



ANNUAL REPORT 2016 - 2017
DEPARTMENT OF RADIATION ONCOLOGY



Radiation Oncology
UNIVERSITY OF TORONTO

ANNUAL REPORT 2016- 2017

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VISION

International Leadership in Radiation Oncology, Research, Education and Practice.

MISSION

We prepare future Radiation Oncology leaders, contribute to our communities and improve the health of individuals and populations through discovery, application and communication of knowledge.

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A portrait of Dr. Fei-Fei Liu, a woman with short dark hair and glasses, smiling. She is wearing a bright pink collared shirt under a black cardigan. The background is a blurred indoor setting with large windows.

DR. FEI-FEI LIU CHAIR'S WELCOME

Dr. Fei-Fei Liu

Welcome to the University of Toronto's
Department of Radiation Oncology
(UTDRO) Annual Report for 2016-2017.

This has been a milestone year for our Department. We went through an extensive self-reflection as we prepared for our Five-Year External Review. I am deeply grateful to our entire faculty, trainees and staff for their important contributions to the review process. The international review panel applauded UTDRO on its output, impact and commitment. The reviewers described our department as one of the top academic cancer programs in the world, *"reaching the prowess and reputation of the top North American Departments of Radiation Oncology, including MD Anderson Cancer Centre and Memorial Sloan-Kettering Cancer Centre."*

This year, we also reached the culmination of our strategic plan The Transformative Agenda: Roadmap to 2017. Since the launch of this plan, we have made significant progress in the areas of education, research and knowledge translation, systems influence and operational excellence. It is now time for us to regroup and refresh our strategy to reflect the rapid pace of innovation within radiation medicine and the changing landscape of the healthcare environment.

Several highlights illustrating the achievements of our UTDRO faculty include the successful capturing of half of the 2016 AbbVie-CARO Uro-Oncologic Radiation Awards; David Jaffray was presented with an AAPM Fellowship; Laura Dawson became a Fellow of ASTRO; Marianne Koritzinsky received the Michael Fry Award from the Radiation Research Society, Brian O'Sullivan was the recipient of the 2017 O. Harold Warwick Prize from the Canadian Cancer Society; culminating with our previous Chair, Mary Gospodarowicz being appointed a University Professor, the highest honour the University of Toronto bestows upon its faculty, and the first ever for a Radiation Oncologist.

In addition, several of our faculty members assumed leadership positions across different domains, exerting our systems influence at multiple levels. Anthony Brade and Rob Dinniwell assumed the Head positions of the Department of Radiation Oncology at Carlo Fidani (Credit Valley), and London Regional Cancer Centers, respectively. Barbara-Ann Millar became the Chair of the Radiation Oncology Speciality Committee at the Royal College of Physicians and Surgeons of Canada. Rob Bristow departed UTDRO to become the Director of the Manchester Cancer Research Centre at the University of Manchester; one of the

most prestigious cancer leadership roles in the world.

We have also had many reasons to celebrate our faculty's successes in the realm of education. Lisa Di Prospero and Kieng Tan were recognized by the University of Toronto for their contributions to continuing education. Meredith Giuliani received the Canadian Medical Association Award for Young Leaders. Within our Department, Marianne Koritzinsky assumed the new role of Director of Research, while Ewa Szumacher and Barbara-Ann-Millar became UTDRO's new Faculty Development and Continuous Education and Professional Development Directors.

Some of my proudest moments over the last year have been at our continuing education and knowledge translation events. At RTi3, 140 radiation therapists came together from across the country to share their knowledge through 59 oral presentations, 28 posters and 1,350 tweets. Target Insight brought together 140 delegates from Canada and the United States for a day of interdisciplinary learning centred on the theme of Personalized Medicine. Our annual radiobiology course welcomed trainees from our own program as well as the BC Cancer Agency, Dalhousie, Queen's and McMaster Universities; attesting to the value of this important course across the country.

As we celebrate the year that has passed, we must also reflect on our responsibilities for the years ahead. The Canadian Cancer Society predicts that one in two Canadians will develop cancer in their lifetime. Our Department is a leader in Radiation Medicine, and we must continue to provide academic training to the next generation of Radiation Medicine leaders to enable the excellence in both research and education.

I would like to extend my deepest gratitude to our Vice Chairs, Michael Milosevic, Rebecca Wong and Shun Wong, for their counsel, assistance and support of our many initiatives. In addition, my thanks to our Executive Committee for their hard work across our multiple programs. Lastly, I would like to thank our faculty members, trainees and staff for helping to elevate UTDRO into one of the top programs in the world!

Dr. Fei-Fei Liu, MD, FRCPC
Chair and Professor
Department of Radiation Oncology

VICE CHAIR REPORT

EDUCATION

DR. REBECCA WONG

VICE CHAIR, ACADEMIC AFFAIRS



The Transformative Agenda: Roadmap to 2017 envisaged six strategies and seven targets to map the path towards our vision of being “the educator of choice internationally for radiation medicine professionals and researchers.” The signposts and metrics were designed to improve our collective mastery in teaching, and to create innovative curriculum and tools, that together will enable us to respond to the learning needs of radiation medicine practitioners, today and tomorrow; within our walls and beyond.

To enable mastery in teaching, the roles of Director in CEPD and Faculty Development were created. Drs. Barbara-Ann Millar and Ewa Szumacher were appointed as our inaugural co-directors in 2016. Faculty development workshops on “Teaching Excellence” covering Feedback, Making Learning Stick, and Learning Climate were piloted at the Princess Margaret. The workshop titled “How to Provide Feedback” saw strong engagement from trainees and faculty across geographic sites. The appointment of Professor Emeritus Dr. Ida Ackerman to the role of Resident Wellness Ambassador represents our first step in declaring a priority towards a supportive learning and practice culture. Within the CEPD portfolio, RTI3 continues to build its unique profile as an international event for radiation therapy research and innovation, while our Radiobiology Course is uniquely designed as a Canadian resource on state of the art radiobiology training. Together with the newly redesigned Target Insight Conference (Personalized Radiation Medicine – From Theory to Practice), our CEPD portfolio continues to mature.

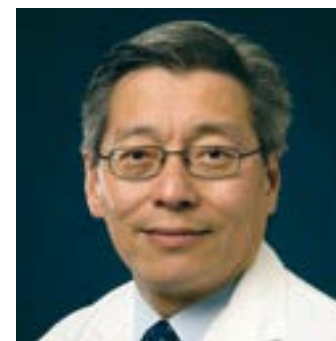
Innovative curriculum and tools are expected to be the cornerstone for expanding the reach of our education offerings. Through the generous collaboration from the designers of the staff scheduling software ESummit, this tool has been successfully adapted to support trainee scheduling at the Princess Margaret. Paired with teaching effectiveness scores across all of our clinical and classroom teachings, the provision of quality and

quantitative metrics is expected to enable personal as well as departmental aspirations towards enhancing mastery in teaching.

Through the Accelerated Education Program, a learning management system is now operational to house distant education offerings and an open access library of academic rounds. We expect these resources to not only enrich the learning experience, but also enable distant learning where geography is a barrier including the learning needs of learners from low and middle income countries. Global education initiatives with a primary radiation medicine focus such as Jordan, Ghana, Zimbabwe, Kenya and Ethiopia are ongoing.

Our professional training programs continue to be leaders in our field. In the words of our external reviewers, our Medical Radiation Sciences Program and our Radiation Oncology Residency program are the “Jewels in the Crown” of our Department. Our Fellowship program was “well known and internationally recognized”. Competency by Design for our residency program is on track to be launched under the leadership of Dr. Andrea Bezjak. An application for certificate of special competency in Brachytherapy led by Dr. Gerard Morton is expected to enhance the offerings available to our fellows. Leadership curriculum development within the MHScMRS program is expected to appeal to all trainees across our department.

The targets set in Roadmap to 2017 are being met, including a 17% increase in overall CEPD registrants. Open access library of academic rounds and a functional learning management system is now in place. Active preparation of our residency program into competency by design, and enriched offerings including specialization for our fellowship program are also on track. Our professional training programs continue to attract some of the strongest candidates, and our high quality of training positions them well to become future leaders in radiation medicine. ♦



The 2016-17 year marked the 25th anniversary of UTDRO. We successfully completed our 5-year External Review, and Dr. Fei-Fei Liu was re-appointed for her second term as Chair. Our regional, national and international leadership role in advancing radiation treatment and cancer care was clearly acknowledged in the External Review.

New appointments in 2016-2017 included Aisling Barry, Tatiana Conrad, Ali Hosni, Luluel Khan, Benjamin Lok, Amandeep Taggar, Darby Erler, Nathan Becker, Tiffany Tam, Grace Lee, Joelle Helou, Matt Wronski, Jette Borg, Brige Chugh and Eric (Chia-Lin) Tseng. After almost two decades of outstanding contributions to the field of prostate cancer genomics and tumor hypoxia, Dr. Rob Bristow has been recruited away to assume a prominent leadership role as the Director of the University of Manchester Cancer Research Centre. Dr. Ida Ackerman has retired in the summer of 2017 after many years of outstanding service at the Odette Cancer Center. Dr. Ackerman will continue to serve as a mentor in post-graduate teaching and education. Dr. Brian O’Sullivan retired from full-time clinical practice, but will continue to serve as a consultant in sarcoma, and head and neck cancer research and practice. Dr. Jackie Spayne will also be retiring to pursue opportunities in global health.

Accolades continues for Professor Mary Gospodarowicz, our previous Chair who became the first Radiation Oncologist to have ever been appointed as University Professor, the highest academic rank at the University of Toronto. She was the 2017 recipient of the “Wendy Lack Women of Action Scientific Award” from the Israel Cancer Research Fund, and the ASCO Conquer Cancer Foundation 2017 Women Who Conquer Cancer Mentorship Award. Professor Brian O’Sullivan received the 2017 Canadian Cancer Society O. Harold Warwick Prize in recognition of his immense contributions to cancer control. Dr. Marianne Koritzinsky received the 2016 Michael Fry Award

VICE CHAIR REPORT

CLINICAL AFFAIRS

DR. SHUN WONG

VICE CHAIR, CLINICAL AFFAIRS

from the Radiation Research Society, and Dr. Giuliani received the CMA Award for Young Leaders (Early Career). Dr. Barbara-Ann Millar started her term as Chair of the Radiation Oncology Specialty Committee of the Royal College of Physicians and Surgeons. UTDRO also witnessed two faculty members who assumed senior leadership positions at UHN. Professor David Jaffray was appointed UHN EVP Technology & Innovation, and Professor Bradly Wouters as UHN EVP Science & Research. Many other members were honored for their outstanding work and contributions as detailed in UTDRO News.

Last but not the least, we offer congratulations to Dr. Arjun Saghal for his academic promotion to the rank of Professor, and Dr. Catherine Coolens for her promotion to Associate Professor; both were effective July 1, 2017. ♦

VICE CHAIR REPORT

RESEARCH

DR. MICHAEL MILOSEVIC
VICE CHAIR, RESEARCH



Investigators continue to innovate in key research areas including bio-physical tumor targeting to enhance the effectiveness of radiotherapy; innovation in the treatment of patients with recurrent or metastatic disease; the development of new strategies for managing treatment side effects; and learning from all of patients through 'big data' initiatives. An important precision medicine focus across UTDRO programs is the use of MR imaging to target tumors more precisely, and adapt radiotherapy to changing anatomical and biological conditions throughout the treatment course. This promises to improve cancer control while reducing side effects; in essence, changing the future paradigm of radiation treatment delivery.

The 2016-17 year proved to be another productive year for UTDRO investigators, with numerous high-impact publications, and continued growth in the number and breadth of collaborative programs locally, nationally and internationally.

The total peer-reviewed grant support available to UTDRO investigators in 2016-17 was \$42.1M. There were a total of 333 peer-reviewed research publications. Examples of influential publications illustrating the richness of UTDRO research are:

- Robert Bristow et al. Germline BRCA2 mutations drive prostate cancers with distinct evolutionary trajectories. *Nature Communications* 2017.
- Charles Catton et al. Randomized trial of a hypofractionated radiation regimen for the treatment of localized prostate cancer. *Journal of Clinical Oncology* 2017.
- Edward Chow et al. Effect of radiotherapy on painful bone metastases: A secondary analysis of the NCIC Clinical Trials Group symptom control trial SC.23. *JAMA Oncology* 2017.
- Gregory Czarnota et al. A priori prediction of neoadjuvant chemotherapy response and survival in breast cancer patients using quantitative ultrasound. *Scientific Reports* 2017.

- David Hodgson et al. Impact of early breast cancer screening on mortality among young survivors of childhood Hodgkin's lymphoma. *Journal of the National Cancer Institute* 2016.
- Normand Laperriere et al. Short-Course radiation plus temozolomide in elderly patients with glioblastoma. *New England Journal of Medicine* 2017.
- Andrew Loblaw et al. Brachytherapy for patients with prostate cancer: American Society of Clinical Oncology/Cancer Care Ontario joint guideline update. *Journal of Clinical Oncology* 2017.

In addition, UTDRO faculty James Brierley and Mary Gospodarowicz spearheaded the development of the TNM Classification of Malignant Tumours (8th Edition). This is likely to be among the most frequently cited cancer publications over the next few years, and will play an important role in harmonizing clinical and research practice on a global scale.

Several faculty were recognized for their contributions to radiation medicine research. Of note, Dr. Marianne Koritzinsky received the Michael Fry Research Award from the Radiation Research Society and Dr. Brian O'Sullivan was awarded the O. Harold Warwick Prize by the Canadian Cancer Society.

Overall, the research conducted by UTDRO investigators is driving innovation and practice evolution in Radiation Medicine on a global scale. Currently, there is unprecedented potential to further improve clinical outcomes by exploiting patient-centric synergies at the interface between biology discovery and technology advancement. UTDRO is ideally positioned to capitalize on these opportunities because of its adaptability and diversity, including its strong educational programs that facilitate rapid translation of new knowledge to clinical practice. ♦

UTDRO RESEARCH HIGHLIGHTS



Note: This total funding includes funding for Principle Investigators and Co-Principle Investigators only and excludes large infrastructure grants.

Welcoming NEW Faculty Members

There were 15 new faculty members who joined UTDR0 in 2016-2017. Representing various disciplines, they bring a wealth of expertise and experience to the Department.



AISLING BARRY, ASSISTANT PROFESSOR

Dr. Aisling Barry is a Radiation Oncologist at the Princess Margaret Cancer Centre. Her clinical subspecialties are breast, gastrointestinal and palliative radiotherapy. Aisling's research interests are palliative radiotherapy, oligo-progression and oligo-metastases, and partial breast irradiation.



NATHAN BECKER, ASSISTANT PROFESSOR

Dr. Nathan Becker is a Medical Physicist at the Princess Margaret Cancer Centre, where he leads the CT imaging and therapy imaging portfolios. His research interests include image-guided RT, adaptive RT, quality control, and automation.



JETTE BORG, LECTURER

Dr. Jette Borg is a Medical Physicist at Princess Margaret Cancer Centre. Her research and clinical expertise converge on brachytherapy for gynaecological and prostate cancers.



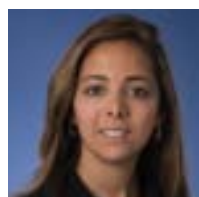
BRIGE PAUL CHUGH, ASSISTANT PROFESSOR

Dr. Brige Paul Chugh is a Medical Physicist at the Odette Cancer Centre. His clinical and research interests are in cancers of the central nervous system, stereotactic radiosurgery and MR-guided radiation therapy.



DARBY ERLER, INSTRUCTOR

Darby Erler is a Clinical Specialist Radiation Therapist at the Odette Cancer Centre. She specializes in stereotactic body radiation therapy (SBRT). Darby's research interests include assessing clinical outcomes associated with the use of SBRT in oligometastatic disease and primary cancers, evaluating innovations in treatment delivery and improving the patient experience with the use of patient reported outcomes.



JOELLE HELOU, ASSISTANT PROFESSOR

Dr. Joelle Helou is a Radiation Oncologist at the Princess Margaret Cancer Centre. Her clinical work focuses on genitourinary cancer with expertise in brachytherapy, and breast cancer. Joelle's research interests are in clinical epidemiology, particularly patient-centered outcomes and health economics.



ALI HOSNI, ASSISTANT PROFESSOR

Dr. Ali Hosni Abdalaty is a Radiation Oncologist at the Princess Margaret Cancer Centre. His clinical focus is on head and neck and GI malignancies, with research interest in investigating outcome predictors, therapeutic biomarkers and individualized radiation dose selection.



GRACE LEE, ASSISTANT PROFESSOR

Grace Lee is a Clinical Specialist Radiation Therapist (CSRT) at the Princess Margaret Cancer Centre. Her clinical work is in the breast site and her research interests include cavity delineation and heart sparing techniques in breast radiotherapy.



BENJAMIN LOK, ASSISTANT PROFESSOR

Dr. Benjamin Lok is a Radiation Oncologist – Clinician Scientist at the Princess Margaret Cancer Centre. He is also appointed as an Affiliate Scientist at the Princess Margaret Research Institute. Benjamin's laboratory research will focus on understanding the mechanisms of therapeutic resistance in lung cancer with an emphasis on the contribution of altered DNA repair pathways.



LULUEL KHAN, ASSISTANT PROFESSOR

Dr. Luluek Khan is a Radiation Oncologist at the Carlo Fidani Cancer Centre, Credit Valley Hospital. Her research interests are focused on brain metastasis, primary CNS, oligometastatic disease and palliative care.



AMANDEEP TAGGAR, ASSISTANT PROFESSOR

Dr. Amandeep Taggar is a Radiation Oncologist at the Odette Cancer Centre. He focuses on gynecological and upper gastrointestinal cancer cases, with a primary focus on MRI guided radiotherapy and brachytherapy.



CHIA-LIN (ERIC) TSENG, LECTURER

Dr. Chia-Lin (Eric) Tseng is a Radiation Oncologist at the Odette Cancer Centre. He is involved in MR-Linac technology at Sunnybrook and is interested in novel technologies for central nervous system cancers and brachytherapy for genitourinary cancers.



MATT WRONSKI, ASSISTANT PROFESSOR

Dr. Matt Wronski is a Medical Physicist at the Odette Cancer Center. His clinical focus is on external beam radiotherapy and brachytherapy for prostate, gynecological and breast malignancies. His research interests include automated quality assurance for high dose rate brachytherapy treatment planning, data mining, adaptive treatment planning, and new applications of the MR-Linac and MR-guided brachytherapy.



L to R: Joe Presutti, Melanie Davidson, William Chu, Marko Cadonic, Andrew Loblaw

APPLYING THE INTERPROFESSIONAL MODEL TO CLINICAL TRIALS AT THE ODETTE CANCER CENTRE

Imagine a cancer treatment that improves wait times, benefits patients and saves the healthcare system millions, without any trade-offs. It may sound like fiction, but one such treatment is being studied at cancer centres around the world.

The Prostate Advances in Comparative Evidence (PACE) study is being led by The Royal Marsden and is taking place at several cancer centres internationally. In Canada, this Phase III clinical trial began at the Odette Cancer Centre (OCC), and is now recruiting patients at nine other Canadian centres.

Stereotactic Body Radiotherapy (SBRT) for prostate cancer presents multiple benefits to different areas. Reducing the number of treatment sessions from 39 to 5 saves the average patient approximately \$2,000 in parking and driving costs. The Departmental Program cost is also reduced by 75%; rendering available treatment slots for additional patients. With benefits across the healthcare system, can SBRT become the

new standard for patients with prostate cancer? This is a question the PACE team will be exploring over the next five years.

Dr. William Chu, Assistant Professor at the Department of Radiation Oncology, University of Toronto (UTDRO), is the Canadian lead for this study. As a radiation oncologist in OCC's genitourinary (GU) group, he explained that his team has a track record of successfully using SBRT to treat prostate cancer. "When the Royal Marsden invited us to participate in this study, we were happy to sign on. This is the first and largest randomized Phase III trial comparing standard radiation treatment, to SBRT for prostate cancer. It addresses our mandate to innovate prostate cancer treatment internationally."

When OCC signed on to PACE, funding for the trial was non-existent outside the United Kingdom. Dr. Andrew Loblaw, GU site lead at OCC and Professor at UTDRO, recognized the need to raise funds to support this trial across Canada. "This is a very important trial for prostate cancer treatment and it aligned with our goals to improve outcomes," he said. "But without funding, this trial wouldn't get off the ground." Therefore, his charity organization, Prostate Cure Foundation raised \$1 million over six months; allowing the future recruitment of 200 patients into PACE across Canada.

With funding in place, William and Andrew started the process for legal approval in 2015 and within a year they were able to start recruiting patients. "We were aiming for 200 Canadian patients by 2020, but more centres have signed on in Canada and internationally recently," William said. "So the accrual numbers have gone up exponentially and we will finish accrual by the end of this year."

The GU team at OCC spent close to a year preparing for this study. UTDRO Assistant Professor Dr. Melanie Davidson, a Medical Physicist at OCC, worked closely with the GU team to develop the technical aspects of this study including simulations and treatment planning. Dosimetrists on the team developed planning protocols. UTDRO Instructor Joe Presutti is one of the dosimetrists involved with PACE. "Within our interprofessional team, many people were planning SBRT for the first time," he shared. "So my colleague, Marko Cadonic and I became a resource for anyone who was unfamiliar with SBRT plans."

"The reason why OCC has successfully recruited almost half of the Canadian patients in such a short time is because of our interprofessional team," noted Andrew. "We work together as a

After we hammered out all the treatment details and guidelines, we shared this information with other centres.

family and complement each other. Every person in our interprofessional team respects each other's strengths, and works together towards the same goal."

After the OCC teams were comfortable with SBRT for prostate cancer, Melanie, Joe, Marko and Will held hands-on training sessions with teams at other hospitals. "After we hammered out all the treatment details and guidelines, we shared this information with other centres," Melanie said. "We are also sharing our protocols, scripts and other information with any centre that needs it. It took us years to develop this information and this resource can be very useful to centres who are starting SBRT from scratch."

As with any new treatment, SBRT presents some challenges for the new centres. The treatment dose is four times higher than the normal radiotherapy dose, and is administered to an area 60% smaller. This is where the OCC team has stepped in to help; their treatment protocols and scripts help to train the new centres on this treatment.

An additional challenge is getting legal approval. "Since we had already secured funding, we were able to focus on working with other centres and rolling this out faster," said Andrew. Andrew and William have met with several legal teams across Canada to help guide them through the process and obtain the necessary approvals to start recruiting patients.

While it is too early to comment on the success of this study, it is worth noting that the OCC GU team has successfully launched the study and recruited patients with great efficiency. The interprofessional team not only trained staff at OCC, they disseminated their experience, and helped eight other centres start this study.

For more information about the PACE trial, visit www.prostatecure.ca/sabr. ♦

SEED GRANT RECIPIENTS COLLABORATING ACROSS ONTARIO

Joelle Helou and Christiaan Stevens

In 2013, the Department of Radiation Oncology at the University of Toronto (UTDRO) launched the Collaborative Research Seed Grant – an annual competition that awards grants to researchers who are collaborating across different cancer centres.

The projects funded by this grant have the potential to significantly impact the science of radiation medicine and improve patient outcome. To date, UTDRO has awarded eight grants to teams comprised of researchers from two or more cancer centres in Southern Ontario.

The latest project to be funded through this program is “Stereotactic Ablative Radiotherapy for Renal Tumors” which is being co-led by UTDRO Assistant Professors, Dr. Joelle Helou from the Princess Margaret Cancer Centre (PM) and Dr. Christiaan Stevens from the Simcoe Muskoka Regional Cancer Program (SMRCP) at the Royal Victoria Hospital (RVH).

UTDRO staff writer, Sarah Khan, spoke with Joelle and Christiaan to find out more about their research project.

Q: Why did you decide to study SBRT for kidney tumours?

Joelle: Stereotactic Body Radiotherapy, or SBRT, is an emerging and evolving treatment modality with a rapidly growing role. For instance, SBRT has been adopted as the standard of care for patients with inoperable early stage non-small cell lung cancer as it enables the non-invasive ablation of the tumor. Researchers have been exploring SBRT for other organs including the kidney, which has been pioneered by the Australians. At the PM, we have a well-established SBRT program. Dr. Laura Dawson is one of the world’s foremost experts on liver SBRT due to her extensive research in this field. Based on Laura’s experience, I wished to explore SBRT as a nephron-sparing modality for kidney tumors.

Christiaan: We are growing our SBRT program at the SMRCP. We have been successful in setting up robust lung, brain and bone metastases SBRT programs, and are developing SBRT for other sites. When Joelle approached us about participating in

a study of SBRT for kidney tumours, we felt that it aligned with our program’s SBRT growth plan as well as our goal to grow clinical research, in order to offer the highest level of care to our patients locally.

Q: What are you hoping to explore in this study?

Joelle: Surgery is the standard treatment for kidney tumours; however, older patients and those with medical co-morbidities cannot undergo surgery have limited options, such as nephron-sparing radiofrequency ablation (RFA) or cryoablation. SBRT enables non-invasive ablation and can mimic surgery; however is still experimental in the setting of kidney tumors. The SBRT experience in other sites suggested very high local control rates with low toxicity. As such, we aim to explore SBRT as a potential nephron-sparing modality in the treatment of kidney tumor.

We also want to assess the motion of the kidney during treatment and the relationship between motion and renal function.

Christiaan: Since SBRT for the kidney is still an evolving experimental treatment modality, it is best to explore this in the context of a study with well-defined outcomes. The data generated will help contribute to the burgeoning literature in this field.

Q: What is the benefit of having different hospitals participate in this study?

Joelle: Having different hospitals participating will increase accrual rates; kidney SBRT is an excellent opportunity to collaborate with other sites.

Christiaan: Collaborating on this study will be of mutual benefit to the collaborators, to our institutions, to UTDRO at large, and to our patients. At RVH, radiation oncologists, physicists and radiation therapists benefit from the experience of PM in this field, which help to accelerate the development of our SBRT program. Our patients will have access to a treatment modality otherwise not available. For PM, understanding the slightly different realities of community radiation oncology practice may help shape the study in a way that may inevitably make



L to R: Joelle Helou, Christiaan Stevens

it more center agnostic. Obviously, access to a larger potential study patient population will also help accrual.

Q: What challenges do you anticipate in the next two years as the study progresses?

Christiaan: Our biggest challenge will be accruing patients. We are introducing a new treatment modality in a space where other modalities, such as surgery and RFA are better established. Urologists are the key “gate-keepers” for management, and they really do not have a vested interest in supporting the study other than academic interest. It will therefore be imperative to engage them upfront to ensure this study is on their radar.

Q: What is next on your radar in terms of this study?

Joelle: I would like to bring other centres on board such as the Carlo Fidani and Stronach Cancer Centres. If it is successful, the next step would be to compare this to other nephron-sparing modalities in a randomized trial.

Christiaan: If we are successful in patient accrual, it would show that we can establish a research relationship with our urological colleagues at the

RVH. If successful, hopefully the data will provide a platform to launch a randomized study comparing SBRT to standard modalities. This would truly help establish SBRT as an alternative treatment modality.

Q: What do you think of the seed grant process?

Joelle: It is an excellent initiative because it pushes different centres to collaborate. UTDRO is a very strong department, and if we all collaborate on a regular basis, we would be unbeatable. Collaborating through these seed grants is an excellent way to conduct strong studies in our field.

Christiaan: I sit on the panel that reviews grant applications, so I have experienced both sides of the process. It is a fair and robust process. One of my observations thus far is that the research collaborations tend to flow one way. Most of the projects are conceived at our academic hospitals and then collaborators from the community hospitals are brought in to strengthen and develop the study. While this is understandable, I hope to see more projects where the genesis of the research idea begins as a true collaboration between the myriad UTDRO sites. I believe this could result in very high quality and ‘practical’ research. ♦

PERSONALIZED CANCER MEDICINE AND ADAPTIVE RADIOTHERAPY

Contributors: Claire McCann, Tim Craig, Arjun Sahgal, Brian Keller

Personalized Cancer Medicine (PCM) also known as precision medicine has defined a new era in oncology with the recognition that tumors once classified solely by their tissue of origin in fact consist of multiple genetically distinct subgroups, and as such, the ability to categorize tumors into smaller subgroups defined by molecular makeup would have an important impact on treatment design, approach and modality.

The concept of one treatment for one tumour tissue type no longer applies, as molecular abnormalities specific to the tumour subgroup can be targeted by specific drugs or treatments such as molecularly targeted therapies and/or immunotherapy for example.

In the current radiation oncology paradigm, the evolution and development of novel, sophisticated technologies, which integrate volumetric imaging functionality with precise and accurate radiation delivery in real time, have allowed us to not only precisely target the radiation treatment to the patient-specific size, shape and location of the tumour, but have also allowed us to adapt the radiation treatment in real-time based on anatomical and functional changes which occur during the course of treatment, resulting in a truly personalized treatment for the patient.

While PCM in the context of radiation oncology takes on many different forms in each of our centres, it is guiding the most advanced clinical research and the redefining the future of radiotherapy practice.

Following are two examples of how PCM is being applied in the clinical setting.

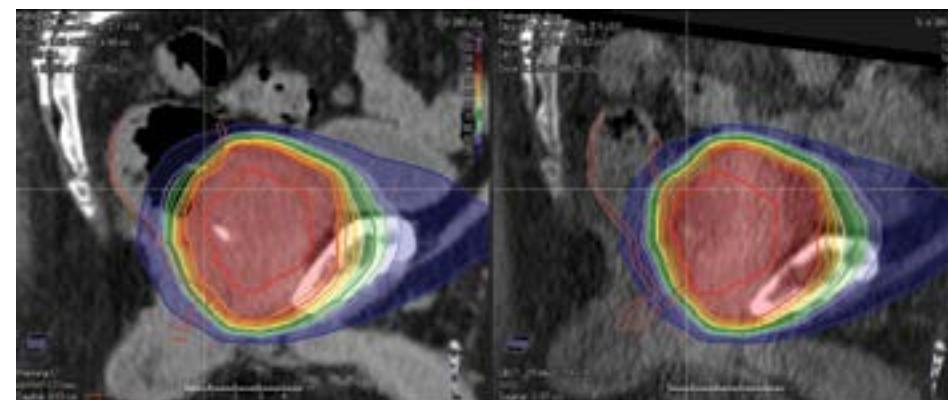
PERSONALIZED CANCER MEDICINE USING RAYSEARCH'S RAYSTATION AT THE PRINCESS MARGARET CANCER CENTRE

By Tim Craig

Radiation medicine requires advanced software to review images, define tumours, and design personalized treatment plans for each patient. The Radiation Medicine Program at Princess Margaret is undergoing a massive technology change that will migrate external beam treatment planning to RaySearch's RayStation treatment planning system. RayStation is an innovative system with novel features such as deformable image registration, dose accumulation, adaptive replanning, and proton planning. In fact, it contains several technologies that were developed within UTDRO, including the Morfeus deformable image registration algorithm and automated breast planning, developed by Tom Purdie, Kristy Brock, Michael Sharpe, and David Jaffray.

Quantifying the dose delivered during treatment can identify the need to intervene, adapt, and replan a patient's treatment. This is a form of treatment personalization known as adaptive radiation therapy (ART). The Princess Margaret Radiation Medicine Program has a strong interest in designing and evaluating innovative ART. UTDRO faculty, including Peter Chung, Charles Catton, and Tim Craig, have been successful in securing grants to conduct feasibility studies. Although the value of ART has been acknowledged for some time, large-scale implementation has been slow and difficult due to a lack of supporting systems. The RayStation platform positions UTDRO to accelerate the pace of ART.

Due to our strong research reputation, RaySearch was eager to collaborate. This research relationship has already yielded several publications by Michael Milosevic, Valerie Kelly, Young-bin Cho, Anthony Fyles, and David Jaffray on the potential for ART in cervical cancer, and prestigious



Sagittal view of a prostate cancer patient

The decision to implement RayStation came from our strengths. A decade ago, UTDRO led the world in the implementation of image-guided radiation therapy (IGRT). This involves imaging and shifting the patient to correct for positioning errors immediately prior to irradiation. IGRT led to incredible improvements in treatment accuracy, and is now considered standard of care in highly conformal treatments. The value in these images however, are not being fully realized. They show that patients experience various anatomical changes, such as weight loss or tumour shrinkage, that lead to the delivered dose differing from the planned dose. Combining these images with algorithms for deformable image registration and dose accumulation, they can be used to monitor the dose delivered on a daily basis. This allows the exploration of the next frontiers in radiation medicine; RayStation was the first system to provide this opportunity.

plenary presentations at the American Society for Therapeutic Radiology and Oncology annual meeting by Michael Sharpe, Laura Dawson, and Brian O'Sullivan.

The potential for the combination of the RayStation platform with our expertise is recognized beyond the university. For example, UTDRO captured an impressive six of eight nationally available AbbVie – CARO and SANOFI-CARO grants this year. Four of these five were awarded for projects that directly use RayStation in their research (UTDRO Principal Investigator faculty included Vickie Kong and Michael Velec, and Fellows Michael Jones and Aravindhan Sundaramurthy).

In addition to enabling ART, dose accumulation may have other impacts on radiation oncology. UTDRO faculty David Jaffray and Patricia Lindsay outlined a vision in the highly cited QUANTEC publications with the hypothesis that dose accumulation leads to a better understanding of

the dose actually delivered, which in turn leads to a better understanding of the relationship between dose and tumour control or toxicity. A UTDRO publication on this topic including Laura Dawson, Michael Velec, Jim Brierley, Rebecca Wong, and John Kim has provided preliminary validation of this hypothesis for tumour control in liver cancers.

In addition to our current implementation, our relationship with RaySearch has been deepened through their generous donation to create a Michael Sharpe Treatment Planning Learning Facility to support treatment planning education in the Medical Radiation Sciences Program, jointly

run by the Michener Institute at University Health Network and UTDRO. This ensures that radiation therapy students in this program will have access to state of the art planning tools, and can graduate prepared for the most technologically advanced radiation treatments.

RayStation is a platform that enables the ambition within UTDRO. We look forward to using it as a foundation for delivering the most innovative clinical treatments, supporting the department's future role as a leader in ART, and educating the next generation of radiation medicine professionals.

THE MRI-LINAC FOR ADAPTIVE AND PERSONALIZED RADIOTHERAPY AT THE ODETTE CANCER CENTRE

By Arjun Sahgal and Brian Keller

The development and clinical implementation of cone beam CT in the early 2000's had a substantial impact on reducing geometric uncertainty; allowing for more conformal radiotherapy and the onset of image-guided radiotherapy (IGRT). This also paved the way for more ablative radiotherapy since target localization was improved. This is particularly exemplified in lung SBRT where a soft tissue tumour in the lung is readily visualized on CBCT.

In most other instances however, tumours and critical structures are not visible on CBCT, so one needs to rely on bony landmarks. Additionally, there is currently no real time tumour imaging during radiotherapy to allow for monitoring of beam-on tumour intrafractional motions/response.

The development of a hybrid, high field strength, integrated MRI-Linac system has the potential to fill some of these gaps, and to provide quantitative response assessment imaging with no imaging-related radiation dose.



At Sunnybrook, the first Canadian MRI-Linac has been installed, and as a member of a global consortium, we are currently evaluating this technology in a systematic fashion.

We will first apply this technology to brain tumor patients, evaluating daily changes to target volumes based on MRI, and use of functional imaging to assess treatment response. In addition, we will treat rectal, pancreas, and cervix patients as examples of our priority sites.

The proper tools are being implemented to allow for auto-segmentation of daily MR images, re-optimization of treatment plans in the presence of the magnetic field, and patient specific QA prior to daily modifications to treatments.

It is hypothesized that adaptation during radiotherapy, accounting for organs at risk (OAR), and target locations and deformations, would allow dose escalation and/or reduced side effects; yet this can only be answered in a number of well controlled clinical trials being organized through the Elekta MRI-Linac Consortium. ♦

L: MR-Linac being installed

INSPIRING DECADES OF RADIATION ONCOLOGISTS

Ida Ackerman

I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel.

- Maya Angelou

And this is why people remember Dr. Ida Ackerman.

After a 33-year career filled with stories of inspiration and empowerment, Ida retired from her positions as an Associate Professor with the Department of Radiation Oncology and the Department of Obstetrics and Gynecology at the University of Toronto, and her role as a gynecology radiation oncologist at the Odette Cancer Centre.

Born in Budapest, Hungary, Ida had early aspirations of pursuing medicine. "I remember I wanted to be a doctor when I was three years old," she said. "I was born with scoliosis and had a pediatrician whom I loved. I also remember being in awe of the offices of my orthopedic surgeons. High ceilings, floor to ceiling bookshelves and Persian rugs. Maybe for my three-year old mind, that inspired me to go into medicine."

For her undergraduate degree and medical school, Ida joined U of T. "I was an average student in class," she recalled. "But I excelled in the hospital environment interacting with patients. I realized that I have the ability to communicate with patients and with staff, and to understand their needs."

During her residency in Internal Medicine, Ida did a rotation at the Princess Margaret Hospital. She was introduced to other

trainees, many of whom went on to become leaders in their fields, including Dr. Ian Tannock and Dr. Brian O'Sullivan. During her radiation oncology training, she was mentored by Dr. Alon Dembo and Dr. Denny Depetrillo and Dr. Gillian Thomas, who inspired her to specialize in gynecologic oncology.

UTDRO has had an indirect influence on Ida's career since before she joined the Department. Professor Emeritus Dr. Gillian Thomas first suggested that Ida should switch to radiation oncology. During her radiation oncology residency, Ida trained with Professor Dr. Brian O'Sullivan. Later, Ida found a colleague and friend in Dr. Pam Catton, who championed many of UTDRO's education programs.

After her residency, Ida did a fellowship in gynecologic oncology and then joined the Odette Cancer Centre as staff in 1984. She has treated many patients with lung, breast and skin cancers over the decades, but her area of passion is gynecologic malignancies. In the 1990s, Ida published her research in endometrial cancer questioning the role of adjuvant radiation treatment for this cancer. This paper unsettled the community, and launched a series of further studies to re-evaluate the role of radiation for uterine cancers.



Ida Ackerman

Ida's practical attitude has made her a strong clinician. Her peers recognize that she brings a different perspective and practicality to cases that others often forget. "Most of medicine is just plain common sense, and that practical common sense, not knowledge, is what I contribute," she said.

Amongst her peers, Ida is known as a master educator. With decades of teaching and mentorship under her belt, Ida's most significant contributions are to those who she has inspired, encouraged and taught. "I love teaching," she shared. "When I teach, I also learn. I try to create an environment where the students and trainees can question me. I find that when they challenge me, I rethink what I am doing, why I am doing it. The student teaching the teacher is an amazing thing, as long as you are open to it."

Dr. Adam Gladwish is an alumnus of UTDRO's Residency and Fellowship programs. "Ida's ability to translate her wealth of experience into pertinent teaching sessions and practical advice was unparalleled," he recalls. "I am grateful to have had the fortune of training under her guidance and am undoubtedly a better physician for it. I am hopeful at least a fraction of her effectiveness as an educator was imparted upon me so that I can carry it forward to future trainees."

During her career, Ida has seen many technologies, including CT scans and MRI, develop and become standard in the clinical setting. She notes that with the proliferation of technology in the clinic, physicians have started relying more and more on the technology:

"The digitization of information has been one of the best changes during my career. We are able to assess the patient better, treat the disease better. However, we need to balance technology with the human. We need to sit down and talk to the patient and understand the patient. Yes, the technology is faster, but that human connection is very important. And we need to use clinical judgement to supplement technology because imaging may not always tell the whole story."

Ida has been mentoring and teaching UTDRO students since the Department's inception in 1991. She has seen the

When I teach, I also learn. I try to create an environment where the students and trainees can question me. I find that when they challenge me, I rethink what I am doing, why I am doing it. The student teaching the teacher is an amazing thing, as long as you are open to it.

Department grow its faculty and academic programs. "As the recent external review noted, the Residency program truly is the jewel in the crown of UTDRO," she said. "Also, the breadth and the depth of the faculty is another highlight of the department. There is amazing potential here; we just need to harness it more."

In addition to her roles at UTDRO and the Odette Cancer Centre, Ida also served as the President of the Canadian Association of Radiation Oncology (CARO) from 1997 to 1999. Following a temporary shutdown of radiation therapy services due to waitlist problems in Ontario, Ida inherited a tense environment at CA-RO. She called for a retreat to map out a time management study to help identify workload standards. From that retreat, guidelines for wait times for radiation therapy were developed and eventually adopted by the provincial cancer agencies.

After retiring, Ida will continue her mentorship role at UTDRO, as a "Wellness Ambassador" for postgraduate trainees. "I want to make sure that the trainees today feel the same way I did about my training many years ago. I want them to love it and to have a good time. Because if they are having a good time, they will want to do good work."

Ida's impact on the radiation medicine field reaches far and wide globally. With a focus on educating the next generation of radiation oncologists, Ida has mentees in all corners of the world. "Clinical care is about today. Teaching and research are about tomorrow. And I have tried to balance all three. I have tried to contribute to today and tomorrow in my own way." ♦

LEAVING A MARK
from the
CANADIAN SPACE AGENCY
to the
ODETTE CANCER CENTRE
Ekaterina Tchistiakova

Ekaterina Tchistiakova

With a PhD in neuroimaging, and research stints at the Canadian Space Agency and the Odette Cancer Centre, Ekaterina Tchistiakova's resume highlights many accomplishments. This Medical Physics Resident at the University of Toronto's Department of Radiation Oncology (UTDRO) has no plans to slow down.

Ekaterina came to Canada in her mid-teens and soon enrolled in a Medical and Health Physics program at McMaster University. During her co-op term, Ekaterina worked at the Canadian Space Agency in Montreal. Canadian astronaut Robert Thirsk was spending six months on board the International Space Station (ISS), and Ekaterina's team was tasked with monitoring radiation and conducting experiments on the ISS. This was Ekaterina's first introduction to radiation.

After her undergraduate training, Ekaterina did an internship at the Ottawa Cancer Centre, where she worked on validation of a new electron treatment planning system. Following this, she came to U of T for her Masters and PhD in Medical Biophysics. "My PhD took me away from radiation and towards neuroimaging," she shared. "I was working with MRI and looking at brain health and vascular function. But I also had an interest in radiation therapy. I realized that there was an appetite for integrating imaging technology, especially MR, into radiation therapy. And that's how I decided to pursue medical physics in radiation medicine."

Ekaterina's background in imaging is a good fit for the Medical Physics residency program, especially since the Odette Cancer Centre has been implementing new MR technology in their clinics. In her two-year residency, Ekaterina has been focusing on clinical projects, which will help her exposure to clinical radiation therapy and research.

Ekaterina has been involved in research with Matt Wronski and Brian Keller, both Assistant Professors at UTDRO and Medical Physicists at the Odette Cancer Centre. "Ekaterina has shown tremendous aptitude for clinical research while engaged in her medical physics residency here at Sunnybrook," said Brian. "She is a self-

starter who comes to you with the answers well ahead of the questions. Her curious nature, combined with her common sense approach, are well served attributes of a productive research career."

The Canadian Organization of Medical Physicists invited Ekaterina to share her research on the implementation of online in-vivo dosimetry for lung cancer patients treated with VMAT, and she later won the J.R. Cunningham Award for Academic Excellence in Research from UTDRO for this work. "This is the first research award I received in radiation therapy," she noted. "It is very encouraging and gratifying to know that my research is going to make a difference in the clinic."

More recently, Ekaterina has been working with Geordi Pang, UTDRO Associate Professor and Medical Physicist at the Odette Cancer Centre, on the implementation of MR-imaging in the radiation therapy clinic. With her strong background in imaging, Ekaterina is well positioned to explore the types of equipment modifications, which will be needed to bring MR into the clinic.

Outside of research, Ekaterina has been busy learning different aspects of radiation treatment. "This is a very enriched program because it exposes you to different disciplines in a very short time," she shared. "As a Physics resident, I have worked on projects with Radiation Oncology residents. Because of this, I already have a great rapport with my peers in radiation oncology and therapy. And this will help me later in my career as I build on these relationships and work with people from different disciplines."

Ekaterina is looking forward to completing her residency this year. "While it has been challenging to learn so much in a very short time," she said, "I am grateful for the many resources available to us and the support from faculty members and fellow residents. Yes, it is a lot of work, but at the same time, it is very gratifying." ♦

BALANCING CLINIC, RESEARCH AND ADVOCACY AS CHIEF RESIDENT

Ezra Hahn

As the Chief Resident at the University of Toronto's Department of Radiation Oncology (UTDRO), Ezra Hahn carefully balances his responsibilities with academic work, clinical training, research and personal life.

Even though Ezra completed his undergraduate degree in Mathematics at York University, he steered towards medicine and joined U of T's medical school. For his residency, Ezra chose UTDRO because Radiation Oncology combined his interests of mathematics, biology and patient interaction in one field.

Now in his fifth year of the Radiation Oncology Residency program, Ezra has been involved in mentoring junior residents and medical students.

Ezra's mathematical background has provided him with a unique foundation of knowledge that he can use to contribute to different types of research. "My research interests in mathematical modeling, machine learning and big data are like a tool that can be applied to different clinical questions and disease sites," he said.

Earlier in his residency, Ezra worked with UTDRO Professor David Hodgson to produce mathematical models of cardiac toxicity following radiation treatment in survivors of Hodgkin's Lymphoma. His research tracked patients over decades to find a link between radiation treatment and heart disease. This study was published in the International Journal of Radiation Oncology Biology Physics and led to Ezra being awarded the Clinical Care and Epidemiology Book Prize at CARO in 2016.

Ezra is now working with Justin Lee, Assistant Professor at UTDRO, to pilot a hypofractionated SBRT approach to improve the quality of life in patients with advanced or metastatic breast cancer.

For this research, Ezra received the Ellen Epstein Rykov Memorial Prize from U of T's Department of Post MD Education.

Andrea Bezjak, Professor at UTDRO and the Director of the Radiation Oncology Residency program, notes that "Ezra exemplifies the well-rounded trainee who is able to excel both clinically and academically," she shared. "He is setting himself well for a promising career ahead."

Last fall, the Princess Margaret Cancer Centre recognized Ezra's "excellence, patient centred values and inclusion of multidisciplinary input" with the Robert V. Brady Resident Award for Exemplary Compassion, Advocacy, and Patient Care.

In addition to his research and clinical duties, Ezra manages to carve out time for advocacy and educational activities. Being the Chief Resident, he organizes academic half days for his fellow Residents during which Residents are exposed to mock drills of possible cases they might come across in the clinic.

He also advocates for the program and often meets with medical students who are interested in the Residency program. He recalled an instance when he was asked to share some real-world cases with a group of undergraduate medical students. "I had personal experiences from my own clinics to share with this group," he said. "And I found that very rewarding. By teaching these students, I reinforced my own knowledge."

Upon completing the Residency program, Ezra hopes to begin a Clinical Fellowship focusing on head and neck cancers at UTDRO. "I want to continue learning and teaching at UTDRO," he said. "My experience here has been phenomenal thus far. The faculty are truly world-class and I want to continue learning with them." ♦



Ezra Hahn

SOUTH AMERICA'S FUTURE LEADERS OF RADIATION MEDICINE

Fabio Moraes, Lucas Mendez, Pablo Munoz

When Fabio Moraes, who is originally from Brazil, started his Clinical Fellowship at the Department of Radiation Oncology, University of Toronto (UTDRO), he was certain that he would return to South America after his training. "I was totally sure that I was going to go home," he said. "But with the enormous opportunities and support I have been exposed to at UTDRO, I feel that I can make a greater impact on cancer care, not only in Brazil but all of South America, if I extend my stay in Canada and focus on my research, clinical care and leadership initiatives."

Over the last two years, UTDRO has welcomed three Clinical Fellows from South America. UTDRO has an established history of attracting clinical fellows from both Canada and other parts of the world. Until recently, the number of South American fellows in the program was relatively limited. It has been a delight to have Fabio, Lucas and Pablo join the program and stay on to further their expertise. They showcase the success that is possible, and we hope that this will reach other trainees in South America and allow us to expand the impact of the UTDRO program in the future.

For the clinical component of his Fellowship, Fabio is focused on patients with central nervous system and the spine neoplasm. "I am currently committed to discovering, investigating, and developing transformative therapies that will improve the outlook for cancer patients," he commented. "I am learning to analyze unique tumor genetic characteristics, which will help me interpret and translate bench findings and potentially apply it in the clinic setting."

During his undergraduate and medical training, Fabio played tennis professionally and represented Brazil in international tournaments. However, he gave up tennis to focus on his medical training. During his

Radiation Oncology Residency in São Paulo, Brazil, Fabio also enrolled in a PhD program, which he hopes to complete in 2017. "Being a PhD student was a great opportunity for me," he said. "It helped me better understand research and to learn more about radiation medicine."

Lucas Mendez also hails from Brazil. He spent his younger years in Salvador-Bahia, and moved to São Paulo for his radiation oncology residency. He completed a Fellowship at the Hospital Israelita Albert Einstein and then moved to Toronto for a Clinical Fellowship focusing on brachytherapy for genitourinary and gynecologic tumours.

Lucas is currently enrolled in a Masters program through the Institute of Medical Science at U of T under the supervision of Dr. Shun Wong and the gynaecological team at OCC. "For my thesis, I am exploring ways to simplify radiotherapy techniques for cervical cancer so that it can be more accessible for low and middle income countries," he explained. "In Brazil, we don't offer image-guided brachytherapy routinely for gynecological tumors. This is unfortunate because Brazil has a high incidence of locally advanced cervical cancer. I want to help bridge the gap between state of the art treatment in cervical cancers and MRI inaccessibility in the developing world."

Chilean Radiation Oncologist, Pablo Munoz, is also a Clinical Fellow at UTDRO. Pablo completed his medical school and residency at the Pontifical Catholic University of Chile, and then joined the University as a faculty member. After his training in Toronto, Pablo plans to return to Chile as an academic radiation oncologist.

During his Fellowship at UTDRO, Pablo is focusing on high-precision radiotherapy, or SBRT, for thoracic and gastrointestinal



L to R: Fabio Moraes, Lucas Mendez, Pablo Munoz

malignancies. When he returns to Chile, Pablo intends to introduce image-guided and high-precision radiotherapy to the hospitals. “There is a critical lack of expertise in these areas,” he said. “I want to build on my experience here at UTDRO and apply my knowledge to take on a leadership role in high-precision radiotherapy in South America.”

In addition to clinical duties, all UTDRO fellows spend time conducting research. “Research to advance the field of radiation medicine is embedded in the ethos of UTDRO,” noted Pablo. They all agree that even though adjusting to a new environment and clinical duties take up much of their time, they are committed to research and want to be involved as much as possible.

Lucas is one of the Principal Investigators on a funded Phase 1/2 trial at the Odette Cancer Centre, along with Gerard Morton, an Associate Professor at UTDRO. This trial is exploring safety and feasibility of combining two different brachytherapy techniques, high dose rate and low dose rate, to treat prostate cancer. “This is the biggest highlight of my training at UTDRO,” said Lucas. “The mentors and faculty at U of T provide you with the capabilities and opportunities to reach beyond your limits. They didn’t provide me with answers; they gave me the tools to find the possible solutions for a specific question and to conduct the study from start to finish.” In addition to this study, Lucas recently published a paper in Radiotherapy and Oncology, which was rated by the American College of Radiology as the top gynecology paper for that month.

Pablo has been involved in research at both the Odette and the Princess Margaret Cancer Centres. In collaboration with UTDRO Professor Laura Dawson, Pablo has been exploring SBRT as a bridge to transplant therapy for patients with hepatocellular carcinoma. Recently, he received a trainee award for his research proposal on kidney SBRT from the Canadian Urological Oncology Group. Pablo is also working with UTDRO Professor Rebecca Wong to analyze the quality of life in patients with oligometastases who are treated as part of an ongoing Phase 2 trial at the Princess Margaret. He noted that in South America, trainees “are not exposed to clinical trials and cutting edge research

I want to build on my experience here at UTDRO and apply my knowledge to take on a leadership role in high-precision radiotherapy in South America.

- Pablo Munoz

because the healthcare environment is very different. We are fortunate to be at UTDRO where research is embedded in the culture of the Department.”

Fabio explained that he was already involved in research in Brazil. “I was mapping radiation oncology facilities in Brazil to explore how the lack of these facilities is having an impact on cancer care in Brazil.” Due to this work, he was invited to join the Union for International Cancer Control (UICC) and presented with a Young Leaders Award by UICC. With UICC, Fabio has been working on several global cancer control projects. Earlier this year, he was invited to participate in the global cancer staging consultation at the Lancet headquarters in the United Kingdom. Fabio’s international collaborations were also recognized by U of T through the Postgraduate Medical Trainee Leadership Award.

Fabio and Pablo were invited to be the 2017 co-chief Fellows for their program. “In this role, we try to advocate for our program on different levels,” said Fabio. “It is a great experience for us to learn leadership skills directly from the Chair and the program directors. We are involved in discussions and decision making which will impact not just the current trainees, but future trainees too.”

“This experience of acting as co-chiefs has changed the way we look at leadership,” Pablo added. “We need to help our fellow trainees achieve their goals. And it’s not just about us, here at UTDRO. We have to think globally. UTDRO is training radiation oncologists and scientists who will go back to different places in the world. In this way, UTDRO is impacting radiation medicine globally through the Fellowship program.” ♦

BRONWYN KING

UTDRO Alumna who took on the Tobacco Industry

“Force of nature”, “Superwoman”, “Powerhouse”. These are just some of the adjectives used in headlines to describe Dr. Bronwyn King, the woman who took on Big Tobacco.

Bronwyn is an Australian radiation oncologist who trained at Melbourne University and came to the University of Toronto’s Department of Radiation Oncology (UTDRO) for a clinical fellowship in 2008. Today, she is a radiation oncologist at Epworth Healthcare, holds an honorary appointment with the Peter MacCallum Cancer Centre (Peter Mac), and is the CEO of Tobacco Free Portfolios.

In the early day of her medical career, Bronwyn worked in the lung cancer ward at Peter Mac. Most of her patients had been impacted by tobacco, and most of them died of tobacco-related cancer. “It really struck me then,” said Bronwyn. “I became acutely aware of the suffering and devastation caused by tobacco.”

Fast forward to ten years later, Bronwyn and her husband, Dr. Mark Shaw set out to buy a house in Melbourne. Their accountant advised them to look into their finances, including their pension plan. In Australia, contributing to the pension plan is mandatory and does not require much, if any, decision-making from the members.

Bronwyn set up a meeting with a representative from her pension plan. As the meeting ended, Bronwyn realized that she did not know how her money was being invested. The representative informed her that she was in the ‘default option’, but that there was a different ‘greenie’ option for those who do not want to invest in mining, alcohol or tobacco companies.

“The realization that I owned stock in the world’s biggest tobacco companies really rattled me,” said Bronwyn. “And not only did I hold stock in tobacco, all of the staff at the hospital did too.”

Bronwyn immediately raised the issue with the CEO of Peter Mac, who agreed that investing in tobacco companies was poorly aligned with the hospital’s vision of eradicating cancer. Within 24 hours, Bronwyn found herself booked in to present to the CEO and investment team of the hospital pension plan. She explained to them why they should reconsider the issue of tobacco and implement a tobacco-free investment policy.

“In 2010 it was unusual for members to ask pension funds to rethink where money was being invested,” explained Bronwyn. “They took



Bronwyn King

some time to warm to the idea, but they eventually agreed to exclude tobacco companies from all of their investments. In 2012, this pension fund went tobacco-free, and the CEO of the pension fund has been supporting me in this cause ever since.”

This meeting was the start of thousands of meetings in boardrooms and cafes with finance leaders, bankers, insurers and investors in Australia and now around the world. Bronwyn has been quietly engaging with finance leaders; partnering with them to address this issue and working with them to develop a framework that suits the goals of the finance sector and enabling them to move their funds away from the tobacco industry.

With her direct approach and willingness to work with the finance sector, Bronwyn has managed to convince investors around the world to redirect \$8 billion AUD away from tobacco companies. To date, investors in Australia, France, United Kingdom, United States of America, New Zealand, Denmark, Sweden, Ireland and the Netherlands have shifted their funds to alternative industries. “But this is not enough,” said Bronwyn. “Tobacco kills 7 million people each year and that is 7 million too many.”

In 2010, Bronwyn started engaging with the finance sector. Five years later, almost half of Australia’s pension funds were tobacco-free. In 2015, Union for International Cancer Control kindly provided seed funding which allowed the work to expand globally. Bronwyn now works with a team of three covering a dozen countries.

Bronwyn now juggles her clinical duties with running Tobacco Free Portfolios, which required her to learn a new language – the language of the finance

“The realization that I owned stock in the world’s biggest tobacco companies really rattled me. And not only did I hold stock in tobacco, all of the staff at the hospital did too.”

sector – in order to connect with finance leaders and help them to defend taking a strong position on tobacco. “The health sector is already united against tobacco, and now the finance sector has to come on board so we can tackle this problem together.”

While this newfound financial knowledge has made her credible to investors, Bronwyn’s radiation oncology background has shaped her to take on Big Tobacco. “It’s an advantage to be able to tell the story of tobacco from the front lines,” she said. “I understand what tobacco does to people. And I realize that those who suffer from tobacco-related illnesses cannot champion this cause because they are too sick or have passed away. I feel compelled to try to change things on their behalf.”

Bronwyn is in talks with dozens of investors and finance leaders to bring them along the tobacco-free journey. Tobacco Free Portfolios is currently seeking funding to be able to operate in other countries, including Canada.

“I miss my time in Canada,” she noted. “My husband and I did our fellowships together at UTDRO. He specialized in genitourinary cancers and I specialized in gynecologic and breast cancers. We learned a lot from great teachers and enjoyed our time in that beautiful city. Toronto will be a year of our lives that we’ll never forget.” ♦

MOBILIZING CSRTs TODAY FOR A BETTER HEALTHCARE SYSTEM TOMORROW

Laura D’Alimonte and Kitty Chan



L to R: Laura D’Alimonte, Kitty Chan

The Masters of Health Science in Medical Radiation Sciences (MHScMRS) program trains radiation therapists for leadership roles. Therefore, it is not surprising that most of the alumni of this program are now Clinical Specialist Radiation Therapists (CSRTs), helping to improve the efficiency and effectiveness of the healthcare system and patient outcomes.

The CSRT role was created by Cancer Care Ontario as a pilot project to explore the benefits of advanced practice in radiation therapy. They observed that empowering, training and enabling radiation therapists to perform advanced practice tasks yielded greater benefits to the cancer care system. CSRTs were able to expedite the treatment process, which saved both the patients’ as well as the physicians’ time; and they were able to increase patient throughput, which saved the system time.

In 2015, the CSRT group in Ontario branched out on their own and created a Community of Practice (CoP) supported by Cancer Care Ontario. The objectives of this CoP were to support the Ontario CSRTs to the CSRT profession, and to advocate for CSRTs Canada-wide.

Laura D’Alimonte and Kitty Chan are both graduates of the MHScMRS program, and CSRTs focused on brachytherapy. Kitty is based at the Princess Margaret Cancer Centre (PM), and Laura is based at the Odette Cancer Centre (OCC).

When the CSRT CoP issued a call for co-chairs, Laura jumped at the opportunity. “Since my undergrad at U of T/Michener, I was interested in leadership opportunities,” she said. “The MHScMRS program exposed us to various leadership roles and skills, and increased my interest in leadership opportunities. As the Interim Professional Practice lead at OCC and as a CSRT, I was working in leadership roles when the CoP was created. This co-chair role with the CSRT CoP is a culmination of years of training, and building upon leadership experience for me.”

Kitty was already a CSRT and part of the CoP at the time of its launch. A few months later, she joined Laura as a co-chair of the group. “I leveraged the MHScMRS program to broaden my horizon,” she said. “In the program, I explored how radiation therapists fit in leadership positions in healthcare. I learned the importance of building our profession today so that we can be its leaders tomorrow. That is why the co-chair position for our CSRT CoP appealed to me.”

As the co-chairs, Kitty and Laura have been busy carving out goals and deliverables for their group of CSRTs. “At the end of the year, we need to be able to quantify the contributions that CSRTs make,” Kitty explained. We need to build a business case for hospitals and demonstrate the value of having a CSRT on board.”

They have created four working groups within their CoP, each of which will provide evidence of the benefits of implementing CSRTs in the hospitals:

1. **CSRT in the palliative setting** to show how CSRTs benefit the patients and the centres
2. **Advanced practice resources** to capture workload codes and define advanced practice roles
3. **Communications** to raise awareness about the CSRT roles nationally and to connect with advanced practice professionals around the world
4. **Advanced practice certification** to support CSRTs in obtaining the Advanced Practice Radiation Therapist (APRT) certification from the Canadian Association of Medical Radiation Technologists

“Through these working groups, we ultimately want to become an autonomous group of certified professionals who are integrated into every cancer centre in Canada,” added Laura. “And for that, we need to look beyond our centres’ immediate needs. We need to look at the needs of the healthcare system 10 years from now, and start building the case within our profession today.” ♦

CLINICAL REPORT

ODETTE CANCER CENTRE

Dr. Gregory Czarnota

The clinical, research and educational activities of the Radiation Treatment Program at Odette Cancer Centre (Odette), Sunnybrook Health Sciences Centre (Sunnybrook) continued to be energetically active in 2016-2017. In the past year, Odette was very busy with high clinical volumes of over 7100 new radiation oncology consultations. With the addition of our Gamma-Knife in 2017, the program has expanded its use of hypofractionated brain stereotactic treatments in addition to its single fraction radiosurgery program. We have also continued to expand our SBRT expertise with large clinical and research programs within each major disease site (e.g. prostate, pancreas, liver, CNS, breast, etc.). Odette also has an active oligometastases program with multiple ongoing clinical trials. Prostate brachytherapy continues to be a priority program and our gynecologic interstitial brachytherapy program continues to grow with the leadership of Dr. Eric Leung.

From a manpower point of view, there were no retirements or hires within this reporting period, though one position was advertised (and since been filled). Steve Russell continues as our Manager and Head of Radiotherapy. Dr. William Song concluded his role of Head of Physics in March 2017. A selection committee has been created to recruit a new Head of Physics.

The Program continues to foster its regional leadership role in cancer care. Radiation Oncologists continued to participate in radiation oncology clinics, and multidisciplinary cancer conferences at a large number of academic and community hospitals including the North York General Hospital, MacKenzie Health, Royal Victoria Hospital, The Scarborough Hospital, Rouge Valley Hospital (Centenary Site), Humber River Regional Hospital, Toronto East General Hospital and St. Michael's Hospital.

Despite the very competitive grant funding climate, faculty members continued to be successful at capturing funding with over \$30 million dollars in external peer-reviewed and industry-supported grants. Faculty at Sunnybrook published over 400 peer-reviewed scholarly articles in 2015, with 161 as primary or senior responsible author. These research grants and publications are detailed elsewhere in the annual report. ♦

CLINICAL REPORT

PRINCESS MARGARET CANCER CENTRE

Dr. John Kim

The Princess Margaret Cancer Centre, Radiation Medicine Program (RMP) is now comprised of 36 radiation oncologists, 33 radiation physicists, 160 radiation therapists, 6 advanced practice radiation therapists, 3 nurse practitioners, 1 physician assistant and 115 administrative, technical and support staff. As one of the world's largest radiation medicine programs, our clinical activities included 8,596 patient consultations with the delivery of 10,626 courses of radiation therapy in fiscal year 2016-2017. The promotion of Quality and Safety continues to be a program priority. In addition to our well established quality and incident reporting program, peer-review site-based rounds for all tumour types, and program-wide monthly quality rounds, we are fully engaged in a University Health Network (UHN)-wide Caring Safely initiative. RMP continues to develop a patient-centred state-of-the-art conformal and image-guided radiation therapy agenda. Expansion of our clinical and research MR-guided activities is planned with the commissioning of a MR-Linac over the next year complimenting the current leading efforts of our GU/GYNE Site Groups in our magnetic resonance-guided radiation therapy (MRgRT) suite. RMP is once again undergoing major transformative changes including implementation of a new treatment planning system with many anticipated clinical, research and educational opportunities for the ultimate benefit for our patients.

Over the past year we have welcomed radiation oncologists Dr. Joelle Helou, Dr. Aisling Barry and Dr. Ali Hosni to RMP. Colleen Dickie was appointed Manager, Strategic Operations, Radiation Therapy. Two RMP Physicists were appointed to UTDRO, Dr. Tony Tadic (Assistant Professor) and Dr. Jette Borg (Lecturer). Dr. Catherine Coolens was promoted to the rank of Associate Professor, UTDRO.

Dr. Robert Dinniwell assumed the role of the Chair and Chief of the Division of Radiation Oncology, and Regional Radiation Lead, Department of Oncology at the London Regional

Cancer Program, London Health Sciences Centre. Dr. Rob Bristow has joined The University of Manchester as their new Director of the Manchester Cancer Research Centre.

RMP staff continue to hold major local, provincial, national and international leadership positions. Past year highlights include Dr. Fei-Fei Liu's reappointment for a second term as Chair, UTDRO. Dr. David Hodgson was appointed as the Medical Director of the Paediatric Oncology Group of Ontario (POGO).

Research achievements in the past calendar year include obtaining over \$35.8 million in peer-reviewed funding and 145 peer-reviewed grants; 233 peer-reviewed publications; with 183 prospective research protocols open; and accruing 11.4% of new patients onto prospective clinical research studies.

Publication highlights include Normand Laperriere, Arjun Sahgal (Odette) and colleagues publishing 'Short-Course Radiation plus Temozolomide in Elderly Patients with Glioblastoma' in The New England Journal of Medicine; Charles Catton and team publishing the results of the 'Randomized Trial of a Hypofractionated Radiation Regimen for the Treatment of Localized Prostate Cancer' in the Journal of Clinical Oncology; and Dr. Brian O'Sullivan, S. Huang and collaborators publishing 'Development and validation of a staging system for HPV related oropharyngeal cancer by the International Collaboration on Oropharyngeal cancer Network for Staging (ICON-S): A multicentre cohort study' in Lancet Oncology. The 8th edition of the UICC TNM Classification of Malignant Tumours was published under the editorial leadership of Dr. James Brierley and UICC past-president Dr. Mary Gospodarowicz with contribution from Dr. Brian O'Sullivan. ♦

UTDRO FACULTY MEMBERS

JULY 1, 2016 TO JUNE 30, 2017

PROFESSORS

Andrea Bezjak
James Brierley
Charles Catton
Edward Chow
Bernard Cummings
Laura Dawson
Anthony Fyles
Mary Gospodarowicz
Richard Hill
David Hodgson
David Jaffray
Normand Laperriere
Fei-Fei Liu
Andrew Loblaw
Michael Milosevic
Brian O’Sullivan
Michael Rauth
Jolie Ringash
Arjun Sahgal
Richard Tsang
Alex Vitkin
Padraig Warde
Rebecca Wong
Shun Wong
Bradly Wouters

ASSOCIATE PROFESSORS

Ida Ackerman
Lisa Barbera
Jean-Pierre Bissonnette
Patrick Cheung
Catherine Coolens
Gregory Czarnota
Charles Hayter
John Kim
Cynthia Menard
Gerard Morton
Geordi Pang
Lawrence Paszat
David Payne
Thomas Purdie
Eileen Rakovitch
Tara Rosewall
William Song
Alexander Sun
Ewa Szumacher
May Tsao
Yee Ung
John Waldron
David Wiljer

ASSISTANT PROFESSORS

Ali Hosni Ali
Abdalaty
Hamideh Alasti
Steven Babic
Elizabeth (Toni) Barnes
Aisling Barry
Andrew Bayley
Nathan Becker
Alejandro Berlin
Anthony Brade
Scott Bratman
Stephen Breen
Lee Chin
John Cho
Young-Bin Cho
James Chow
William Chu
Brige Chugh
Hans Chung
Peter Chung
Tim Craig
Jennifer Croke
Melanie Davidson
Colleen Dickie
Robert Dinniwell
Mary Doherty
Warren Foltz
Caitlin Gillan
Meredith Giuliani
Kathy Han
Nicole Harnett
Joelle Helou
Lori Holden
Andrew Hope
Sophie Huang
Mohammad Islam
Irene Karam
Zahra Kassam
Brian Keller
Harald Keller
Anthony Kim
Luluel Khan
Anne Christine Koch
Marianne Koritzinsky
Renee Korol
Patricia Lindsay

Stan Liu
Grace Lee
Justin Lee
Young Lee
Daniel Letourneau
Eric Leung
Wilfred Levin
Benjamin Lok
Kathy Mah
Lee Manchul
Claire McCann
Andrea McNiven
Barbara-Ann Millar
Douglas Moseley
Sten Myrehaug
Cathryn Palmer
Lisa Di Prospero
John Radwan
Ananth Ravi
Alexandra Rink
Mark Ruschin
Arman Sarfehnia
David Shultz
Katharina Sixel
Hany Soliman
Teodor Stanescu
Amandeep Singh
Taggar
Kieng Tan
Mojgan Taremi
Danny Vesprini
Douglass Vines
Robert Weersink
Woodrow Wells
Matt Wronski
Collins Yeboah
Ivan Yeung
Beibei Zhang

LECTURERS

David Beachey
Jette Borg
Renata Bradley
Angela Cashell
Charles Cho
Daria Comsa
Laura D’Alimonte
Louis Fenkell
Marisa Finlay
Audrey Friedman
Robert Heaton
Jane Higgins
Glenn Jones
Juhu Kamra
Valerie Kelly
Winnie Li
Jidong Lian
Rosanna Macri
Karen Moline
Kari Osmar
Sarah Rauth
Raxa Sankreacha
Senti Senthelal
Anna Simeonov
Emily Sinclair
Jacqueline Spayne
Christiaan Stevens
Chia-Lin (Eric) Tseng
Jonathan Tsao
Angela Turner
Yongjin Wang
Jason Wong
Frederick Yoon
Jasper Yuen
Grace Zeng

INSTRUCTORS

Martin Chai
Patricia Charman
Krista Dawdy
Darby Erler
Carina Feuz
Wendy Flanagan
Floencia Jon
Natalie Lauzon
Nadiya Makhani
Marc Potvin
Joe Presutti
Aisha Sheikh

UTDRO TRAINEES

JULY 1, 2016 TO JUNE 30, 2017

FELLOWS

Fawzi Abuhijla
Hossam Alassaf
Fatimah Alfaraj
Majed Alghamdi
Motasem Al-Hanaqta
Taghreed Al-Hindi
Abdulla Al-Rashdan
Kevin Chiu
Melvin Chua
Shira Felder
Alireza Fotouhi-Ghiam
Adam Gladwish
Georgia Harris
Ali Hosni
Michael Jones
Jonathan Klein
Nafisha Lalani
Magali Lecavalier-Barsoum
Hester Lieng
Andrea Lo
Lucas Mendez
Fabio Moraes
Hane Muamenah
Shirin Namini
Shrinivas Rathod
Kathy Rock
Pablo Schuffenegger
Aravind Sundar
Monali Swain
Robert Thompson
Anil Tibdewal
Reem Ujaimi
Vivian Yau

PHYSICS RESIDENTS

Syed “Bilal” Ahmad
Michael Balderson
Eric Da Silva
Alyaa Elzibak
Michael Jensen
Anthony Lausch
Daniel Markel
Shahram Mashouf
Sandra Meyers
Ekaterina Tchistiakova
Jeff Winter
Shima Yaghoobpour Tari
Roja Zakariaee

RADIATION ONCOLOGY RESIDENTS

Jenna Adleman
Yasir Alayed
Mohammed Aldehaim
Aisha Al-Qaderi
Ahmad Bushehri
Jay Detsky
Neil D’Souza
Salman (Muhammad) Faruqi
Rachel Glicksman
Ezra Hahn
Mohammad Hasan
Yaser Hasan
Jennifer Kwan
Pencilla Lang
Sangjune (Laurence) Lee
Gordon Locke
Aruz Mesci
Mark Niglas
Sylvia Ng
Srinivas Raman
Hamid-Reza Raziee
Danielle Rodin
Jonathan So
Horia Vulpe
Yonatan Weiss
Kang Liang Zeng

MHSc in MEDICAL RADIATION SCIENCES

Joanna McCusker
Nastasha (Tasha) McMaster
Winter Spence

DONOR RECOGNITION

JULY 1, 2016 TO JUNE 30, 2017

CHAMPIONS

(\$25,000 or more)

Department of Radiation Oncology,
Princess Margaret Cancer Centre

Sunnybrook Radiation Oncology
Association

Richard Wong

SUPPORTERS

(\$1,000 to \$4,999)

Bernard J. Cummings

Michael Milosevic

Felicia Morrison

Jacqueline A. Spayne

Padraig R. Warde

PARTNERS

(\$5,000 to \$24,999)

Rebecca Wong

Shun Wong

FRIENDS

(Upto \$999)

Ida Ackerman

Jennifer Croke

Ciaran Graham

John Kim

Simon S. Lo

Douglas Moseley

Srinivas Raman

Danny Vesprini

Roxana Vlad

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