WesCan 20/20: Maintaining Clarity in a Complex Future

Event Agenda

Event Location: Inn at Laurel Point
680 Montreal St.
Victoria BC V8V 1Z8

PRE – DAY 1: March 12, 2020	
6:00 – 9:00 pm	Conference Check-in/Registration Icebreaker & Social Event (Rogers Suite – 6th floor Erickson Wing)

DAY 1 – March 13, 2020	
8:00 am	Conference Check-in/registration opens Coffee and Mingling (Lobby outside Spirit Rooms)
8:45 am	Opening Remarks from Dr. Wayne Beckham
9:00 – 10:00 am	**Keynote address from Dr. Karl Otto** Deep Learning: Important Concepts and Application to Automatic Segmentation of Medical Images (Spirit Rooms)
10:00 – 10:40 am	**RT Therapist Session : 10 minutes + 2 for questions** (Spirit Rooms) **Kelly Earnshaw** Improving bladder and bowel variability during prostate radiotherapy using a standard protocol and daily patient feedback **Valerie Small** ALIGN RT – Surface guided radiation therapy as used at VIC **Ankit Sondhi and Helene Gaffney** Planning comparison of field in field tangent breast radiation therapy using Varian Eclipse treatment planning system vs. EZFluence, an automated planning software: Planning time and quality
10:40 - 11:00am	Morning Break

11:00 am – 12:15 pm	**<u>Technologist Session: 10 minutes + 2 for questions</u>** (Spirit Rooms) **Claudia Mendez** eFLASH Radiotherapy at BC Cancer – Vancouver **Don Ta** Development of a Phantom Incorporating Simultaneous Cardiac and Respiratory Motions **Kim Lawyer** Squint – Efficient DVH-based plan comparison and evaluation using ESAPI **Nathan Smela** 3D printing silicone bolus **Cody Crewson** Leapfrogging Software. A story of skipping Aria RO 13 **<u>Physicist Talk: 10 minutes + 2 for questions</u>** **Parminder Basran** Evaluation of radiomic feature selection and classification algorithms in microCT of racehorse bones
12:15 – 12:30 pm	WesCan 2020 Group Photo
12:30 – 1:30 pm	Buffet Lunch
1:30 – 2:30 pm	**<u>Keynote address from Caitlin Gillan</u>** Square Peg, Round Hole: Conceptualizing AI's Disruption to Practice (Spirit Rooms)
2:30 – 3:15 pm	**<u>Physicist Session 1: 3 minutes + 1 for questions</u>** (Spirit Rooms) **Carmen Popescu** The Vancouver Island experience in prone breast radiotherapy - moving forward **Cheryl Duzenli** CARA Breast Positioning: Study updates **Zahra Anjomani** A Robust and clinically relevant skin toxicity indicator in Permanent Breast Seed Implant brachytherapy **Manuel Rodriguez** Novel User-friendly Software to Streamline QA of HDR Brachytherapy Plan **Quinn Matthews** Evidence-based PTV margin reduction for modern lung SABR using deformable registration

	Iulian Badragan A Study in Least Squares - The Mysterious Case of the Gamma Rate Sweet Spot
3:15 – 3:30 pm	Afternoon Break
3:30 – 5:00 pm	**<u>Physics Student Session: 10 minutes + 2 for questions</u>** (Spirit Rooms) **Chelsea Dunning** Photon-counting computed tomography of lanthanide contrast agents with a high-flux 330um cadmium zinc telluride (CZT) detector **Emilie Carpentier** A novel method for calculating dose on different breathing phases during dynamic tumour tracking on the VERO4DRT linear accelerator **Devon Richtsmeier** Parameter optimization for multi-contrast imaging using photon-counting CT **Radim Barta** How to build an RF-coil for the Rotating B0 Linac-MR **Kyle Bromma** Determining the effect of nano-based therapeutics in cancer vs normal cells **Alexander Hart** FDG Dose Reduction Based on NEMA PET Phantom study **Thomas Mann** No more “spherical” patients: Path to improved radiosurgery treatment based on optimized beam angles
6:00 – 10:00 pm	Dinner Banquet and Awards (Terrace Ballroom)

DAY 2 – March 14, 2020	
8:15 – 8:45 am	Coffee and Mingling (Spirit Rooms)
8:45 – 10:00 am	**<u>Physicist Session 2</u>** (Spirit Rooms) **<u>Oral (10 minutes + 2 for questions)</u>** **Alanah Bergman** First Trajectory-Based VMAT Clinical Delivery in Canada: Dynamic Wave Arc (DWA) **Matthew Larocque** Conformal Ocular Brachytherapy in Alberta **Sarah Quirk** A programmatic approach to automation in radiotherapy at the TBCC

	Steven Thomas Susceptibility Induced MRI Geometric Distortion Prediction **<u>Rapid fire Oral (3 minutes + 1 for questions)</u>** **Steven Thomas** Titanium Susceptibility Measurements of Spine Hardware **Tony Mestrovic** Comparing different methods of assessing the safety of complex treatment plans with dynamic tumour tracking on the Vero4DRT linear accelerator **Conor Shaw** Timeline of Symptoms Leading to the Discovery of Damage to a Varian Clinac Target **Lesley Baldwin** Commissioning of a patient-specific 3D printed bolus program for clinical radiotherapy at the Cross Cancer Institute	
10:00 – 10:30 am	Transportation to BC Cancer – Victoria Morning Break once arriving at BC Cancer – Victoria	
10:30 – 11:15 am	Demonstration #1	Two stations will include: • CDR Systems (CT Sim Room #1) • Ultraray – on full product line from Klarity (CT Sim Room #2) Note: attendees will be divided into two groups and rotate through demonstrations.
11:15 – 12:00 pm	Demonstration #2	
12:00 – 12:30 pm	Tour of BC Cancer – Victoria Radiation Therapy department	
12:30 – 12:45 pm	Transportation back to the Inn at Laurel Point	
12:45 – 1:45 pm	Boxed lunch	
1:30 – 2:00 pm	Business meeting to discuss the future of WesCan 2021 Some members of the current organizing committee will join anyone interested in hosting WesCan 2021 (Location TBD)	
3:00 – 5:00 pm	Explore Victoria Walk (Meet in the lobby at the Inn at Laurel Point)	
7:00 pm	WesCan Pub Crawl (Meet in the lobby at the Inn at Laurel Point)	

Keynote Address from Dr. Karl Otto

Deep Learning: Important Concepts and Application to Automatic Segmentation of Medical Images

Deep Learning (DL) has shown promise for advancing a wide range of different fields. Self-driving cars, drug discovery, robotics, virtual assistants and more. A key ingredient for success with Deep Learning is large amounts of labeled data. Radiation therapy is a promising area for applying DL because each patient has many forms of data associated with them including images, dose distributions, treatment delivery parameters, consultation notes etc. Deep learning has been applied to natural image classification and object detection since it first showed promise in 2012. In our work we explore current and emerging DL methods that are applicable to RT images. In particular, we have developed a comprehensive platform for automatic segmentation (contouring) of CT and MRI images (Limbus Contour).

Limbus Contour uses a multi-layer "U-net" deep neural network. The U-net architecture accepts a series of CT or MRI images as input. At each network layer the input from the previous layer is processed and rescaled by applying multichannel convolution operations. Each layer forms a deeper abstraction of the possible shape and location of the structure being contoured. These abstractions are then deconvolved and expanded in another series of layers to build a new image where each pixel represents the probability that the structure exists at that location. The DNNs were trained for a variety of structures using several expert contoured scans as reference. Structures included all typical head and neck, CNS, lung and pelvis healthy tissue structures used in RT planning. A separate set of scans was used to evaluate the accuracy of the DNN contours.

DL based auto-segmentation can reduce contouring time dramatically, by 90% in most cases. Auto-segmented contours closely match RO contours and fall within inter-observer variability, particularly for OARs. Auto-segmented CTVs can serve as a starting point for subsequent manual edits.

Learning Objectives:

1. Understand the basic concepts of deep learning and how this rapidly evolving technology can be applied to automatic contouring of medical images.
2. Learn how state of the art deep learning based contours compare to expert contours.
3. Understand how deep learning methods can be successfully integrated into the clinical environment.

Dr. Karl Otto, PhD FCCPM MCCPM

Karl Otto is an Adjunct Professor in the Department of Physics and Astronomy at the University of British Columbia. His research includes Volumetric Modulated Arc Therapy (VMAT), 4D VMAT planning and real-time interactive planning methods for general and adaptive RT. The planning algorithms developed by Dr. Otto are now included in the commercial RapidArc platform offered by Varian Medical Systems. RapidArc is now used in over 1000 centers worldwide. Dr. Otto received the British Columbia Young Innovator Award and the Canadian Organization of Medical Physics his development of VMAT. He also received the Sylvia Fedoruk award and Publication Impact Prize from the Canadian Organization of

Medical Physics for this contribution. More recently Dr Otto joined Limbus AI to pursue applications of Deep Learning and Artificial Intelligence for RT planning and treatment.

Keynote Address from Caitlin Gillan

Square Peg, Round Hole: Conceptualizing AI's Disruption to Practice

Artificial intelligence (AI) in healthcare will require consideration of employment, training, education, and professional regulation. Recognizing that we are best served by taking a proactive approach to considering the nature and potential scope of AI, both in its benefit to our patients and in its impact on healthcare and those who practice it, it is important that we equip ourselves to engage in the relevant conversations. In radiation medicine we find ourselves at a crossroads, where our professions need to decide how they envision the impact of AI in our practice, and how we can collaboratively define appropriate AI-enabled care alongside society, industry, and other stakeholders.

Gains in quality and efficiency in radiation medicine practice will require new workflows, skills and even models of care for all relevant professional groups. As we work to separate the reality from the hype, the cautious optimism from the fearmongering, and the human opportunities from the expansion of technology, we can begin to prepare for the future. Doing so will require an acknowledgement that we are not simply replacing humans with AI within the existing model of radiation medicine practice, but rather fundamentally disrupting practice by augmenting human abilities.

This session will highlight the professional, ethical, regulative, and educational considerations around AI that should be as equally emphasized as the clinical and technical advancements in order to ensure responsible integration while maximizing potential. Technology is only as good as the people and system equipped to support it.

Caitlin Gillan, MRT(T) BSc MEd FCAMRT

Caitlin is a radiation therapist by training, having practiced for 12 years at the Princess Margaret Cancer Centre in Toronto. Since 2019, she has served as the Manager of Education and Practice for the Joint Department of Medical Imaging at Sinai Health, University Health Network, and Women's College Hospital. She is currently immersed in her PhD at the University of Toronto, considering how medical imaging and radiation therapy professions are preparing for artificial intelligence.

Scientific Session Chairs

RT Therapist Session

- Cathy Lacey, Radiation Therapist
- Carmen Popescu, Medical Physicist

Technologist Session + Physicist Talk

- Derek Wells, Medical Physicist
- Nolan Esplen, Medical Physics Graduate Student

Physicist Session 1

- Parminder Basran, Medical Physicist
- Devon Richtsmeier, Medical Physics Graduate Student

Physics Student Session

- Will Ansbacher, Medical Physicist (retired)
- Evan Maynard, Medical Physics Resident

Physicist Session 2

- Manuel Rodriguez-Vega, Medical Physicist
- Alexander Hart, Medical Physics Graduate Student