POON RESEARCH EVENING 2017

DIAMOND HEALTH CARE CENTRE, 1020 LT
VANCOUVER GENERAL HOSPITAL
2775 LAUREL STREET

WEDNESDAY, JUNE 7, 2017 @ 5:00 PM

Accredited by UBC CPD
CONTINUING PROFESSIONAL DEVELOPMENT
FACULTY OF MEDICINE
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SUMMARY

AWARD PRESENTED
The Dr. Peter Poon Memorial Research Award

ADJUDICATORS
You, the Audience!
Please kindly fill out the attached ‘Scoring Sheet’ with your ratings for each presentation. Scores will be tabulated and the winners will be awarded the prizes at the PGY 5 Graduation Dinner on June 14, 2017.

If you prefer to submit your scoring sheet electronically after the presentations, please complete the following Google Form: goo.gl/4tf6uE

ACCREDITATION
UBC Radiology’s Poon Research Evening is an Accredited Group Learning Activity eligible for up to 1.0 Section 1 credits as defined by the Maintenance of Certification program of the Royal College of Physicians and Surgeons of Canada. This program has been reviewed and approved by UBC Division of Continuing Professional Development. Each physician should claim only those credits he/she actually spent in the activity.

To claim credits, please complete the ‘Assessment of Radiology Grand Rounds’ form as you would do for other Grand Rounds: goo.gl/XU5CB4. A letter indicating the number of credits earned (including credits earned from viewing other Grand Rounds) will be sent to your email address in January 2018.

LEARNING OBJECTIVES
1. Appreciate the diversity of resident research and the associated medical and imaging background within a Canadian Radiology Residency Program.
2. Critique and optimize experimental design, from hypothesis to conclusion, of the presented projects.
3. Provide feedback to the speakers in assurance of high quality of the oral presentation of their research in a limited time period.

IN ATTENDANCE

Mrs. Myrna Poon
Widow of Dr. Peter Poon
# SCHEDULE OF EVENTS

**UBC RADIOLOGY POON RESEARCH EVENING 2017**

Diamond Healthcare Centre, Lecture Theatre 1020 (DHCC 1020 LT)

**MODERATOR: DR. JONATHON LEIPSIC, VICE CHAIR RESEARCH**

<table>
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<tr>
<th>Time</th>
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<td>5:00 PM – 5:20 PM</td>
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| 5:20 PM – 5:30 PM | WELCOME INTRODUCTIONS  
*By Drs. Bruce Forster and Jonathon Leipsic* |
| 5:30 PM – 6:30 PM | PRESENTATIONS                                            |
| 5:30 PM – 5:45 PM | THE IMPACT OF ON-SITE 24/7 EMERGENCY  
*RADIOLOGIST COVERAGE*  
*Dr. Jason Motkoski* |
| 5:45 PM – 6:00 PM | ASSOCIATION OF LOW GRADE VERTEBRAL  
*FRACTURES WITH SCHMORL’S NODES AND THE EDGREN-VAINO SIGN*  
*Dr. Jeffrey Hu* |
| 6:00 PM – 6:15 PM | PERSONALIZED DOSIMETRY – ARE THE CURRENT  
*IMAGING TECHNOLOGIES AND PROCESSING SOFTWARE UP TO THE CHALLENGE?*  
*Dr. Stefano Tolhurst* |
| 6:15 PM – 6:30 PM | UNDER SAMPLING OF INVASIVE CARCINOMA IN CORE  
*BIOPSIES OF BREAST PAPILLARY LESIONS*  
*Dr. William Guest & Dr. Jason Motkoski* |
| 6:30 PM – 6:40 PM | CLOSING COMMENTS                                         |
Dr. Peter Yui-Chee Poon was born on November 2, 1939, in Hong Kong. He attended the University of Hong Kong, where he obtained his MD degree in 1966. From 1967 to 1968, he undertook his first studies in radiology at Queen Elizabeth Hospital in Hong Kong. The following year, he immigrated to Regina, Saskatchewan, Canada, where he completed another year of internship at Regina General Hospital and 1 year of internal medicine at the University of Manitoba, Winnipeg Health Sciences Center.

From 1970 to 1971, Dr. Poon was a general practitioner in Scarborough, Ontario, Canada, before returning for a radiology residency at McMaster University, Hamilton, Ontario, Canada, from 1971 to 1974. In 1975, he received his first academic appointment at the University of Toronto, Ontario, Canada, as a lecturer. He began his career as a staff radiologist at the Princess Margaret Hospital, Toronto. He steadily moved up the academic ladder to the rank of associate professor. In 1987, he transferred to St Michael’s Hospital in Toronto and had a major role in the establishment of one of the first magnetic resonance imaging units in Ontario.

In 1992, Dr. Poon moved to Vancouver to assume the position of head of radiology at the British Columbia Cancer Agency, Vancouver Cancer Centre and was promoted to professor at the University of British Columbia. He was intimately involved in the delivery of cancer care in British Columbia and was the provincial practice leader for diagnostic imaging. He was vigorously involved with the agency until his death.

Throughout his career, Dr. Poon was an enthusiastic teacher to both medical and graduate students and consistently promoted research. One of his proudest achievements was being voted Best Teacher of the Year by the radiation oncology residents at the British Columbia Cancer Agency in 1999. He was a reviewer for several radiology journals. He authored more than 50 papers and four book chapters and spoke at numerous national and international meetings. He was greatly respected and well liked throughout the Canadian radiology community.

Dr. Poon enjoyed traveling with his wife, jogging with his dog Page, and the occasional game of golf or squash with his sons. He will be sorely missed by his wife, sons, and friends. He is survived by his wife, Myrna; and four sons; Ferdinand, Ian, Emmet, and Daniel.

The Peter Poon Award aims to encourage original hypothesis-driven research in which residents are the principal investigator or co-investigator.
THE IMPACT OF 24/7 ON-SITE STAFF EMERGENCY RADIOLOGIST COVERAGE

AUTHOR
Jason Motkoski, PGY 4

CO-AUTHORS
Sabeena Jalal Khan, Faisal Khosa, Luck Louis, Chad Kim Sing, David Evans, John Mayo and Savvas Nicolaou

PURPOSE
The purpose of this study is to compare (1) imaging utilization, (2) patient length of stay (LOS), (3) Radiology Report turnaround time (TAT), and (4) operational cost; before and after the implementation of 24/7 on-site Staff Radiologist coverage in the Vancouver General Hospital (VGH) Emergency Department (ED).

METHODS
We extracted clinical data from PCIS and Radiology data from IDX Rad on 173,829 consecutive patient encounters in the VGH ED and 137,761 imaging studies performed on those patients in the VGH ED, representing all encounters and all imaging studies performed for 12 months before and 12 months after the implementation of 24/7 Emergency Radiology. For every patient encounter, we extracted clinical times (Triage, Registration, Seen by MD, Disposition), the Canadian Triage and Assessment Score (CTAS) at triage (1 to 5), Trauma status at Triage (Y/N), CDU Length of Stay, and Admission Status (Y/N). For each imaging study, we collected all relevant times (Requested, Serviced, Dictation, Transcribed and Released), study modality and body part. Multivariate statistical analysis is being used to identify significant changes before and after the implementation of 24/7 on-site Staff Emergency Radiologist coverage.

RESULTS
So far, we have learned that the implementation of 24/7 on-site Staff Radiologist coverage in the VGH ED is associated with a reduction in the proportion of ED patients receiving imaging studies (47.6% reduced to 46.7%); a reduction in average ED patient LOS (259.2 minutes reduced to 254.4 minutes) which predominantly impacted acutely unwell patients (38-minute reduction for CTAS 1 patients, 26-minute reduction for CTAS 2 patients, 22-minute reduction for CTAS 3 patients, 2-minute reduction for CTAS 4 patients and 4-minute reduction for CTAS 5 patients); a reduction in the admission rate (22.4% reduced to 21.4%); and a reduction in Radiology Report TAT (547 minutes reduced to 233 minutes). Analysis of 24/7 on specific imaging modalities, specific body part being imaged, and impact on overnight-only imaging a study is in progress. Economic impact to ED, Radiology and VGH budgets are also in progress.

CONCLUSION
So far, the implementation of 24/7 on-site Staff Radiologist coverage in the VGH ED was associated with (1) a reduction in the proportion of patients receiving imaging studies; (2) a reduction in average patient LOS that was proportionate to patient acuity; (3) a reduction in Radiology report TAT; and (4) a reduction in the admission rate. Analysis of specific imaging modalities, body areas, overnight-only studies and economic impact are in progress.
ASSOCIATION OF LOW GRADE VERTEBRAL FRACTURES WITH SCHMORL’S NODES AND THE EDGREN-VAINO SIGN

AUTHOR
Jeff Hu, PGY 3

CO-AUTHORS
Brian Lentle, and the CAMOS group

PURPOSE
Although there is no consensus radiologic definition of an osteoporotic vertebral fracture (VF), two models have been applied: morphometric, such as the Genant Semi-Quantitative (GSQ) tool, and morphologic, such as the algorithm-based quantitative (ABQ) tool. Recent studies have shown that the number of incident GSQ and ABQ fractures is similar, but the number of prevalent GSQ VFs is higher than that of ABQ VFs, particularly in the mid thoracic spine. In addition, low-grade ABQ fractures are associated with incident non-vertebral major osteoporotic fractures whereas low grade GSQ fractures are not.

These findings suggest that some low-grade GSQ positive, ABQ negative lesions may represent non-vertebral fracture deformities. Although the pathophysiology of Schmorl’s nodes and the associated Edgren-Vaino sign has not been definitively elucidated, they are thought to represent developmental deformities as opposed to the direct outcome of osteoporosis. The purpose of this study is to determine if low grade GSQ positive, ABQ negative lesions are associated with Schmorl’s nodes and the Edgren-Vaino sign.

METHODS
A subset (609 patients) from the Vancouver and St. John’s datasets of thoracic and lumbar radiographs from the Canadian Multicentre Osteoporosis Study (CaMos) was analyzed and scored for the presence of vertebral fractures using the GSQ and a modified ABQ (mABQ) method, and for the presence of SNs and the EV sign from the T4 to L5 vertebral level. GSQ fractures were identified by a greater than 20% reduction of vertebral height by visual estimation (without direct measurement) and graded as 1 (20–25% loss of height), 2 (26–40%), and 3 (> 40%).

A modified ABQ method was applied in which fractures were identified by fracture of the vertebral endplate and/or cortical buckling/breaks. Expected proportion of SNs and EV sign per fracture type (eg. G1, mABQ1) was calculated and compared with actual occurrence using a Chi-square goodness of fit test with the null hypothesis that there is no association between G1 deformities and Schmorl’s nodes, and similarly for the EV sign.
PERSONALIZED DOSIMETRY – ARE THE CURRENT IMAGING TECHNOLOGIES AND PROCESSING SOFTWARE UP TO THE CHALLENGE?

AUTHOR
Stefano Tolhurst, PGY 2

CO-AUTHORS
Dave Liu, Chloe Mortensen, Hillgan Ma, Anna Celler

OBJECTIVES
1) Validating the use of PET-CT for dosimetry calculations in patients undergoing transarterial radioembolization with Y-90.
3) Dosimetric comparisons of resin versus glass microspheres.

MATERIALS AND METHODS
IRB approved prospective Phase Ila dataset has been obtained over 4 years consisting of patients undergoing liver directed Selective Internal Radiation Therapy (aka SIRT, Y90).

Pre-implantation multiphasic CT, angiography, Tc99-MMA Gamma SPECT CT, Post implantation 3d-TOF PET, and 3-month post implantation multiphasic CTs have been obtained in 40 patients (2012-2016) and serve as the reference data.

Using advanced imaging processing software allowing for non-rigid co-registration of the individual imaging studies (MIM Software, MIM Software Inc., Cleveland OH, USA), the liver and tumour volumes from each modality will be segmented. Combining these volumes of interest with the dose information from the Y90 PET CT, dose volume histograms (DVH) will be generated.

Cross correlation of the imaging, allowing for predictive and targeted radioactivity models will be synthesized and compared with actual tumor response utilizing a modified volume based iteration of the response evaluation criteria in solid tumours (RECIST 1.1).

The analysis may determine the relationship between the personalized dose volume histograms and tumour response. The results of this analysis will provide proof of principle in establishing a DVH based predictive model of dosimetry that will permit a voxel based approach to therapy.

This approach may result in decreased complications, establishment of dose/response curves (alpha/beta), and potentially reduced overall radiation exposure to the patient and operator during SIRT therapy. Additionally, it will allow for direct dosimetric comparison between resin and glass microsphere treatments.

PRELIMINARY RESULTS
The patient-data acquisition is completed. We recently acquired the software needed to allow for non-rigid co-registration and in the process of segmenting the liver and tumour volumes.

This process is running in parallel to the experiments by MIRG, who we are collaborating with to validate the use of PET CT for dosimetric calculations.
UNDER SAMPLING OF INVASIVE CARCINOMA IN CORE BIOPSIES OF BREAST PAPILLARY LESIONS

AUTHORS
William Guest & Jason Motkoski, PGY 4

CO-AUTHORS
Nick Myles, Marie-Josee Cloutier, Paula Gordon

OBJECTIVES
To investigate the rate of under-sampling invasive carcinoma and ductal carcinoma in-situ (DCIS) in imaging-guided biopsy of papillary breast lesions compared to final surgical pathology of resected specimens. Papillary lesions of the breast are a heterogeneous group of epithelial lesions, which include: intra-ductal papilloma (with or without atypical ductal hyperplasia or ductal carcinoma in situ), papillary ductal carcinoma in situ, papillary carcinoma (encapsulated or solid) and invasive papillary carcinoma. There is controversy in the literature about the management of patients whose breast biopsy specimens contain a papillary lesion, due to highly variable reports about the rate of under sampling an invasive carcinoma.

MATERIALS AND METHODS
Institutional ethics approval has been obtained. As we are interested in rates of underestimation, our measurable outcomes are: the proportion of biopsy-proven papillary lesions that were surgically excised, and the proportion of excised papillary lesions that demonstrate invasive carcinoma or DCIS in the surgical pathology sample. Subgroup analysis will be performed based on the presence or absence of atypia in each papillary lesion seen on biopsy pathology.

This information is being collected from a multi-hospital pathology database for all ultrasound-guided and stereotactic biopsies performed in a Vancouver medical facility (BC Women’s Hospital, BC Cancer Agency, Mount St. Joseph’s Hospital and X-ray 505) between January 1, 2008 and May 1, 2016. Since surgical pathology will not be available in cases that did not go to surgery, and to control for false negatives, a note will be made of any pathologic diagnosis of breast malignancy (DCIS or invasive carcinoma) identified within 12 months of the initial imaging investigation that led to a biopsy recommendation. Radiology/pathology correlation will be performed on each biopsy sample.

RESULTS
Preliminary analysis (n=52) of biopsies performed in 2016 indicate that 77% of papillary lesions are surgically excised. DCIS was identified in 27% of the surgical specimens, and 10% contain invasive carcinoma. The rate of under-sampling DCIS or invasive carcinoma was 6% in papillary lesions without atypia and 57% in lesions with atypia. Data collection is ongoing; we have identified approximately 700 core biopsy results in the time period of our study that fit inclusion criteria. Understanding the probability of under-sampling invasive carcinoma or DCIS in breast papillary lesions enables radiologists and their patients to make better decisions about the need for surgical removal of these lesions.