participants

**Academic year statistics*

AEP Online: First Education Courses Delivered Virtually



The Accelerated Education Program (AEP) continued to provide exceptional training to radiation medicine professionals despite the restrictions of the COVID-19 pandemic. This past year, AEP successfully delivered two fully online courses. The conversion of the in-person courses to virtually formatted platforms were made possible through significant multi-disciplinary team efforts amongst our staff and external partners. **Nicole Harnett**, **Barbara-Ann Millar**, **Catherine Coolens**, and **Winnie Li** spearheaded the first online education course. As a culmination of the CIHR-funded ICON research project led by David Jaffray, Caroline Chung, and Catherine Coolens, the AEP team created a longitudinal, integrative virtual learning platform for their Intracranial fSRS Education course in January 2021. Two of our esteemed guest external faculty, Caroline Chung (MD Anderson) and Jeffrey Greenspoon (Juravinski Cancer Centre), generously shared their perspectives on fSRS from Linac-based and CyberKnife-based experiences. AEP also assembled a world-class panel for case discussion including **David Shultz**, Paul Kongkham (neurosurgeon, TWH), Paula Alcaide Leon (neuroradiologist, TWH), and Seth Climans (neurooncologist, PM). Other key contributors included **Ivy Lee** and **Messeret Tamerou** who described simulation and treatment workflows and captured video footage of these processes. **Monique van Prooijen** and **Marianne Koritzinsky** recorded their talks for offline viewing; **Robert DeSimone** helped with back end preparations; and the Princess Margaret Cancer Campus team helped launch the course.

Following the successful completion of the first online course, AEP proceeded to deliver the ninth Accelerator Technology Education Course (ATEC) in an online format as well. Course Co-Directors **Bern Norrlinger** and **Patricia Lindsay** initiated the transformation of this intensive four-day in-person course into a five-week hybrid consisting of weekly online presentations, discussions, computer exercises, and offline activities. Our multi-disciplinary faculty of physics residents and contributors from across the country worked together with energy and creativity to make this delivery possible.

Special thanks to **Robert Heaton**, **Victor Malkov**, **Michael Milosevic**, **George Parsons**, **Makan Farrokhkish**, **Andrea McNiven**, **Ivan Yeung**, **Andrew Currell**, **Carlos Varon**, Raina Park, Dave Niven, **Jeff Winter** and Doug Moseley (Mayo Clinic). Vince Addario and Jeffrey Cardozo from the Princess Margaret Cancer Campus were also instrumental in helping shape AEP's online presence and Nitai Steinberg (Multimedia Designer, Earth Rangers) generously provided his expert technological support for offline elements.

Leadership Appointments

Jennifer Croke: UTDRO Fellowship Director (September 2020), succeeding Peter Chung who held this role since 2014.

Jelena Lukovic: Director of the RMP Observership Program (November 2020), succeeding Jennifer Croke who held this role since 2017.

Danielle Rodin: UTDRO Director of Equity, Inclusion, and Professionalism (February 2021), succeeding Charles Catton, who held this role since 2015.

Kieng Tan: Associate Director of the Medical Radiation Sciences program (July 2020).

Excellence in Teaching

Meredith Giuliani received the Association of Faculties of Medicine of Canada (AFMC) Young Educators Award in April 2020.



RMP Welcomes Virtual Summer Students



RMP welcomed six virtual summer students in 2020. Although the COVID-19 pandemic shortened the program and prevented students from visiting on-site, virtual events provided opportunities for students to connect with colleagues, supervisors, and program staff. The Summer Student Research Day took place in August, allowing students to display their summer projects and gain valuable feedback from Education Director **Rebecca Wong** and other RMP faculty. RMP's ability to provide a valuable summer program in the midst of the pandemic was emphasized by students:



I felt that I was very supported by my supervisors and the other RMP staff. I think that even though everything was online, RMP reacted well to this and was still able to deliver a great program even with the shortened amount of time.

Summer Student



This summer program was an amazing opportunity that not only helped me build new skills, but also a new passion and interest for cancer research, and appreciation of UHN/PM.

Summer Student

Academic Appointments

Jean-Pierre Bissonnette: Cross-appointed as Associate Professor at U of T Department of Medical Biophysics (MBP; May 2020)

Scott Bratman: Promoted to rank of Associate Professor at UTDRO (July 2020)

Catherine Coolens: Cross-appointed as Associate Professor at U of T MBP (May 2020)

Andrei Damyanovich: Appointed as Assistant Professor at UTDRO (October 2020)

Kathy Han: Promoted to rank of Associate Professor at UTDRO (July 2020)

Daniel Letourneau: Promoted to rank of Associate Professor at UTDRO (July 2020)

Thomas Purdie: Cross-appointed as Associate Professor at U of T MBP (May 2020)

Alexandra Rink: Cross-appointed as Assistant Professor at U of T MBP (May 2020)

Robert Weersink: Cross-appointed as Assistant Professor at U of T MBP (May 2020)

NOVEL DISCOVERIES



\$45M
peer-reviewed
funding



391
active clinical
studies



285
peer-reviewed
publications



123
prospective clinical
research studies



122
peer-reviewed
grants



7%
new patients accrued
to prospective clinical
research studies

**calendar year statistics*

RESEARCH

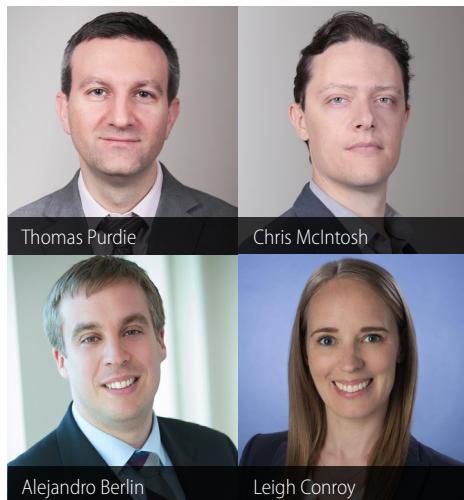
RMP is a world-leader in radiation research aimed at developing more precise, personalized solutions that will cure more patients with fewer side effects. Our research program spans the breadth of the four professional disciplines of radiation oncology, medical physics, radiation therapy and radiation nursing, and is led by nationally and internationally recognized experts. The program encompasses the full spectrum of radiation research from laboratory-based biology and physics discovery to clinical trials in patients, including survivorship, health services, and education research.

RMP is disrupting the radiation treatment landscape through new Adaptive Radiation Oncology research and knowledge dissemination to ensure the right treatment at the right time for every patient. The program is accomplishing this through innovative approaches that integrate clinical care and research, learning from all of our patients while focusing on the outcomes that matter most to patients along their cancer journey. RMP research activities are strategically focused on six key domains to accelerate the availability of adaptive radiation oncology for every patient:

1. **Radiogenomics**
2. **Radiomics**
3. **MR-guided radiotherapy**
4. **Oligoprogession**
5. **Regenerative radiation medicine**
6. **Patient-reported outcomes**

These research themes are highly integrated and closely aligned with the research objectives of the Princess Margaret, UHN and University of Toronto's Department of Radiation Oncology. There is strong collaboration with other academic and industry-based research groups within UHN, as well as external groups locally, nationally and internationally.

NOTABLE PUBLICATIONS



Enhancing Radiation Treatment Through AI

Thomas Purdie, Chris McIntosh, Leigh Conroy and Alejandro Berlin, along with a multi-disciplinary team of radiation oncologists, medical physicists, and radiation therapists in the RMP Genitourinary (GU) site group published a high-impact study in *Nature Medicine* on June 3, 2021. Titled “Clinical integration of machine learning for curative-intent radiation treatment of patients with prostate cancer”, this groundbreaking study on automated radiation therapy (RT) treatment planning compared evaluations of machine-learning (ML) generated RT treatment plans with human-generated plans in retrospective simulations and prospective clinical deployment phases for prostate cancer treatment. In blinded head-by-head comparisons of ML and human-generated treatment plans, treating physicians deemed 89% of ML-generated plans clinically acceptable based on radiation oncologist clinical judgement and 72% were selected over human-generated plans. Although ML-generated plans were overwhelmingly selected in the simulated phase, physician selection of ML-generated treatments significantly decreased when it came to applying treatments to patients in a real-world clinical setting. These results suggest that physicians may continue to view laboratory-validated ML treatment plans with hesitancy when applying treatments for their patients.

This article from Team RMP is the first of its kind in *Nature Medicine*, placing RMP on the world stage of advancing machine learning automated planning and innovative research that improves technical aspects of radiation treatment delivery. The team is currently expanding their work to other cancer sites, including the brain and breast site groups, with the goal of reducing treatment side effects and enhancing radiation care for all patients at the Princess Margaret. Congratulations also to all co-authors of this important study: **Michael Tjong, Tim Craig**, Andrew Bayley, **Charles Catton, Mary Gospodarowicz, Joelle Helou, Naghmeh Isfahanian, Vickie Kong, Tony Lam, Srinivas Raman, Padraig Warde**, and **Peter Chung**.ⁱ

Personalized Circulating Tumor DNA Surveillance as a Predictive Biomarker for Advanced Solid Tumours

Scott Bratman, Lillian Siu, Trevor Pugh, and colleagues conducted a prospective phase II clinical trial to investigate serial circulating tumour DNA levels in patients with advanced solid tumours treated with pembrolizumab. Published in *Nature Cancer*, findings reveal the clinical utility potential of ctDNA surveillance. A non-invasive strategy, ctDNA surveillance may better predict clinical benefit and long-term survival than existing biomarkers, with potential generalizability to other tumour types. This publication was awarded the 2021 Till & McCulloch Paper of the Year Award from the Princess Margaret Research Institute in the Translational Science category.ⁱⁱ



Atlas of Upper Abdominal Organs-at-Risk a Useful Clinical Resource in MRI-Guided Radiation Therapy

Jelena Lukovic, Laura Dawson, and colleagues developed an atlas to identify and delineate upper abdominal organs-at-risk (OARs) for reference in magnetic resonance imaging (MRI)-guided radiation treatment planning and delivery. Published in *Int J Radiat Oncol Biol Phys*, the authors demonstrated that an OAR atlas might help improve contouring and OAR dose calculation.ⁱⁱⁱ



Interactive Simulation-based Learning Tool for Radiation Treatment Plan Evaluation

Jeff Winter, Jennifer Croke, and colleagues created, deployed and evaluated an interactive simulation-based learning tool for radiation treatment plan evaluation for use in radiation oncology and medical physics residency training. Published in *Int J Radiat Oncol Biol Phys*, the authors observed that residents positively endorsed the learning simulation’s design, content and perceived impact on learning.^{vi}



MRI-based Imaging Technique to Measure Oxygen Levels in Pancreatic Cancer Tumours

Edward Taylor and colleagues developed an MRI-based imaging technique to measure reoxygenation levels in pancreatic cancer tumours during stereotactic body radiotherapy (SBRT) using patient-derived xenografts. Published in *Sci. Rep.*, the authors are currently setting up a clinical trial to apply the imaging and treatment workflow described in the publication to pancreatic cancer patients undergoing SBRT on the MR-linac.^{iv}



MR-Guided Brachytherapy Shows Greater Treatment Effectiveness and Cost Utility for Cervical Cancer

Michael Milosevic and colleagues undertook a cost-utility analysis to compare magnetic resonance guided brachytherapy (MRgBT) to 2D brachytherapy and CT-guided brachytherapy in treatment of locally advanced cervical cancer. Published in *Int J Radiat Oncol Biol Phys*, their data documented improved tumour control, fewer side effects and superior cost-effectiveness of MRgBT.^{vii}



New Risk Factor to Predict Breast Cancer-related Lymphedema

Jennifer Kwan, Fei-Fei Liu and colleagues conducted a study evaluating lymphedema severity as a function of mammographic density in patients with breast cancer. Published in *JAMA Network Open*, the authors made the novel observation of increased risk of severe lymphedema in patients with low breast density on mammograms. Risk models incorporating mammographic breast density can predict lymphedema development and its severity in breast cancer.^v



Hypofractionated Radiotherapy Can Be Used to Treat Head and Neck Cancers During COVID-19

Sophie Huang, John Waldron, and colleagues confirmed the clinical utility of hypofractionated radiotherapy (RT-hypo) in subsets of head and neck squamous cell carcinoma patients receiving treatment during the COVID-19 pandemic. Published in *Cancer*, the authors proposed that delivery of RT-hypo in place of concurrent chemoradiotherapy could reduce hospital visits and bypass immunosuppressive effects of chemotherapy to decrease risk of COVID-19 infection.^{viii}

Excellence in Cancer Research



Michael Velec was appointed as the inaugural RMP MR-Guided Radiotherapy Program Leader, effective April 29, 2021. As RMP's first Radiation-Therapist Clinician Scientist and one of the first two radiation therapists to receive a PhD degree in Ontario, Mike is dedicated to enhancing adaptive radiation therapy through research in radiation dose reconstruction, with applications for stereotactic-body radiation, MR-guided external-beam radiation, and brachytherapy. In this role, Mike will support MR-guided adaptive radiotherapy research and clinical implementation at RMP, with a focus on our two facilities: the integrated MR-LINAC (MRL) and the MR-on-rails facility (MRgRT) for external-beam therapy and brachytherapy. He will connect with multidisciplinary research and clinical teams in RMP and beyond to advance MR-guided RT development, integration of emerging workflows into clinical practice, as well as global knowledge dissemination in MR-guided adaptive radiotherapy.



Scott Bratman was appointed as the Dr. Mariano Antonio Elia Chair in Head and Neck Cancer Research for a five-year term, effective December 1, 2020. Established in 2001, the Dr. Mariano Antonio Elia Chair envisions a future of personalized Head and Neck Cancer (HNC) therapy free from toxicity. Since his arrival at the Princess Margaret in 2014, Scott has quickly become an internationally recognized leader in liquid biopsy, HNC, and personalized radiation medicine. His research program focuses on HNC clinical and translational studies, with the aim of developing biomarkers for improved diagnosis and treatment. In this role, Scott will lead a clinical trial in liquid biopsy as a guide for personalized immunotherapy. This endowed Chair will facilitate his advancement of HNC research on multiple fronts, both in his laboratory as well as in partnership with clinical colleagues, data scientists, clinical trial groups, and industry.

Notable Peer-Reviewed Funding

Scott Bratman: Detection of methylated DNA as a liquid biopsy test for early detection of oral squamous cell carcinoma in high-risk patient populations. Princess Margaret Catalyst Grant.

Jennifer Croke: Supporting the mental health of palliative cancer patients and their caregivers through a pandemic and beyond: Feasibility of a virtual patient-reported outcome model of care. MSH UHN Academic Medical Organization Award.

Meredith Giuliani, Jennifer Croke, Tina Papadakos, Anne Koch: Curating a comprehensive, multi-modal education pathway for breast cancer patients and family. Princess Margaret Breast Friends Conquer All Grant Competition.

Kathy Han, Adam Gladwish, Anthony Fyles, Julia Skliarenko: SPARTACUS II - A randomized phase II feasibility trial on hypofractionated radiation versus conventional fractionation in endometrial cancers. University of Toronto Department of Radiation Oncology Collaborative Research Grant.

Kathy Han: Decreasing chemotherapy and radiotherapy use in POLE-mutated endometrial cancer. Princess Margaret Catalyst Grant.

Benjamin Haibe-Kains, Andrew Hope, Scott Bratman, Kathy Han, Chris McIntosh, Thomas Purdie: Development and comparison of radiomics models for prognosis and monitoring. CIHR Project Grant.

Benjamin Lok: Employing small cell lung cancer patient-derived organoid cultures as an efficient high-throughput strategy to identify novel therapeutic approaches. Cancer Research Society.

Benjamin Lok: The SCF(FBXO11) - XAB2 axis mediates DNA repair and therapeutic resistance in small cell lung cancer. CIHR Project Grant.

Benjamin Lok: Understanding the molecular mechanism of a protein-recycling complex in small cell lung cancer treatment resistance. NIH/NCI U01 Grant.

Amir Safavi, Leigh Conroy, Alejandro Berlin: Evaluation of a machine learning-based automated planning method as a tool for optimizing patient outcomes from prostate volumetric arc radiotherapy. 2020 Abbvie CARO Uro-Oncologic Radiation Awards (ACURA) Competition.

Teodor Stanescu: Design of a novel MR-Linac system. Princess Margaret Cancer Centre Innovation Acceleration Fund.

Derek Tsang: US pediatric photon therapy comparison cohort study. NIH/NCI Local PI Subcontract.

Alex Vitkin: Novel polarized light methodology as a quantitative oncological prognostication tool. New Frontiers in Research Fund.

Notable Awards and Distinctions

Sophie Huang: Journal of Medical Imaging and Radiation Sciences Top 5 Paper Award. "What we know so far (as of March 26, 2020) about COVID-19—an MRT point of view"

Chris McIntosh: Appointed as the R. Howard Webster Foundation Chair in Medical Imaging and Artificial Intelligence at Joint Department of Medical Imaging (JDMI) for a five-year term

Maitry Patel and Samantha Parmelee: Canadian Association of Physician Assistants Annual Meeting poster competition winners for their poster "Radiation Oncology Physician Assistant: Evaluation of a Novel Role leading to Improved Patient Care"

Grace Tsui: CARO Best Abstract in Radiation Therapy Award for her abstract "Automated machine-learning radiotherapy planning for pediatric and adult brain tumours"

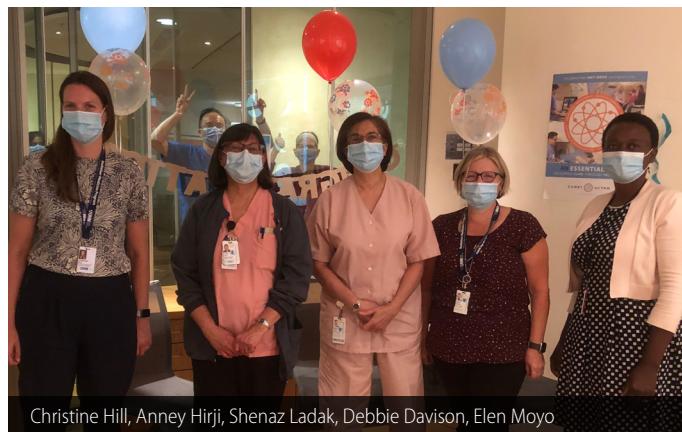
Rebecca Wong: Canadian Nuclear Isotope Council (CNIC)'s Academic Leadership Award

Princess Margaret CAMP HN.10 and CAMP CE.8 Clinical Trial Teams: CCTG Phase III Team Awards, which recognize excellence in accrual metrics, including local activation time and compliance.

- **HN.10 team:** Scott Bratman, Andrew Bayley, John Cho, Meredith Giuliani, Ezra Hahn, Andrew Hope, Ali Hosni, John Kim, Jolie Ringash, John Waldron, Andrea McNiven, Aaron Hansen, Lillian Siu, Anna Spreafico, John de Almeida, Eugene Yu, Ur Metsler, Pat Merante, Masoud Mohammadi, Andrei Rotarescu, Rehab Chahin, Jessy Abed, Maria Braganza, Zoe Doyle, Sarah Ramotar, Vanessa Speers
- **CE.8 team:** Warren Mason, Normand Laperriere, Barbara-Ann Millar, David Shultz, Derek Tsang, Ronald Ramos, Seth Climans, Stephanie Baker, On Yee Jones, Lynette Francis, Risho Yoganathan, Stephanie DeLuca, Anjie Yang, Irum Mahmood, Divyalakshmi Babu, Christina Cater, Kristin Dunlop, Sarah Eley, Shirley Ho, Sam Park, Rosa Pezzulli, Eamay Apostol, Moya Brown, Chermay Espino, Jermain Joseph, Hema Mohabir, Kenneth Mojica, Madeline Philips, Kathie Witkowski, Jessy Abed, Benoit Guibord, Vanessa Speers, Nanthini Tharahan, Rohini Gosai

TEAM RMP

With a team of over 400 radiation specialists, the Radiation Medicine Program is fortunate to have a diverse pool of talent to increase RMP's capacity to deliver on its vision to achieve **Precision Radiation Medicine. Personalized Care. Global Impact.** In 2020, RMP continued to exhibit excellence, innovation and leadership in patient-centered care, research and education, exemplified by the high level of productivity and achievements of our staff.



Christine Hill, Anney Hirji, Shenaz Ladak, Debbie Davison, Elen Moyo

Honouring a Lifetime of Achievement

In 2020-21 RMP celebrated the well-deserved retirements of radiation therapists **Debbie Davison, Anney Hirji, Shenaz Ladak** (July 2020), **Rajinder Ubhi** (September 2020), **Zarin Remtulla** (April 2021), as well as **Gavin Disney**, who was a member of RMP-UHN Digital HelpDesk team (November 2020). RMP thanks Debbie, Anney, Shenaz, Rajinder, Zarin and Gavin for their commitment in providing decades of exceptional service to RMP to enable top-notch, patient-centered care at the Princess Margaret.

NEW TALENT

- Radiation Oncology** Philip Wong, Jelena Lukovic
- Medical Physics** Anthony Lausch, Victor Malkov, Yiwen Xu
- Administration/ Research/Operations** Ebrahim Aslani, Sebastian Koprowski, David Lu, Fayaza (Fia) Syed
- Clinical Research Program** Elizabeth Evans, Julian Kwok



Laura Dawson was elected President of the American Society for Radiation Oncology (ASTRO). ASTRO is the world's largest society of radiation oncologists, with over 10,000 members across the fields of medicine, radiation therapy, nursing, research, and healthcare. Laura is the first Canadian and only the fifth woman to be elected to this prestigious leadership position since ASTRO was founded in 1958.



Michael Velec was named a Fellow of the Canadian Association of Medical Radiation Technologists (CAMRT), on May 15, 2021 in recognition for demonstrating advanced competence, commitment and contribution to the growth of the radiation therapy profession.



Mary Gospodarowicz was named one of the Top 10 Canadian Oncologists on Twitter by The Rounds. Mary's Twitter account [@marykge](#) has over 7,400 posts that span her insightful reflections on radiation oncology, global health, personal and career development, and life.



Brian O'Sullivan received the 2020 American Society for Radiation Oncology (ASTRO)'s Gold Medal Award. The Gold Medal is the society's highest honour, awarded to individuals whose exceptional contributions to the field of radiation oncology have made a global impact on research, clinical care, teaching and service. Brian is only the seventh Canadian to receive the distinction. Previous Canadian Gold Medal recipients include David Jaffray (2018), Mary Gospodarowicz (2014), Bernard Cummings (2011), Walter Rider (1986), Harold Johns (1980) and Vera Peters (1979), all from the Princess Margaret.

SUSTAINED SERVICE

Congratulations and thank you to our dedicated RMP members who have reached their ≥25 year service milestone in 2020.

- 25 Years** Allan Fernandes, Normand Laperriere
- 30 Years** Valerie Kelly

**Permanent new staff hires listed*

Jolie Ringash was elected incoming President of the Canadian Association of Radiation Oncology (CARO). CARO supports professional development, education, and collaboration with other health disciplines. Since its establishment, five RMP radiation oncologists have held the position of CARO president: Bernard Cummings, David Payne, Mary Gospodarowicz, Michael Milosevic and Andrea Bezjak.



Andrea McNiven was appointed to the Commission of Accreditation of Medical Physics Education Programs (CAMPEP) Board of Directors for a three-year term, effective January 2021.



Marcia Bowen was appointed as Supervisor of the DRO Administrative Assistants, effective October 20, 2020. She works with Tracey Williams, Manager of DRO Administrative Services, to supervise, train and support DRO administrative assistants, while continuing in her revised role as DRO Program Coordinator.



Notable Awards and Distinctions

On September 10, 2020, RMP held its first-ever virtual awards ceremony to celebrate Team RMP's achievements. Over 90 participants joined us online for the ceremony.

RMP Clinical Awards

- Exceptional Program Service Award: DRO Administration Team (**Samina Akhtar, Priyani Alahakoon, Zoraida Betancourt, Marcia Bowen, Chantel Credo, Elizabeth De Ocampo, Vanessa DeConcily, Mary Gong, Bailey Hill, Ellen Hoffman, Nahida Jafferli, Patricia Lee, Cheryl Marcelo, Rita McCurdy, Melanie Robson, Eleni Sachinidis, Anila Samji, Maria Sheikh, Tara Spence, Fia Syed, Mariann Szekeres, Jenny Vargas, Tracey Williams**)
- Distinction in Quality & Process Improvement Award: COMET-SABR Implementation Team (**Aisling Barry, Patricia Lindsay, Joanna Javor**)
- Distinction in Technical Improvement Award: AI Treatment Planning Implementation Team (**Thomas Purdie, Chris McIntosh, Alejandro Berlin, Leigh Conroy, Michael Tjong, Tony Lam, Vickie Kong**)
- Excellence in Patient Experience Award: COVID-19 Patient Screening Implementation Team (**Richard Tsang, John Waldron, Michelle Mackay**)

RMP Education Awards

- Distinction in Professional Mentorship Award: **John Kim**
- Distinction in Teaching Award: **Patrick Darcy**
- Trainee Excellence in Education Award: **Amir Safavi**
- Excellence in Education Support Award: **Jenny Vargas**
- AEP "Putting Innovation to Work" Builder Award: **Beibei Zhang & Jasmine Chen**

RMP Research Awards

- Paper of the Year - Radiation Oncology: **Andrea Bezjak**
 - Safety and Efficacy of a Five-Fraction Stereotactic Body Radiotherapy Schedule for Centrally Located Non-Small-Cell Lung Cancer: NRG Oncology/RTOG 0813 Trial. *J Clin Oncol.* 2019; 37(15):1316-1325.
- Paper of the Year - Radiation Physics: **Robert Weersink**
 - Feasibility Study of Navigated Endoscopy for the Placement of High Dose Rate Brachytherapy Applicators in the Esophagus and Lung. *Med Phys.* 2020; 47(3):917-926.
- Paper of the Year - Radiation Therapy: **Vickie Kong**
 - Quantification of Interobserver Variability in Image Registration Using Conebeam CT for Partial Bladder Radiotherapy - A Comparison between Lipiodol and Bladder Wall Surface. *Br J Radiol.* 2019; 92(1094):20180413.
 - Comparison of 3 Image-guided Adaptive Strategies for Bladder Locoregional Radiotherapy. *Med Dosim.* 2019; 44(2):111-116.
- Exceptional Research Support: Machine Shop Team (**Ted Clark, Jason Ellis, Matthew Filleti, Jacob Broske**), **Anna Simeonov, Naz Chaudary, Rehab Chahin**
- Research Leadership Award: **Sophie Huang**
- Top Clinical Trial Accrual Investigator Award: **David Shultz**

Princess Margaret Employee Engagement and Wellness Award

- Group Leadership Impact Award: RMP Helpdesk Team (**Stephen Liu, Nicolas Andrada, Faisal Baig, Arash Marand, Tashi Tsering**)



Machine Shop Team: Ted Clark, Jason Ellis, Matt Filleti, Jake Broske

Jasmine Chen

Beibei Zhang

RMP Helpdesk Team: Stephen Liu, Nicolas Andrada, Arash Marand, Faisal Baig, Tashi Tsering

Tribute to Brian O'Sullivan: A Luminary Figure in Radiation Oncology

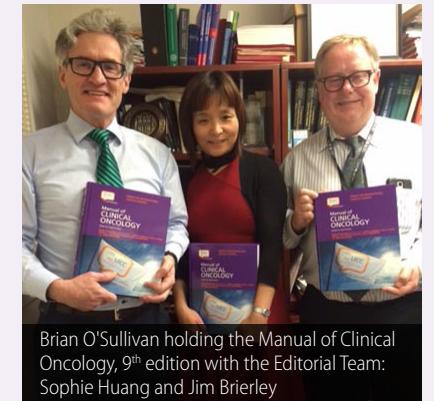


Brian O'Sullivan was awarded the American Society for Radiation Oncology (ASTRO) Gold Medal, the Society's highest honour, at the 62nd virtual ASTRO Annual Meeting in October 2020. A highly esteemed researcher, clinician, and educator, Brian has dedicated his life to improving cancer outcomes for patients, advocating for the highest quality care while minimizing toxicity. After completing his MB degree and registrar training in Dublin, Ireland, Brian came to the Princess Margaret as a Medical Oncology Fellow, before quickly realizing the potential of Radiation Oncology. In 1984, he completed his residency training and embarked on what would become an extraordinary career in radiation medicine research, clinical care and education.

Brian has passionately committed himself to his goal of "achieving an uncomplicated cancer cure". A tremendous academician with over 400 peer-reviewed scientific papers, Brian is a world leader in the management of adult soft tissue sarcoma and head and neck cancers. His landmark achievements have helped reduce toxicity for innumerable patients receiving radiation treatment, and his practices in intensity-modulated radiation therapy (IMRT) have been adopted as the standard of care by multiple centres around the world. In 2013, Brian published another groundbreaking

paper on potential candidates for treatment de-escalation strategies. His work was pivotal in developing a unique staging system for HPV positive oropharyngeal carcinoma, which was later adopted by both the American Joint Committee on Cancer (AJCC) and the Union for International Cancer Control (UICC). Brian is the recipient of numerous awards and honours, including the prestigious 2017 Canadian Cancer Society O. Harold Warwick Prize, awarded for outstanding achievements in cancer control research.

A talented and influential educator, Brian has mentored countless medical students, radiation oncologists, and early-career physicians, always encouraging his mentees to strive for excellence and achieve their full potential. His leadership, integrity, and proficiency in communication have made an impact at the local, national and international levels, resulting in a number of productive international collaborations that further advance our field of radiation oncology. Deeply committed to improving cancer treatment for patients around the world and ensuring equitable access to healthcare resources, Brian has spent decades supporting global research initiatives and leveraging his platform to expand opportunities in cancer research and clinical care. The lives of countless global citizens are enriched and illuminated through his exceptional work. RMP is honoured to have such a brilliant, dedicated, and compassionate physician in our midst.



Brian O'Sullivan holding the Manual of Clinical Oncology, 9th edition with the Editorial Team: Sophie Huang and Jim Brierley



The Original Princess Margaret Sarcoma Team: Bob Bell, Charles Catton, Brian O'Sullivan, Ian Quirt

Brian O'Sullivan at the Canadian Cancer Society Awards Ceremony with Mary Gospodarowicz, Sophie Huang, Carol O'Sullivan, Jonathan Irish, Colleen Dickie, Fei-Fei Liu & John Waldron to receive the O. Harold Warwick Prize

Dr. Vera Peters Honoured in Medical Groundbreakers Stamp Series



Canada Post © 2020

In September 2020, Canada Post released a series of commemorative stamps in honour of six **Canadian medical groundbreakers**, including Princess Margaret's Drs. James Till and Ernest McCulloch, as well as RMP's very own Dr. **Vera Peters**.

Dr. Vera Peters was a revolutionary radiation oncologist, whose bold innovations in cancer treatment propelled her to global recognition as a leader in cancer care. An intuitive and creative thinker, her landmark discoveries in breast cancer and Hodgkin's lymphoma transformed the way these patients were treated. She pioneered a novel medical model that focused on the patients being at the centre of their own treatments – what we know today as patient-centred care. At a time when radical mastectomy was the conventional treatment for breast cancer, Dr. Peters instead championed breast-conserving surgery. In 1967, she published a seminal study demonstrating that lumpectomy and radiation offered equal cure rates to radical surgery for stage I and II breast cancer. Women could receive the same chance of survival without suffering permanent disfigurement. Despite initial strong opposition from the medical community, Dr. Peters' treatment became the standard of care for breast cancer around the world.

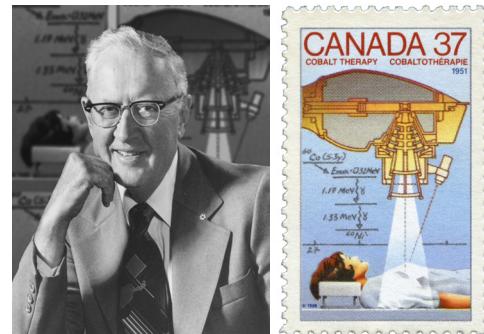
A tireless advocate for compassionate and empathic physician-patient relationships, Dr. Peters once said: "A patient is someone's child, someone's friend, wife or husband, a patient is perhaps a parent. A physician is also all of these things. A patient is pain, joy, love, sorrow, grief, a physician is also all of these things ... We are entities – one no more important than the other ... we must put more into compassionate communication and less into professional prestige." In October 2019, BBC World Service published an article honouring Dr. Peters' achievements, which was distributed internationally in a number of languages. These articles received such an enthusiastic response from readers that BBC later featured Dr. Peters in an episode of their Witness History radio program, entitled "A ground-breaking change to treating breast cancer". To this day, Dr. Peters continues to be an inspiration to physicians, students, educators, and members of the general public who admire her revolutionary approach and resoluteness in the face of opposition.



A patient is someone's child, someone's friend, wife or husband, a patient is perhaps a parent. A physician is also all of these things. A patient is pain, joy, love, sorrow, grief, a physician is also all of these things ... We are entities – one no more important than the other ... we must put more into compassionate communication and less into professional prestige.

Vera Peters

Canada Post had previously honoured RMP's medical physicist Dr. **Harold Johns** with their 1988 issue of a commemorative stamp featuring an image of a cobalt-60 unit. Dubbed the "cobalt bomb", Dr. Johns' invention was used to treat cancer patients around the world. Delivering high-energy radiation to tumours located deep within the body, the cobalt-60 unit transformed the way deep-seated tumours such as those located in the bladder, cervix, and lungs were targeted and treated. Cobalt-60 thus offered previously unseen chances of long-term survival for patients with these cancers. Dr. Johns' work on high-energy photon beams revolutionized the field of radiation medicine and brought him worldwide recognition. He received many honours throughout his lifetime, including the prestigious Officer of the Order of Canada in 1976. In 1998, he was posthumously inducted into the Canadian Medical Hall of Fame. Dr. Johns remains an important figure in the history of radiation medicine, revered for his innovation and leadership.



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- iii. 10.1016/j.ijrobp.2019.12.003
- iv. 10.1038/s41598-019-57364-0
- v. 10.1001/jamanetworkopen.2020.24373
- vi. 10.1016/j.ijrobp.2020.03.018
- vii. 10.1016/j.ijrobp.2020.03.004
- viii. 10.1002/cncr.32968

Read the annual report online at www.radiationatpm.com

Radiation Medicine Program

Precision Radiation Medicine. Personalized Care. Global Impact.

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