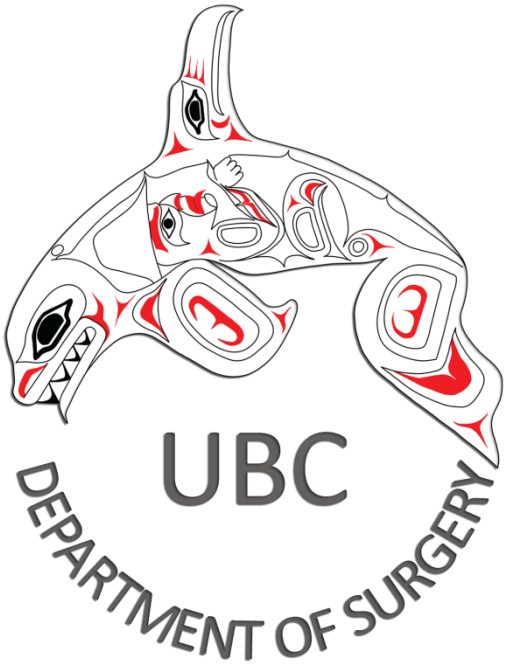
THE SURGICAL TIMES

UBC Department of Surgery November 7, 2016



The 22nd Annual

WB & MH Chung
Lectureship and Research Day

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Accredited by UBC CPD

CONTINUING PROFESSIONAL DEVELOPMENT
FACULTY OF MEDICINE

This event is an Accredited Group Learning Activity eligible for up to 6 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.

Learning Objectives:

1. To describe and evaluate the clinical, education and basic science research being conducted in the Department of Surgery.
2. To discover new and innovative research techniques.
3. To participate in the collaborative research environment within the Department of Surgery.

The Surgical Times was formerly the newsletter of the UBC Department of Surgery produced by two distinguished emeriti professors: Dr. Phil Ashmore and Dr. John MacFarlane. With the advent of electronic communication the Surgical Times is now only printed in paper form once a year for Chung Research Day.

Research Day Schedule

Plenary sessions

MORNING SESSION - Chair: Dr. York Hsiang

8 minute paper with 2 minute discussion

0800 **WELCOME - Dr. Gary Redekop**

0805 **Dr. Danny Mendelsohn, Neurosurgery**
Work hours, sleep, physical activity and resident well-being, burnout and job satisfaction in surgical, medical, and restricted-call specialty training programs: results from the prospective RATE Study

0815 **Dr. Kristin DeGirolamo, General Surgery**
Process mapping as a framework for performance improvement in emergency general surgery

0825 **Dr. Sonia Butterworth, Pediatric General Surgery**
Pediatric mortality associated with delays in access to emergent surgery: a risk stratified analysis

0835 **Dr. Matthew Chan, Radiation Oncology**
Patterns of radiation therapy technology use in the treatment of bone metastases

0845 **Dr. Evie Landry, Otolaryngology**
Outcomes of an otolaryngology screening clinic in a high-risk underprivileged community - Vancouver Downtown Eastside

0855 **Dr. Karan D'Souza, General Surgery**
Improving outcomes in colorectal surgery through implementation of sequential quality improvement interventions at a community hospital

0905 **Dr. Shyama Das, Thoracic Surgery**
A cross-sectional study: chest tube drainage practice patterns among Canadian thoracic surgeons following pulmonary surgery

0915 **REFRESHMENT BREAK**

MORNING SESSION - Chair: Dr. Geoff Blair

0935 **Dr. Richard Cook, Cardiac Surgery**
Comparison of outcomes after incomplete vs complete revascularization in patients undergoing robotically-assisted minimally-invasive direct coronary artery bypass

0945 **Dr. Leslie Leung, Plastic Surgery**
Accelerant-related burns in British Columbia: patient demographics and outcomes

0955 **Dr. Mahammad Pakyari, Plastic Surgery**
Application of a novel hydrogel collagen composite: is it possible to live in an artificial skin?

1005 **Dr. Layla Nabai, Plastic Surgery**
Controlled delivery of methotrexate: a novel approach to reduce post-surgical scarring

1015 **Dr. Oleksandr Butskiy, Otolaryngology**
Rinne test revisited: The position of the tuning fork does not affect the results of the Rinne test

1025 **Dr. Diana Forbes, Plastic Surgery**
Growth hormone therapy accelerates axonal regeneration, promotes motor reinnervation, and reduces muscle atrophy following peripheral nerve injury

1035 **Dr. Romy Hoeppli, General Surgery**
Migration capacity of thymic regulatory T cells can be tuned by expansion in cytokine-enriched culture conditions

1045 **Dr. Queenie Hui, General Surgery**
Neutralizing interleukin-1 beta enhances survival and function of human islets: implications in clinical islet transplantation

1100 SIMULTANEOUS SESSIONS & LUNCH

1300 CHUNG LECTURE - Dr. Ivar Mendez

AFTERNOON SESSION - Chair: Dr. John Reid

8 minute paper with 2 minute discussion

1400 **Dr. Jonathan Misskey, Vascular Surgery**
Hemodialysis for elderly renal failure patients: an age-based comparison of fistula location, patency, maturation and patient survival

1410 **Dr. Anali Dadgostar, Otolaryngology**
The application of a free nasal floor mucosal graft in functional endoscopic sinus surgery

1420 **Dr. Kyle Arsenault, Vascular Surgery**
Standard TEVAR compared to PETTICOAT technique for aortic dissection

1430 **Dr. Mohammadali Khorasani, Pediatric General Surgery**
In vivo continuous pressure and airflow rate measurement in pneumatic reduction of intussusception: how high do we go?

1440 **Dr. Mitchell Webb, General Surgery**
Incisional negative pressure wound therapy following colorectal resection: a single site, prospective, randomized control trial

1450 **Dr. Maryam Dosani, Radiation Oncology**
Impact of spinal instability neoplastic score on surgical referral patterns and outcomes of patients treated with palliative radiotherapy to spinal metastases

1500 **Dr. Mostafa Fatehi, Neurosurgery**
Determinants of quality of life improvement after pituitary surgery in patients with acromegaly

Evening Reception *(RSVP required)*

Program

6:00 pm - Cocktails
6:30 pm – Award Presentations
7:00 pm – Dinner

Location

The University Golf Club in the heart of the Pacific Spirit Park and the University Endowment Lands
5185 University Blvd, Vancouver, BC V6T 1X5

Simultaneous Session A

Chair – Dr. Gary Redekop

Paetzold Multipurpose Room, 11:15 am - 12:45 pm

2.5 minute paper with 0.5 minute discussion

#	Division	Submitting Author	Abstract Title
A01	Neurosurgery	Honey, Christopher	The discovery and cure of hemi-laryngopharyngeal spasm (HELPS) syndrome
A02	General surgery	Wong, Jordan	Management of PET detected thyroid incidentalomas in British Columbia Canada: importance of the PET report
A03	General surgery	Wiseman, Sam	Completeness of ultrasound reporting impacts time to biopsy and surgery for benign and malignant thyroid nodules
A04	Otolaryngology	Gurberg , Joshua	The educational effectiveness of "pediatric tracheostomy: student edition" an educational mobile app for healthcare students
A05	Otolaryngology	Gurberg , Joshua	Acute pediatric supraglotitis – the need to enhance education and redistribute classic management protocols internationally in the post-HiB vaccine era
A06	Plastic surgery	Cheng, Jasmine ZiJin	Modulation of human adipose derived stem cells by acellular dermal matrix for treatment of chronic wounds
A07	Thoracic surgery	Drewbrook, Connie	Incidence risk and independent predictors of prolonged air leak in 269 consecutive pulmonary resection patients over nine months: a single-center retrospective cohort study
A08	Thoracic surgery	Mousadoust, Dorsa	Independent predictors of progression to empyema: A retrospective cohort study of 1766 pneumonia cases at a tertiary-level regional thoracic surgery referral center
A09	Otolaryngology	Jabalee, James Patrick	Epigenetic silencing of SMPD3 in oral cancer
A10	Vascular surgery	Misskey, Jonathan	Transapical delivery of a custom branched aortic arch endograft in an animal model
A11	Otolaryngology	Luu, Kimberly	Evaluation of a low-fidelity, low-cost ear surgery simulator in a low-resource setting
A12	Plastic surgery	Ebtia, Mahshid	Evaluation of the anti-glucotoxic effects of leech saliva extract (LSE) on mouse and human pancreatic islets
A13	Plastic surgery	Van Slyke, Aaron	Outpatient burn care at BC Children's Hospital burn treatment room: a 3-year review
A14	Otolaryngology	Rasool, Alysha	Retrosphenoid air cell: case series and description of a new cell in the paranasal sinuses
A15	Otolaryngology	Dadgostar, Anali	The use of polydiaxanone (PDS) plates for endoscopic skull base repair
A16	General surgery	Shi, Rocky Qiushi	Investigating the importance of anti-apoptotic Bcl-xL for mitochondrial networking and function in pancreatic β-cells
A17	Otolaryngology	Amanian, Ameen	The safety of long-term intranasal budesonide delivered via the mucosal atomization device for chronic rhinosinusitis
A18	Otolaryngology	Okpaleke, Christopher	A comparison of silastic and gloved merocel middle meatal spacers following functional endoscopic sinus surgery: a randomized controlled trial
A19	General surgery	Orban, Paul Christopher	Genetic surgery to improve function and viability of stem-cell-derived insulin producing cells
A20	Otolaryngology	Rasool, Alysha	Esthesioneuroblastoma of the maxillary sinus antrum presenting as SIADH: a case report
A21	Otolaryngology	Parhar, Harman	Incidence patterns of parotid gland carcinoma in the United States by histologic type: a population-based analysis of 11,959 cases
A22	Otolaryngology	Sorichetti, Brendan	Child abuse and the otolaryngologist: a systematic review of the literature
A23	Plastic surgery	Van Slyke, Aaron	Perioperative and long-term smoking behaviors in cosmetic surgery patients
A24	General surgery	Dawson, Nick	Design and optimization of mass cytometry to measure immune reconstitution post-hematopoietic stem cell transplant

Simultaneous Session B

Chair – Dr. Hannah Carolan

Paetzold Lecture Theatre, 11:15 am - 12:45 pm

2.5 minute paper with 0.5 minute discussion

#	Division	Submitting Author	Abstract Title
B01	Otolaryngology	Akbari, Ardalan	Luc's abscess: the spectrum of disease including the first reported case with associated intracranial abscess
B02	Radiation oncology	Zhang, Christina Rui	Lymphoma cancer internet patient information: a systematic evaluation of the quality of online resources for lymphoma patients
B03	Plastic surgery	Pripotnev, Stahs	Split thickness skin graft meshing ratio indications and common practices
B04	Pediatric general surgery	Joharifard, Shahrzad	Pleurectomy versus pleural abrasion for primary spontaneous pneumothorax in children
B05	Plastic surgery	Omeis, Tyler	Autologous reconstruction of the inframammary fold in aesthetic and reconstructive breast surgery
B06	Vascular surgery	Arsenault, Kyle	Management of the left subclavian artery during thoracic endovascular aortic repair
B07	Neurosurgery	Ayling, Oliver	Dissociation of early and delayed cerebral infarction after aneurysmal subarachnoid hemorrhage
B08	Otolaryngology	Ayub, Aysha	A systematic review of extra-tympanic electrocochleography (ET ECochG) in Ménière's disease diagnosis
B09	Neurosurgery	Makarenko, Serge	Multimodality management of trigeminal schwannomas and quality of life outcomes – a single institution experience
B10	Plastic surgery	Farrokhi, Ali	Application of a indoleamine 2,3-dioxygenase expressing allogenic dermal fibroblast populated within an acellular skin substitute as a biological wound coverage
B11	Vascular surgery	Misskey, Jonathan	Endovascular management of extent II-IV thoracoabdominal aortic aneurysms in patients unfit for open repair
B12	Thoracic surgery	Drewbrook, Connie Elizabeth	Incidence risk and independent predictors of prolonged air leak in 269 consecutive pulmonary resection patients over nine months: a single-centre retrospective cohort study
B13	Otolaryngology	Luu, Kimberly	Characterization of global and sino-nasal morbidity in CRS patients with and without a concomitant chronic airway condition
B14	Plastic surgery	Fossey, Mary Pauline Mona	Polyaspartic acid nanofiber material loaded with silver: antimicrobial activity and cell viability of human adipose stem cells
B15	Otolaryngology	Dickman, Christopher	Secreted miRNAs and their role in promoting oral cancer
B16	Otolaryngology	Tan, Colin Naiqian	Perceptions and attitudes towards children with hearing aids
B17	General surgery	Cha, Jieun	Delay between neoadjuvant chemoradiation and surgery on rectal cancer outcomes
B18	Otolaryngology	Yi, Grace Sooeun	Pediatric patients with cochlear implants: obstacles to full-time utilization
B20	General surgery	Chen, Yi-Chun	ER stress and lipotoxicity impair processing of pro-islet amyloid polypeptide in beta cells
B21	General surgery	Denroche, Heather C	Deletion of TLR2 or MyD88 does not ameliorate islet amyloid induced beta cell dysfunction
B22	Otolaryngology	Al-Salihi, Salahaldin	The use of topical anaesthetic in Poloxamer-407 gel for the treatment of recalcitrant atypical facial pain
B23	Otolaryngology	Butskiy, Oleksandr	ThroatUnwrap - computer optimization of anterolateral thigh flap design for circumferential pharyngeal reconstruction: a cadaveric proof of principle study
B24	Radiation oncology	Cho, Chan-Kyung Jane	Palliative radiotherapy for bone metastases in patients dying of prostate cancer: the British Columbia experience

Message from the Department Head, Dr. Gary Redekop

The WB & MH Chung Research Day provides an opportunity for our large and diverse Department of Surgery to highlight the wide range of basic and clinical research conducted by our faculty and trainees. The program includes topics ranging from pure basic science to translational research, education, and clinical outcome studies.

We are honored to have Dr. Ivar Mendez as our visiting Chung lecturer. Dr. Mendez is a Fellow of the Royal College of Physicians and Surgeons of Canada and the American College of Surgeons. As a Clinician Scientist, Dr. Mendez' research focus is in functional neurosurgery, brain repair, stem cells, robotic neurosurgery and computerized systems in neurosurgical applications. He is recognized internationally as an expert in his field, having over 200 international and national presentations as well as over 200 scientific publications. For the past decade he has worked in the use of remote-presence robots for medical care in neurosurgery. In 2002, Dr. Mendez and his team performed the first long distance telementoring neurosurgery in the world and in 2013, he reported the first experience in remote programming for neuromodulation devices.

Dr. Mendez has taken an active role in humanitarian and global health issues. He has been instrumental in establishing and equipping neurosurgical units in several developing countries. Through the Ivar Mendez International Foundation, he has instituted programs for child health care and computer education in his native Bolivia. In 2010, Dr. Mendez was awarded a Canadian Red Cross Humanitarian of the Year Award, and was named one of 10 most Influential Hispanic Canadians for his clinical research and humanitarian contributions. Dr. Mendez has also received the Health Canada Contribution to the Improvement of the Health of Canadians Award and The Queen Elizabeth II Diamond Jubilee Medal. In 2014 Dr. Mendez was inducted as a fellow into the Canadian Academy of Health Science..

I would like to recognize the energy and creativity that the event organizers have put into making Chung Day a success. Dr. Alice Mui and her scientific program committee have carefully reviewed many submissions and selected a cross section of high quality projects representative of the many avenues of research in the Department of Surgery, which will be presented in a variety of formats. Dr. Mui has also worked along with Susan Nye, my Executive Assistant, and Bethany Saunders, our Director of Administration, to look after the planning and logistics for the day. My sincere thanks to all of you!

I would also like to acknowledge the outstanding accomplishments of the many faculty, residents, fellows, and graduate students in the Department of Surgery, and sincerely hope that you will share with me a deep satisfaction that comes from noting our Department's many research activities.

Gary Redekop

Head, Department of Surgery
November 2016

Founders of the W.B and M.H. Chung Lectureship

Prior to the establishment of the W.B. and M.H. Chung Research Day, the Department of Surgery only had Division specific research days. In 1995, the Dr. W.B. and M.H. Chung created an endowment that allows us to hold an annual research day that has become the premier, department-wide event at which we recognize our research achievements

Wallace B. Chung, MDCM, FRCSC, DSc '94

Dr. Chung was born and raised in Victoria, British Columbia. After pre-medical education at Victoria College and UBC, he attended the McGill University and received his M.D. in 1953. Following internship and surgical residency training at VGH and UBC, Dr. Chung was appointed to the Department of Surgery at UBC as an Instructor in 1960. After being appointed to an Assistant Professor in 1961, Dr. Chung rose quickly through the ranks to become a full Professor in 1972. For his many professional and community contributions, Dr. Chung has received many awards, including being appointed to the Order of Canada in 2005.

Professional Career

Dr. Chung was noted as a technically gifted surgeon who pioneered Vascular Surgery in Western Canada. In particular, Dr. Chung was known for his excellent surgical results for carotid artery surgery for transient ischemic attacks. He established Vascular Surgery as a new specialty in BC, and as a separate division of surgery at VGH and UBC. He was one of founders of the Canadian Society for Vascular Surgery, and served as its president in 1982. Throughout his academic career, Dr. Chung has taken positions of responsibility (appointed University Head of the Division of General Surgery in 1970, Head of the University Division of General and Vascular Surgery in 1978, Head of the Department of Surgery at the University Hospital in 1981). During his nine year tenure he built the University Hospital Department of Surgery into an excellent academic unit with international recognition for vascular surgery and gastrointestinal surgery. He was also the Governor of the American College of Surgeons from 1980 to 1986. Dr. Chung has received many awards for his teaching and service, including being honoured by the vascular surgeons of British Columbia with a named day – The Wallace B. Chung Clinical Day.

Community Service

Dr. Chung has also been an effective and tireless pillar of the community. He has used his extraordinary gifts of wisdom and diplomacy to help advance the integration of the Chinese Community. He was one of the founding executives of the Chinese Cultural Centre of Vancouver serving as Chair from 1983-87. Under Dr. Chung's leadership, the Centre has become a model for other multicultural programs in Canada. Among his other community activities, Dr. Chung is a founding member and patron of the Sun Yat-Sen Gardens, served on the Board of Directors International Dragon Boat Festival Society, and Vice Chair of the Canadian Multiculturalism Council. Dr. Chung's contributions have been recognized by awards (Chinese Cultural Centre Outstanding Achievement Award in 1989 and Chinese Benevolent Association Outstanding Citizen Award in 1990) and his appointment to the B.C. Heritage Trust in 1993.

History Scholar

An avid reader and collector of first edition rare books, Dr. Chung became a renowned authority and collector of one of Canada's best libraries on the history of the Pacific Northwest exploration and Chinese Canadian immigration. Due to his interest in the Canadian Pacific Steamship Company, Dr. Chung was a guest curator of the Vancouver Maritime Museum for the "Empress to the Orient Exhibition" in 1991. In recognition of this interest, the Vancouver Maritime Museum has named its library, the W.B. and M.H. Chung Library. In 1999 he made a gift of more than 25,000 rare and unique items to the University of British Columbia. The Chung Collection is housed in the Ike Barber Learning Centre (http://chung.library.ubc.ca/) and attracts scholars and visitors from around the world.

Madeline Chung, MD, FRCSC

Dr. Madeline Chung was born in Shanghai, China. Her medical education took place at the Yale Medical College of China. She did her internship in Victoria, B.C. followed by specialty training in Obstetrics and Gynecology in Montreal and at the Mayo Clinic in Rochester, Minnesota. Upon coming to Vancouver in the late 1950's, she was the first female and first Chinese-Canadian specialist in Obstetrics and Gynecology in British Columbia. She was appointed as a Clinical Instructor at the University of British Columbia and by the time of her retirement she had delivered over 6,500 babies over a 40 year career, and held the rank of Clinical Professor. Shortly after her retirement from clinical practice she was made an Honorary Life Member of the College of Physicians & Surgeons of British Columbia. Dr. Madeline Chung is also a Clinical Professor Emeritus of the Department of Obstetrics and Gynecology in the Faculty of Medicine at the University of British Columbia.

Physician

She was known as a compassionate and empathic physician who gave freely and willingly of her time to her patients, often acting as a counselor to her patients and mentor to the children and adults who she had previously delivered. Frequently, the children she delivered would return to see Madeline years later when it was time for them to have their own babies.

Community Service

Dr. Madeline Chung extended her philosophy of volunteerism and service to the community in all aspects of her life. Not only was this evident in her professional life but she was active in her church and community as well. She served on boards of the Chinese United Church, the Vancouver Academy of Music, and was the founding Executive Director of the True Light Chinese School in Vancouver. Well into her eighties, she was given an honorary graduation certificate from York House School in recognition of her contributions to the school.

Family

Despite her tireless devotion and dedication to her patients she was still able to balance a healthy family life providing endless support to her husband, Wally, while raising two children who felt inspired enough by their home life to pursue careers in medicine. Their daughter Dr. Maria Chung is in the Division of Geriatric Medicine at the University of British Columbia. Their son Dr. Stephen Chung is the past University of British Columbia Head of the Division of General Surgery and the current Vancouver General Hospital Head of Hepatobiliary & Pancreatic Surgery. Late in her career, she experienced a life-threatening illness but was able to return to full-time work. At the same time, she was the primary caregiver to her elderly mother whom she looked after in her home. Dr. Madeline Chung's is a busy grandmother of five grandchildren.

Chung Lecture 2016

Dr. Ivar Mendez

Dr. Ivar Mendez is the Fred H. Wigmore Professor and Unified Head of the Department of Surgery at the University of Saskatchewan.

His research focuses on functional neurosurgery, brain repair, stem cells, robotic neurosurgery and computerized systems in neurosurgical applications. In 2002, Dr. Mendez and his team performed the world's first long distance telementoring neurosurgery. In 2013, he reported the first remote programming for neuromodulation devices. Dr. Mendez was the President of the Canadian Neuromodulation Society (CNS) from 2009 – 2012 which, under his leadership, has promoted the access of neuromodulation therapy to all citizens of Canada.

He will be speaking on his internationally renowned work in robotic and distance tele-mentoring surgery.

Abstracts

Plenary Presentations

0805 **Danny Mendelsohn,** Neurosurgery

Title: Work hours, sleep, physical activity and resident well-being, burnout, and job satisfaction in surgical, medical, and restricted-call specialty training programs: results from the prospective RATE Study

Danny Mendelsohn, Ivan Despot, Peter Gooderham, Ashtush Singhal, Gary Redekop, Brian Toyota

Introduction: Work hours and on-call periods during residency may restrict resident physicians' abilities to obtain the recommended daily hours of rest. The relationship between work hours and sleep across different specialty training programs and the impact on resident well-being is unclear. Wearable activity trackers are a novel tool for prospectively measuring sleep and physical activity.

Objectives: The Resident Activity Tracker Evaluation (RATE) Study was designed to evaluate the impact of work hours, sleep, and physical activity on resident well-being, burnout, and job satisfaction.

Methods: Residents were recruited from select University of British Columbia training programs: 1. general surgery and orthopedics (SURG), 2. internal medicine and neurology (MED) and 3. anesthesia and radiology, specialties with call durations restricted to under 12 hours (RCD). Participants wore FitBit Charge HR activity trackers continuously for a 14-day period while rotating on their home specialty service. Participants completed four validated surveys assessing self-reported health, sleepiness, burnout, and job satisfaction.

Results: Fifty-nine residents completed the study (9 from orthopedics and 10 from each other specialty). A total of 778 days of activity and 244 on-call periods were tracked. Average wear time was 93%. Surgical residents worked 24 more hours per week than non-surgical residents (SURG: 84.3, MED: 69.2, RCD: 52.2, $p<0.001$). Hours worked per week ranged from 32 to 109. The average duration of call shifts were longer in the surgical and medical cohorts (SURG: 28.3, MED: 24.7, RCD: 11.3 hours, $p<0.001$). Surgical residents were on-call more hours per week (SURG: 61.7, MED: 36.2, RCD: 34.2, $p<0.001$). Participants in all cohorts had less sleep on-call than during free time (1.56 hrs vs 8.44 hrs, $p < 0.001$). Surgical residents had on average 7 less hours of sleep per week ($p<0.001$). Surgical residents stayed on average 5 hours longer post-call (SURG: 2:20 pm, MED: 11:09 am, RCD: 9:25 am). Epworth Sleepiness scores were significantly higher in the surgical cohort. Thirty-six out of 59 participants (61%) scored high burnout on the depersonalization subscore. Despite a wide range in hours worked and sleep obtained, self-reported well-being, burnout, and job satisfaction were not significantly different between the groups. The total steps per day, total distance travelled, and floors climbed per day were also similar between the cohorts.

Conclusions: Surgical residents worked more hours and obtained less sleep; however, burnout rates were comparable among the medical, surgical, anesthesia and radiology resident trainees. Self-reported physical activity and actual steps per day were not associated with lower burnout scores. Our study is the first to comprehensively measure work hours, sleep, and burnout among resident physicians using wearable trackers. Prospective studies investigating how work hours, sleep, and burnout affect physician performance are needed.

0815 **Kristin DeGirolamo,** General Surgery

Title: Process mapping as a framework for performance improvement in emergency general surgery

Kristin DeGirolamo1, Karan D'Souza1, Jacques Zhang1, Barb Drake1, Markus Zurberg1, Rita Mah1, Andrea Bisaillon1, Kelly Mayson2, Emilie Joos1, Jason Sutherland3, Morad Hameed1 1. Department of Surgery, Vancouver General Hospital 2. Department of Anaesthesia, Vancouver General Hospital 3. School of Population and Public Health, UBC

Introduction: Emergency general surgery conditions are often thought of as being too acute and unpredictable for the development of standardized approaches to quality improvement (QI). However, process mapping, a concept that has been applied extensively in manufacturing, has been used to understand opportunities for improvement in complex health care processes. This study uses process mapping to deconstruct the surgical care of patients presenting to emergency general surgery (EGS) services with acute small bowel obstruction (SBO).

Objective: To process map SBO patients in an effort to identify potential areas for quality improvement and patient management.

Methods: The American College of Surgeons Emergency General Surgery Quality Improvement Program (EQIP) pilot database was used to identify patients presenting to a single, large teaching hospital over a 1 year period (Mar. 1, 2015, to Mar. 1, 2016), for the nonoperative or operative management of SBO. The EQIP database and chart and electronic health records were used to create process maps for each patient from the time of onset of symptoms to the time of outpatient follow-up. These process maps were evaluated to identify important process issues and their potential impact on clinical outcomes.

Results: 87 patients with SBO (34 operative, 53 nonoperative) were identified. Three were excluded for not being admitting to General Surgery. Operative SBO had a complication rate of 32%. The processes of care from the time of presentation to the time of follow-up were highly elaborate and variable in terms of duration; however, the sequences of care were found to be consistent. Data visualization strategies were used to identify bottlenecks in care and demonstrated substantial variability in terms of operating room access.

Conclusions: Complication rates in the operative care of SBO are high and represent an important QI opportunity in general surgery. Process mapping can identify common themes, even in acute care, and suggest specific performance improvement measures. At our centre, we are directing plan-do-study-act (PDSA) cycles and developing standardized orders and approaches based on process map inputs.

0825 **Sonia Butterworth,** Pediatric General Surgery

Title: Pediatric mortality associated with delays in access to emergent surgery: a risk stratified analysis

Irena Zivkovic, Seo Young Kim, and Sonia Butterworth, Division of Pediatric Surgery, BCCH

Background: Literature demonstrates that delays to operation for patients with acute surgical emergencies may contribute to potentially avoidable morbidity and mortality. Emerging evidence from our institution demonstrates delays to the operating room were most likely to occur in the population requiring Stat, emergency surgery in ≤ 60 minutes. Mortality risk scoring systems using physiologic and laboratory parameters for neonates and children have been developed and well validated. Our hypothesis was that in the high risk patient population, delays to surgery would be associated with an increased mortality.

Objectives: To determine the preoperative risk of mortality in patients requiring emergency surgery and assess if delays to the operating room correlated with an increased risk of death in the neonatal and pediatric surgical population.

Methods: With REB approval, a retrospective review of the ORSOS (prospectively collected patient and operating room information) database was undertaken from June 15, 2011-June 15-2015 on all Class 1 (≤ 60 minutes) surgeries at BCCH. All patient charts as well as the EMRs were reviewed. Patients were then scored using age appropriate SNAPII (neonatal) or PRISM (pediatric) systems based on preoperative parameters. Patients were classified as either low or high risk of mortality. Descriptive statistics were used.

Results: There were 394 Class 1 cases during the study period and complete data was available for 305. There were 87 who met high risk criteria and 218 who were in the low risk category for mortality based on the scoring system. Delays to the OR (> 60 minutes) occurred in 59 high risk patients (68%) and 212 low risk patients (97%). In total, there were 31 mortalities, 29 in the high risk category and 27 (93%) had delays to OR; both mortalities in the low risk group had delays to the OR of > 60 minutes. In the high risk group, delay of > 60 minutes to operating room was significantly associated with mortality

(p=0.00044); similarly, delay to incision > 60 minutes in this group was also associated with an increased risk of death (p=0.00036). There was no significant increase in mortality associated with delay to OR in the low risk group of patients.

Conclusions: In our institution, the majority of Class 1 cases experienced a delay to operation. The delay did not significantly increase the risk of mortality for the low risk patient group, however, for the high risk patients, delay to the operating room and delay to incision of > 60 minutes resulted in a significantly increased risk of death. Efforts must be made to improve surgical access and ensure timely surgical intervention to our most critically ill children.

0835 **Matthew Chan,** Radiation Oncology

Title: **Patterns of radiation therapy technology Use in the treatment of bone metastases**

Matthew Chan, Robert A. Olson, Shilo Lefresne, and Michael R. McKenzie, Department of Radiation Oncology, British Columbia Cancer Agency, Vancouver, BC

Background: In recent years, there has been a transition from two-dimensional radiation therapy (2DRT) planning towards more advanced techniques such as three-dimensional conformal radiation therapy (3D-CRT), volumetric modulated arc therapy (VMAT), and stereotactic body radiation therapy (SBRT).

Objective: Our study aim was to analyze these trends in the treatment of bone metastases.

Methods: All patients aged 18 and older who had received palliative intent RT for bone metastases between 2009-2014 and referred to any 1 of 6 regional cancer centers in British Columbia, Canada were reviewed. Summary statistics were used to describe radiation technique patterns. Logistic regression modeling was used to assess the influence of demographic, clinical, and health services variables on receipt of types of RT.

Results: We identified 8,059 patients and 15,832 courses of RT; overall, 97.9% of courses were achieved by 2DRT and 2.1% by 3D-CRT, VMAT, or SBRT. Despite the low overall use of advanced techniques, its use was significantly higher in all subsequent years compared to 2009 (p<0.05 for all years). The median age for patients treated with 2DRT was 67.0 (19-99) versus 66.0 years (19-93) for advanced techniques. There did not appear to be a statistically significant difference in age at the time of treatment start (OR 0.99; 95% CI 0.981 – 1.00, p<0.05). Compared to lung cancers, thyroid (OR 9.9; 95% CI 5.197-18.724, p<0.001) and kidney cancers (OR 3.9; 95% CI 2.508-5.911, p<0.001) were significantly more likely to be treated with advanced techniques, while breast (OR 0.90; 95% CI 0.621-1.306, p=0.58) and prostate cancers (OR 0.93; 95% CI 0.613-1.410, p=0.73) were not any more likely. Compared to the Vancouver centre, all other treatment centres in the province were utilizing advanced techniques less frequently. Patients were also more likely to complete RT with 2DRT than with advanced techniques (98.3% versus 95.8%, p<0.05).

Conclusions: The vast majority of treatment of bone metastases is still done by 2DRT in British Columbia. Despite these overall statistics though, a trend towards increasing use of more advanced techniques was observed.

0845 **Evie Landry,** Otolaryngology

Title: **Outcomes of an otolaryngology screening clinic in a high-risk underprivileged community - Vancouver Downtown Eastside**

Evie Landry, MD; Kimberly Luu, MD; Jane Lea, MD FRCSC; Brian Westerberg, MD FRCSC, Division of Otolaryngology-Head & Neck Surgery, University of British Columbia

Objective: The objective of this study was to evaluate an otolaryngology screening initiative in one of Canada's poorest communities, Vancouver's Downtown Eastside (DTES). Specific aims included: (1) assessing the need for screening and patient acceptance; and (2) evaluating potential barriers to screening and subsequent follow-up.

Methods: The screening clinic was open to anyone residing within the DTES, including the transiently homeless, on a walk-in basis. Personal interviews were conducted in order to collect data on demographic characteristics, known risk factors and medical history. Patients also received a full head and neck examination by an OTO-HNS resident. Descriptive statistics were then performed on the collected data. Our study group included 48 people residing in the DTES.

Results: Acceptance of screening was high (96%); however, acceptance of biopsy for abnormal findings and follow-up was low (20%). This screening activity identified a significant disease burden in this community, particularly in the areas of otology and head and neck.

Conclusion: Our data supports the continued development of this initiative in order to develop a more comprehensive outreach strategy which encompasses screening, diagnostic work up, follow up and treatment.

0855 **Karan D'Souza,** General Surgery

Title: **Improving outcomes in colorectal surgery through implementation of sequential quality improvement interventions at a community hospital**

Karan D'Souza1, Julie Wootton2, Tom Wallace1, 2, 3 1 Faculty of Medicine, University of British Columbia; 2 Royal Inland Hospital, Interior Health Authority; 3 Division of General Surgery, Department of Surgery, University of British Columbia

Background: Risk adjusted reports from the American College of Surgeons National Surgical Quality Improvement program (NSQIP) showed colorectal surgery patients are at increased risk of post-operative morbidity. Standardized care protocols offer the potential to reduce morbidity. Evidence-based pathways, including Surgical Site Infection Bundle (SSIB) and an Enhanced Recovery After Surgery pathway (ERAS), to improve care for colorectal surgery patients were sequentially introduced at a community hospital.

Objective: The purpose of this study is to determine if there was additive benefit with the introduction of these initiatives and report results from a community hospital setting.

Methods: Patients at a single institution who underwent elective colorectal surgery between the dates April 1, 2011 – May 31, 2015 were identified using NSQIP data. The cohort of patients was stratified into 3 groups by implementation dates for the initiatives. This included a pre-initiative group (April 1, 2011 – June 16, 2013); a post-SSIB/pre-ERAS group (June 17, 2013 – May 20, 2014); and a post-initiative group (May 21, 2014 – Oct 31, 2015). Characteristics of the groups and their 30-day outcomes were assessed. Primary outcomes assess were Length of Stay, Morbidity and SSI Rate. Inverse proportional weighting (IPW) was used to control for possible differences between the groups.

Results: There were 354 patients included: 94 in the pre-initiative group, 95 in the post SSI/pre ERAS group, and 165 in the post-initiative group. The groups were balanced with respect to procedural and patient characteristics using IPW. Length of stay was reduced by each successive intervention (9 days vs. 7 days vs. 5 days). SSI rate (17% vs. 10% vs. 4%) and morbidity (35%, 27%, 20%) were also reduced in each post intervention group

Conclusions: The combination of SSI and ERAS quality improvement initiatives yielded additive benefit for patients undergoing colorectal surgery with a decrease in morbidity, SSI rate and length of stay.

0905 **Shyama Das,** Thoracic Surgery

Title: **A cross-sectional study: chest tube drainage practice patterns among Canadian thoracic surgeons following pulmonary surgery.**

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Background: High chest tube drainage following lung surgery is a rate limiting step to patient to patient discharge, increasing length of hospital stay. There is a paucity of evidence-based clinical research on safe 24-hour maximal chest tube drainage prior to removal.

Objectives: To describe the practice patterns of Canadian thoracic surgeons practice with respect to chest tube fluid drainage after routine pulmonary surgery.

Methods: Via the U.B.C. online Fluid Survey tool, a self-reported questionnaire was administered to all 124 members of the Canadian Association of Thoracic Surgeons (CATS). To maximize response rate subjects were invited to participate with 3 emails sent at 1-week intervals. Data was tabulated on the primary outcome of acceptable maximal 24-hour pleural output prior to chest tube removal, and secondary outcomes of: years in clinical practice, academic versus

community setting, and rational for chest tube management. Descriptive analysis involved calculating overall frequencies and histograms for all subject responses. Frequencies and histograms were then analyzed for each response by maximal acceptable 24-hour pleural drainage category.

Results: A total of 124 surveys were distributed. Response rate was 56% with 70 returned surveys, 65 of which were fully completed (93%). Acceptable maximal pleural drainage among surgeons ranged greatly from: <200ml (7%), 200-249ml (20%), 250-299ml (10%), 300 – 349ml (2.8%), 400 – 449ml (25.7%), >450ml (10%), Other (2.8%). Rationale for tube removal was also heterogeneous, including: algorithms learned in training (26%), individual clinical experiences (33%), evidence based guidelines (26%), and group practice pattern (17%). The practice setting for 72% of respondents was academic. Community-practice based surgeons appeared to use lower 24-hour drainage values prior to chest tube removal compared to those in an academic setting (200ml versus 400ml respectively).

Conclusion: There is great variability in post-operative management of chest tube fluid output among Canadian thoracic surgeons. Future research on this topic is warranted, with the aim of developing an evidence-based chest tube management algorithm incorporating 24-hour chest tube drainage volumes as a key variable.

0935 **Richard Cook,** Cardiac Surgery

Title: Comparison of outcomes after incomplete vs complete revascularization in patients undergoing robotically-assisted minimally-invasive direct coronary artery bypass

Richard Cook, Neil Wu, Peter Skarsgard, Anthony Fung, Jacqueline Saw, David Wood

Introduction: Until recently, patients with multi-vessel coronary artery disease (CAD) who underwent incomplete revascularization (i.e. not bypassing or stenting all vessels > 1.5mm diameter with > 50% stenosis) were felt to have poorer long-term outcomes. However, an important randomized trial (COURAGE) suggests that a strategy of revascularization may not confer a survival benefit over a strategy of medical management in some patients with CAD. Furthermore, some patients with multi-vessel CAD may have a high risk of peri-operative mortality when undergoing standard coronary artery bypass graft (CABG) surgery. Robotically assisted Minimally Invasive Direct Coronary Artery Bypass (MIDCAB) surgery may allow higher risk patients to receive a bypass graft to the left anterior descending artery (LAD) with less risk of mortality and morbidity than standard CABG. However, complete revascularization would require stenting of other stenosed coronary arteries. Since 2009, ~ 150 patients have undergone robotically assisted MIDCAB at Vancouver General Hospital. Of those patients, 77 had multi-vessel CAD, however, only 22 patients had complete revascularization ("Hybrid" group). We sought to compare outcomes between these patients, and the 55 patients who did not ("Non-Hybrid group).

Methods: This was a retrospective review of the 77 patients with multi-vessel CAD who underwent robotically-assisted MIDCAB operations at Vancouver General Hospital between May 2009 and August 2015. All patients received a left internal mammary artery (LIMA) bypass graft to the left anterior descending artery (LAD). Patients in the Hybrid group underwent stenting of other stenosed arteries after the robotically-assisted MIDCAB operation. Preoperative factors were compared between the two groups using 2-tailed Student's t-tests. Follow-up information was collected at least one year after each operation to assess peri-operative mortality, survival, and major complications. Kaplan-Meier survival curves were used to compare survival between the 2 groups.

Results: The mean Society for Thoracic Surgery (STS) risk score for perioperative mortality was higher in the Hybrid group than the Non-Hybrid group (6.3 +/- 2.0 vs 3.1 +/-1.8, respectively), however, there were no perioperative deaths. There was no significant difference in survival observed between the Hybrid and Non-Hybrid groups (log rand test p = 0.57). Only 1 patient (Hybrid group) had a major cerebrovascular accident post-operatively, and none of the patients had a wound infection.

Conclusions: Although the Hybrid group had a higher predicted risk of perioperative mortality, there was no significant difference in perioperative mortality, survival, or major complications observed between those patients, and the Non-Hybrid group. Our results suggest that in certain highly-selected patients with multi-vessel CAD, incomplete revascularization with robotically-assisted MIDCAB may be a reasonable and safe alternative to complete revascularization.

0945 **Leslie Leung,** Plastic Surgery

Title: Accelerant-related burns in British Columbia: patient demographics and outcomes

Leslie Leung, Anthony Papp, Division of Plastic & Reconstructive Surgery, University of British Columbia

Introduction: Accelerants are flammable substances that may cause explosion when added to existing fires. Misuse of accelerants is directly related to increased burn severity. The relationships between drug abuse and accelerant-related burns are not well elucidated in the literature. Of these burns, a portion is related to drug manufacturing, which are associated with worse burn outcomes.

Objectives: To evaluate the demographics and clinical outcomes of accelerant-related burns in British Columbia and to analyze a subgroup of patients with history of drug abuse and drug manufacturing.

Methods: Patient data associated with accelerant-related burns from 2009-2014 were obtained from the British Columbia Burn Registry. The demographics of these patients including age, sex, gender, co-morbidities, and ethnicity were collected. These patients were then compared with a control group of non-accelerant related burns. Clinical outcomes that were evaluated include inhalational injury, ICU length of stay, ventilator support, surgeries needed, and burn complications.

Results: Accelerant-related burns represent 28.2% of all burn admissions (N=512) from 2009-2014. The accelerant group has higher percentage of patients with history of drug abuse and is associated with higher TBSA burns, ventilator support, ICU stay and pneumonia rates compared to the non-accelerant group. Within the accelerant group, there is no difference in clinical outcomes amongst people with or without history of drug abuse. Four cases were associated with methamphetamine manufacturing, all of which required ICU stay and ventilator support.

Conclusions: Accelerant-related burns cause significant burden to the burn centre. A significant proportion of these patients have history of drug abuse.

0955 **Mahammad Pakyari,** Plastic Surgery

Title: Application of a novel hydrogel collagen composite: is it possible to live in an artificial skin?

Mohammad Reza Pakyari, Ali Farokhi, Ryan Harwell, Hatem Alnojeidi, Erin Brown & Aziz Ghahary

Introduction: Burns and chronic wounds comprise nearly two-thirds of the advanced wound care sector, which amounts to nearly $20 billion worldwide. Rapid biological wound coverage can greatly benefit wound care, but as of yet, has failed to overcome key tissue engineering hurdles, such as preparation time, ease of use, and integration with the recipient tissue. Using previously approved polymers our goal was to establish a biomimetic network that could function with simple biochemistry in order to expedite the regulatory process, reduce treatment cost and easily gel within the wound. Our hypothesis is that a hydrogel-containing scaffold will be able to rapidly integrate with the wound surface and provide a means in which transplanted cells can remodel the environment.

Methods: In-situ gelling scaffolds were fabricated by combining collagen with a pH-sensitive hydrogel. For most treatments, collagen scaffolds with and without hydrogels were compared against a solid support. Mice received a full thickness wound that was splinted to prevent contracture. The results also were compared with the most widely used products as control in terms of wound closure and changes in the wound at cellular level.

Results: In situ gelling scaffolds, containing hydrogels, were non-toxic, exhibited significantly faster fibril formation than controls ($p<0.05$). Hydrogel scaffolds demonstrated a greater mechanical strength, as well as resistance to contracture and degradation ($p<0.05$). Splinted wounds demonstrated a significantly faster time to wound closure over controls ($p<0.05$). The results from comparing with other collagen based scaffolds showed significant superiority in wound closure time.

Conclusions: Collectively our data suggest that the hydrogel containing scaffolds showed to be a promising method to provide rapid, integrative wound coverage that may improve treatment outcome.

1005 **Layla Nabai,** Plastic Surgery

Title: **Controlled delivery of methotrexate: a novel approach to reduce post-surgical scarring**

Layla Nabai, 1 Ryan Hartwell, 1 Malihe-Sadat Poormasjedi-Meibod, 1 John Jackson,2 Aziz Ghahary, 1 1BC Professional Fire Fighters' Burn & Wound Healing Research Lab, Department of Surgery, Division of Plastic Surgery 2 Faculty of Pharmaceutical Sciences, The University of British Columbia

Background: Post- surgical fibrosis is a common complication with significant consequences and no completely efficient preventive or therapeutic option. Over the past decades, considerable body of research has been performed to elucidate the mechanism(s) involved in scar development. Excessive collagen deposition, as a result of increased production or decreased degradation, is implicated in fibrosis. It has been previously shown that low dose methotrexate (MTX) decreases collagen and increases matrix metalloproteinas 1 (MMP1) expression in dermal fibroblasts in vitro. Here we proposed that controlled delivery of MTX to wound bed through a drug delivery system will reduce post- surgical fibrosis in vivo.

Hypothesis: In this study we hypothesised that implantation of MTX loaded biocompatible, biodegradable microspheres in wound bed before suturing will reduce fibrotic scar formation following surgical procedures.

Methods: Poly(L-lactic acid)(PLLA), methoxypolyethylene glycol-block-poly(D, L-lactide)(MePEG-b-PDLLA), and poly lactic-co-glycolic acid (PLGA) polymers were used to fabricate microspheres. MTX loaded microspheres with different formulations were prepared using emulsion/solvent evaporation technique. The encapsulated amount of MTX and the in vitro release profile of different formulations were determined. The stability of the encapsulated and released MTX was tested in vitro through its effect on cultured dermal fibroblast. For in vivo efficacy, a validated animal model of fibrosis was used. In this model, pre-cut PVA sponges with one cm diameter were implanted subcutaneously under the panniculus carnosus layer in rat. PVA sponges loaded with either empty microspheres or MTX microspheres, were implanted as well. Tissue samples were collected after 8 weeks and examined histologically. Masson's trichrome staining and hydroxyproline assay were used to determine collagen deposition inside PVA sponges.

Results: The most efficient formulation for encapsulation of MTX was PLGA: MePEG-PDLLA (diblock):MTX 75:20:5 (86.74%±8.89).The early burst release for PLGA + diblock was significantly lower than the PLLA and PLLA + PLGA (20%, 45%, and 80% respectively). Extended in vitro release profile for MTX microspheres fabricated with PLGA + diblock revealed gradual release started after 32days and continued up to 59days. Further experiment showed that encapsulated and then released MTX had similar effect on the collagen and MMP-1 expression by dermal fibroblasts as fresh MTX in vitro. Histology showed that collagen deposition inside the PVA sponge implants loaded with MTX microspheres was reduced in comparison with PVA alone or PVA loaded with empty microspheres.

Conclusion: The results of our study shows that MTX can efficiently be encapsulated in and released from PLGA, a FDA approved polymer; and implantation of the controlled release, MTX- loaded microspheres in wound bed reduces the post- surgical fibrosis in vivo.

1015 **Oleksandr Butskiy,** Otolaryngology

Title: **Rinne test revisited: The position of the tuning fork does not affect the results of the Rinne test**

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Background: Rinne test continues to be in widespread clinical use to detect conductive hearing loss in patients. The traditional teaching on performing the Rinne test stresses the importance of placing the tuning fork tines in parallel to the ear canal when testing air conduction. Previous work from our group established that Canadian Otolaryngologists demonstrate a wide variation in the orientation of the tuning fork with respect to the ear when performing the Rinne test. Furthermore, laboratory experiments showed that placing the tuning fork tines parallel to the ear canal generates higher amplitude sound at the tympanic membrane level. The present study assesses whether the difference in amplitude of sound between the two positions of the tuning fork (1) is perceived by subjects with normal hearing and (2) affects the results of the Rinne test in patients with hearing loss.

Hypotheses: (1) normal hearing Subjects can perceive a difference in the amplitude of sound between the parallel (A) and perpendicular placement (B) of the activated tuning fork next to the ear. (2) In patients with conductive hearing loss, the orientation of the tuning fork during the Rinne test (parallel vs perpendicular) affects the results of the test.

Methods: (1) Audiometrically normal hearing adults were recruited for the study. Each participant was presented with paired tuning fork sounds (512Hz) four times (A&B, B&A, A&B, B&A in a random order) and asked to state whether sound A or B was louder. If the participants could not tell the difference between the two sounds, A or B were picked at random using a random number generator. Chi-squared test with Yates's correction for continuity was then used to compare the frequencies of response A and B. (2) Patients with conductive hearing loss in at least one ear (air-bone-gap greater than 10dB) were recruited at an outpatient otolaryngology clinic. Four Rinne tests were performed on each ear with conductive hearing loss: two with the tuning fork held parallel and two with the tuning fork held perpendicular to the ear canal. The results of the Rinne test between the parallel and perpendicular placement of the tuning fork were compared using the chi-squared test.

Results: (1) 20 audiometrically normal hearing adults were recruited for the study. Out of 156 paired sounds presented to the 39 audiometrically normal ears, the parallel placement of the tuning fork was reported louder 72 times (46%) which was not statistically different from the perpendicular placement of the tuning fork (p=0.38). (2) 35 patients with audiometrically confirmed hearing loss in 37 ears were selected into the study. Rinne test performed with the tuning fork held parallel and perpendicular to the ear canal correctly identified the presence of a conductive hearing loss in 48 (65%) out of 74 and 47 (64%) out of 74 tests respectively. The results of the tuning fork tests were not statistically different between Rinne tests performed with the tuning fork placed parallel and the tuning fork placed perpendicular to the ear canal (p=0.864).

Conclusion: Normal hearing individuals are unable to distinguish the difference between the two positions of the 512Hz tuning fork. Furthermore, during the Rinne test, the orientation of the tuning fork did not appear to influence the outcome of the test.

1025 **Diana Forbes,** Plastic Surgery

Title: **Growth hormone therapy accelerates axonal regeneration, promotes motor reinnervation, and reduces muscle atrophy following peripheral nerve injury**

Sami H. Tuffaha, Joshua D. Budihardjo, Karim A. Sarhane, Mohammed Khusheim, Diana Song, Justin M. Broyles, Roberto Salvatori, Kenneth R.Means Jr., James P. Higgins, Jaimie Shores, Damon Cooney, Ahmet Höke, W.P. Andrew Lee, Gerald Brandacher
Department of Neurology, Johns Hopkins (Hoke); Department of Medicine, Johns Hopkins (Salvatori); Curtis National Hand Center, Baltimore, MD (Higgins, Means); Division of Plastic and Reconstructive Surgery, University of British Columbia (Song); Department of Plastic and Reconstructive Surgery, Johns Hopkins for the rest

Background: Therapies to improve outcomes following peripheral nerve injury are lacking. Prolonged denervation of muscle and Schwann cells (SCs) contributes to poor outcomes. In this study, we assess the effects of growth hormone (GH) therapy on axonal regeneration, SC and muscle maintenance, and end-organ reinnervation in rats.

Hypothesis: Growth hormone therapy improves outcomes in rats with peripheral nerve injury.

Methods: Male Sprague-Dawley rats underwent sciatic nerve transection and-repair and femoral nerve transection-without-repair and received either daily subcutaneous GH (0.4 mg/day) or no treatment (N=8 per group). At 5 weeks, we assessed axonal regeneration within the sciatic nerve, muscle atrophy within the gastrocnemius muscle, motor endplate reinnervation within the soleus muscle, and SC proliferation within the denervated distal femoral nerve.

Result: GH-treated animals demonstrated greater percent increase in body mass (12.2 1.8 vs. 8.5 1.5, p=0.0044), greater number of regenerating myelinated axons (13876 2036 vs. 8645 3279, p=0.0018) and G-ratio (0.64 0.11 vs. 0.51 0.06, p=0.01), greater percent reinnervation of motor end lates

(75.8 8.7 vs. 38.2 22.6, p=0.0008), and greater muscle myofibril cross sectional area (731.8 157 µm vs. 545.2 144.3 µm, p=0.027).
Conclusions: In male rats, GH therapy accelerates axonal regeneration, reduces muscle atrophy and promotes muscle reinnervation. GH therapy may also maintain proliferating SCs in the setting of prolonged denervation.

1035 **Romy Hoeppli,** General Surgery
Title: **Migration capacity of thymic regulatory T cells can be tuned by expansion in cytokine-enriched culture conditions**
Romy Hoeppli1,#, Esmé Dijke2,3,#, Andrew Campbell1, Lori West2,3,4,# Megan Levings1,#
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#Canadian National Transplant Research Program Investigator
Background: Regulatory T cell (Tregs)-based therapy is a promising approach to treat allograft rejection. We have previously found that thymuses, routinely removed during pediatric cardiac surgery, are a potential source of therapeutic Tregs. To be effective, Tregs must express homing receptors for migration to inflammatory sites. For example, expression of the chemokine receptor CXCR3 on Tregs is essential to guide Tregs to locations of Th1-inflammation.
Hypothesis: We hypothesized that expression of homing receptors by thymic Tregs could be fine-tuned by including cytokines in the expansion protocol.
Methods: CD4+CD25+ Tregs were isolated from pediatric thymuses by magnetic bead-separation. Tregs were expanded with artificial antigen-presenting cells, rapamycin and IL-2. The cells were re-stimulated after 7 days without rapamycin. For Th1-polarizing conditions, IL-12 and IFN-gamma were added to cultures either during the first, second or both rounds of stimulation.
Results: Thymic Tregs cultured under Th1-polarizing conditions significantly increased CXCR3 expression and showed >2-fold higher expansion capacity compared to Tregs cultured in neutral conditions. Importantly, Tregs cultured with Th1-inducing cytokines during the first round of stimulation maintained a stable phenotype, including high FOXP3 expression, did not acquire the ability to produce Th1-cell associated cytokines such as IL-2 or IFN-gamma and potently suppressed proliferation of conventional T cells in vitro. In contrast to neutral cultures, expansion under Th1-conditions enabled thymic Tregs to migrate towards the CXCR3-specific chemokine CXCL10 in vitro and migration could be specifically blocked using a CXCR3-neutralizing antibody.
Conclusion: Expansion conditions of thymic Tregs can be manipulated to specifically tailor the cells' homing capacity. The ability to direct Tregs towards specific tissues or sites of inflammation may enable optimal targeting as a therapeutic in vivo. Future investigations will focus on testing the ability of Th1-polarized thymic Tregs to specifically suppress Th1 cells in vitro and in a pancreatic islet transplant model in vivo.

1045 **Queenie Hui,** General Surgery
Title: **Neutralizing interleukin-1 beta enhances survival and function of human islets: implications in clinical islet transplantation**
Queenie Hui, Yoo Jin Park, Ziliang Ao, Nooshin Safikhan, Garth Warnock, Lucy Marzban, Department of Surgery, Faculty of Medicine, University of British Columbia
Introduction: Islet amyloid formation due to aggregation of human islet amyloid polypeptide (hIAPP), contributes to beta-cell dysfunction and death in type 2 diabetes, cultured and transplanted human islets. We previously showed that amyloid formation induces upregulation of the Fas cell death receptor in human islet beta-cells. Interestingly, most amyloid forming human islets also had elevated IL-1 beta levels.
Objectives: In this study, we tested if neutralizing IL-1 beta can prevent amyloid-induced Fas upregulation and beta-cell toxicity thereby enhancing islet viability and/or function.
Methods: Human islets isolated from cadaveric pancreatic donors (n = 6) were cultured with or without a human IL-1 beta neutralizing monoclonal antibody at 11.1 mmol/L glucose (to potentiate amyloid formation) for 7 days. Amyloid formation, islet IL-1beta levels, beta/alpha-cell ratio and beta-cell apoptosis were assessed by immunolabeling. Beta-cell function was assessed by measuring insulin response to the elevated glucose and islet insulin content (ELISA).
Results: Progressive amyloid formation in human islets during culture closely correlated with increased IL-1 beta release, beta-cell dysfunction, Fas upregulation and apoptosis. Also, suppression of amyloid formation in cultured human islets by adenoviral prohIAPP-siRNA transduction significantly reduced islet IL-1 beta levels, suggesting that amyloid formation is an important factor inducing IL-1 beta production. Treatment with IL-1 beta neutralizing antibody markedly reduced beta-cell Fas expression in cultured human islets despite amyloid formation, resulting in lower beta-cell apoptosis, higher beta-cell area to total islet area and beta/alpha-cell ratio in treated islets as compared to non-treated cultured islets. Moreover, treated human islets had a greater insulin response to elevated glucose and higher insulin content than non-treated cultured islets.
Conclusions: In summary, these data suggest that amyloid-induced beta-cell Fas upregulation is mediated by IL-1 beta in human islets. Neutralizing IL-1 beta may provide a new strategy to protect beta cells from amyloid toxicity in conditions associated with islet amyloid formation such as type 2 diabetes and clinical islet transplantation.

1400 **Jonathan Misskey,** Vascular Surgery
Title: **Hemodialysis for elderly renal failure patients: an age-based comparison of fistula location, patency, maturation and patient survival**
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Background: In many centers elderly patients (>65 years) comprise a significant proportion of renal replacement therapy patients. Current KDOQI guidelines, however, do not incorporate age in determining optimal fistula placement, and controversy exists regarding the optimal access type and configuration in elderly patients.
Objectives: Comparison of patency, maturation rates, survival and complications between several age cohorts (<65, 65-79, >80) to determine if current access protocols should be modified to account for advanced age.
Methods: Data were retrospectively analyzed from a prospectively maintained database. All patients at 2 teaching hospitals undergoing a first ipsilateral autogenous arteriovenous fistula creation between 2007 and 2013 were considered eligible for inclusion. Kaplan Meier survival estimates and Cox proportional hazards models were used to compare fistula patency and risk factors for fistula failure.
Results: A total of 941 patients had a first arteriovenous fistula placed during the study period and were eligible for inclusion. Of this cohort, 152 (15.3%) fistulas were in patients 80 or older, 397 were aged 65-79 (42.2%), and 392 (41.8%) were < 65. Mean follow-up for all groups was 26.0 ±19.8 months (Range 0 – 89 months). Primary patencies between patients >80, 65-79 and < 65 were 40 ±4%, 38±3% and 51±3% at 12 months, 22±4%, 21±3% and 33 ±3% at 24 months and 12 ±5%, 13±3% and 27±23% at 36 months (P <0.001). Primary assisted patencies were 72±4, 70±2, and 78±2 at 12 months, 60±5, 60 ±3 and 72± 2 and 24 months, and 52±5, 52±3 and 67±3 and 36 months (P <0.001). Secondary patencies were 72±4%, 71±2% and 79±2% at 12 months, 60±5, 62±3 and 75±2 at 24 months, and 54±5, 55±3 and 72±3 at 36 months (P <0.001). Failure to mature rates were significantly higher in age groups of >80 and 65-79 compared with those <65 (32.9% and 34.2% vs. 25.0% P = 0.016). There were no differences in fistula maturation rates with proximal fistula configurations between groups (24.7%, 30.4% and 21.8%; P = 0.118), however distal fistulas had a higher rate of nonmaturation in those >80 and 65-79 compared with patients <65 years of age (47.3%, 38.8%, and 28.7%; P = 0.020). There were no differences between the three cohorts with respect to postoperative incidence of access related hand ischemia (8.6%, 5.8% and 5.4%; P = 0.359) or wound complications (5.3%, 4.5% and 6.9%%; P = 0.350). Mean survival was lowest among those >80 (39.4±3.1 months; 95% CI: 33.2 – 45.5), followed by those 65-79 (44.3±1.6 months; 95% CI: 41.0-47.6) and <65 (60.9±1.9 months; 95% CI: 57.3-64.6; P <0.001). Coronary artery disease (HR 1.31; 95% CI 1.01 – 1.70; P = 0.042), female gender (HR 1.57; 95% CI 1.24 – 1.98; P < 0.001), a previous ipsilateral tunneled catheter (HR 1.62; 95% CI 1.12 – 2.35; P = 0.011), previous bilateral tunneled catheters (HR 1.95; 95% CI 1.26 – 3.00; P = 0.003)

and creation of a distal fistula (HR 1.61; 95% CI 1.28 – 2.02; P < 0.001) were found on multivariate regression analysis to be associated with loss of AVF secondary patency.

Conclusions: Patients <65 demonstrated superior primary and cumulative patency rates for all access configurations compared to older cohorts, with the effect greatest among distal accesses. These findings suggest that an approach that favors access patency over the most distal configuration in cohorts with significantly shortened life expectancy may be associated with increased autogenous access use.

1410 **Anali Dadgostar,** Otolaryngology

Title: **The application of a free nasal floor mucosal graft in functional endoscopic sinus surgery**

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Background: Numerous reconstructive techniques and materials have been reported for repair of skull-base defects, CSF leaks and coverage of denuded bone, including pedicled vascularized flaps and free mucosal grafts.

Objective: This study introduces the novel technique of harvesting and transferring a free nasal floor mucosal graft, and discusses our experience with application of this technique.

Methods: Retrospective review of 8 patients (mean age 57.8, all male) treated with image-guided endoscopic sinus surgery for chronic rhinosinusitis or tumors. Intraoperative free mucosal graft repair was performed for large skull-base defects after resection of esthesioneuroblastoma (n=2), coverage of denuded mucosa/osteoneogenic bone (n=3), and iatrogenic CSF leak with frontal sinus osteoma coverage (n=3). Repair was performed in an overlay or underlay fashion with a multilayer approach in cases of a large skull-based defect. Patients underwent endoscopic assessment at 6-days, 5 and 12-weeks post-operatively for assessment of healing and CSF leak.

Results: Minimal crusting was identified at the donor site in all patients at 6-days with no evidence of CSF leak. In cases of exposed bone/mucosal stripping, hyperostosis at the recipient graft site was avoided. All patients had complete healing at the donor site and recipient site with minimal morbidity at 5 and 12-weeks without evidence of recurrent CSF leak.

Conclusion: The use of nasal floor mucosal free grafts in endoscopic surgery offers the advantage of ease of harvest, coverage of large defects, multiple applications of use, and minimal donor site morbidity when compared to alternative tissue grafts currently utilized in sinus and skull-base surgery.

1420 **Kyle Arsenault,** Vascular Surgery

Title: **Standard TEVAR compared to PETTICOAT technique in aortic dissection**

Kyle Arsenault, Darren Klass, Joel Price, Michael Janusz, Joel Gagnon, Jerry Chen, Jason Faulds

Objectives: An endovascular approach to the management of aortic dissection complicated by malperfusion syndrome or early expansion has been shown to be associated with improved short-term outcomes. Thoracic endovascular aortic repair (TEVAR) also encourages favourable aortic remodelling, thereby preventing late aneurysmal degeneration and its associated mortality. The PETTICOAT (provisional extension to induce complete attachment) technique is a modification of TEVAR that utilizes bare metal stents to scaffold open the true lumen of the thoracoabdominal aorta and preferentially direct blood flow. This technique has been shown to be technically feasible but there are few studies reporting the influence on aortic measurements.

Methods: We performed a retrospective chart review of all patients receiving a thoracic endovascular aortic repair for aortic dissection at our centre between March 2005 and February 2016. Patients were categorized by whether they underwent a PETTICOAT technique repair with distal bare metal stenting or not. We collected data from paper charts, electronic medical records, and an imaging database. Our primary outcome was aortic remodeling, including false lumen thrombosis, and true and false lumen diameters at both the point of maximum aortic diameter and the diaphragmatic hiatus. Continuous variables were analyzed using the Student's t-test or the Mann-Whitney U test, as appropriate. Categorical variables were analyzed with the chi-squared test. A p value of less than 0.05 was considered statistically significant.

Results: From March 2005 to February 2016 there were 39 patients that received TEVAR for aortic dissection. Twenty-three of these patients underwent a PETTICOAT technique repair. Baseline characteristics and aortic morphology were similar between the two groups. The majority of cases were for Debakey class 3a or 3b dissections. Approximately half of cases were elective, while half were urgent or emergent for malperfusion syndrome or rupture. Mean length of follow-up was 1.1 years in the Petticoat group and 2.9 years in the Non-Petticoat group. There was no significant difference in maximum aortic diameter at baseline compared to follow-up for the Petticoat (median 52.1 vs. 46.2mm; p=0.07) or the Non-Petticoat groups (51.3 vs. 44.5; p=0.39). This was similar at the diaphragmatic hiatus (36.1 vs. 38.9; p=0.34 for Petticoat; 41.9 vs. 40.7; p=0.39 for Non-Petticoat). At follow-up, the true lumen diameter at the point of maximum aortic diameter was significantly increased in both groups (19.7 vs. 31.6; p<0.00001 for Petticoat; 21.0 vs. 34.5; p=0.0019 for Non-Petticoat). However, at the diaphragmatic hiatus, the true lumen was significantly increased at follow-up for the Petticoat group (13.4 vs. 24.0; p<0.00001) but not for the Non-Petticoat group (15.1 vs. 27.6; p=0.30). Twelve (52.2%) patients in the Petticoat group had at least thrombosis of the thoracic component of false lumen, compared to 10 (40.0%) in the Non-Petticoat group (p=0.36). A greater proportion of patients in the Petticoat group remained free from reintervention during follow-up (73.9% vs. 62.5%) but this was not statistically significant (p=0.39).

Conclusions: While this cohort study is limited by a small sample size and a lack of long-term follow-up, it does present encouraging results with the use of the PETTICOAT technique in TEVAR. The use of bare metal stents was associated with a statistically significant improvement in the true lumen diameter at the diaphragmatic hiatus compared to covered stents alone. There was also a tread towards increased false lumen thrombosis and freedom from intervention. Longer-term follow-up is key to determining the success of this technique and identifying the factors that may predict aneurysmal degeneration in aortic dissection.

1430 **Mohammadali Khorasani,** Pediatric General Surgery

Title: **In vivo continuous pressure and airflow rate measurement in pneumatic reduction of intussusception: how high do we go?**

Mohammadali Khorasani, Dylan Stephanian, Douglas H. Jamieson, Jack Dundas, Lachlan Pedersen, Tanya Jane Bennet, Kade Patrick Curran Philps, Sean Lee Zhang Wharton, Janyce Colleen Archutick, Jesse Lee Labrecque, Alexander Anthony Hutchinson, James J. Murphy

Background: Safety and efficacy of pneumatic intussusception reduction are dependent on management of intra-colonic pressures. We measure pressures and airflow rates during the procedure to assess operator's control over these parameters. We also analyze the graphs and pattern associations with procedure outcomes.

Methods: A novel data logger was used to prospectively measure pressures and airflow rates during intussusception reduction at a tertiary pediatric hospital between January 2015-January 2016.

Results: Twenty cases had initial diagnosis of intussusception, 4 of them had no intussusception at fluoroscopy. In 100% of the procedures, maximum intended pressure of 120 mmHg was exceeded, 69% of which went unrecognized by the radiologist. Ten out of 14 patients (71%) were reduced successfully at the first attempt, but 4 were not; two out of 4 reduced with a second attempt, and 2 required surgery. Mean pressure for successful and unsuccessful attempts ranged from 44 to 81 and 45 to 100 mmHg respectively. Pressures above 120 mmHg occupied 4% to 53% and 10% to 38% of area under the time pressure graph for successful and unsuccessful attempts respectively.

Conclusions: Intra-colonic pressures during pneumatic intussusception reduction exceed intended thresholds more frequently than expected. Current means of intra-colonic pressure monitoring and control should be reassessed and optimized.

1440 **Mitchell Webb,** General Surgery

Title: **Incisional negative pressure wound therapy following colorectal resection: a single site, prospective, randomized control trial**

Neely Panton MD FRCSC, Vy Nguyen MD FRCSC, Mitchell Webb M, UBC Department of Surgery, Division of General Surgery

Background: Superficial surgical site infection (SSI) is a preventable postoperative complication that impacts length of hospital stay, health care spending, and patient morbidity/mortality. Unfortunately, it is a relatively common occurrence, especially following clean-contaminated procedures, such as colorectal resection (CRR). According to NSQIP data, the average incidence of superficial SSI for these operations is 7% among hospitals in North America. Meanwhile our centre (VGH) has recorded higher than average rates of 10.7% despite implementation of best practices, for the last 3 years. Numerous trials that have sought to establish perioperative protocols to reduce the incidence of SSI. Recently, literature has been produced on the efficacy of incisional Negative Pressure Wound Therapy (iNWPT) in orthopaedic, vascular, and cardiac surgical patient populations. These trials were able to demonstrate a relative risk reduction of 60-80%. A case-control study from Texas reported a relative risk reduction (RRR) of 57% with the use of iNWPT in CRR. We intend to study in a randomized controlled trial, the use of iNWPT in both open and minimally invasive CRR.

Objectives: Answer the question, "does incisional negative pressure wound therapy convey a reduced incidence of superficial surgical site infection or wound complication in colorectal laparotomies?"

Methods: In this single-institution, prospective, randomized, open-label, superiority trial, patients scheduled for elective colorectal resection with or without creation of an ostomy (open or MIS) will be considered eligible. Exclusion criteria includes patients who are under 19, pregnant, immune compromised, allergic/sensitive to adhesive dressings or operations performed under an emergent basis, without an anastomosis (e.g. APR/Hartmann), for palliation or without a midline incision made for specimen extraction. Cases involving additional procedures at time of CRR (e.g. hernia repair) will also be excluded. Anticipating a wound complication rate of 20-30%, and a RRR of 50%, we will recruit subjects to provide appropriate power. Subjects will be randomized into one of two treatment arms: use of standardized adhesive dressings vs application of a negative pressure wound device for three days. The surgical team will inspect incisions every day leading to discharge. Patients will be followed up to 30 days following surgery and a satisfaction questionnaire will be completed by the patient on the last day of follow up. SSIs will be diagnosed according to CDC guidelines.

Results: Primary outcomes will be wound complications within 30 days of surgery and SSI reported separately. Secondary outcomes include length of stay, number of post-operative visits in the 30-day period, complications (according to Clavien-Dindo classification), wound vac specific complications and patient satisfaction. Using intention-to-treat analysis, the incidence of primary outcomes between groups will be compared using Chi-squared test. In the event that baseline characteristics are significantly different, a secondary analysis using multivariable regression will adjust for the effect of the difference.

Conclusions: Results from this study will help surgeons in deciding upon use of negative pressure wound therapy following CRR, a clean contaminated procedure with a high rate of SSI. A clinically relevant relative risk reduction in addition to good patient tolerance and satisfaction will help to support their use, despite the perceived added cost.

1450 **Maryam Dosani,** Radiation Oncology

Title: **Impact of spinal instability neoplastic score on surgical referral patterns and outcomes of patients treated with palliative radiotherapy to spinal metastases**

Maryam Dosani, 1 Sarah Lucas, 1 Jordan Wong, 1 Lorna Weir, 1 Christina Cumayas, 1 Sheri Lomas, 1 Charles Fisher, 2 Scott Tyldesley1
1) University of British Columbia, Department of Surgery, Division of Radiation Oncology and Developmental Radiotherapeutics 2) University of British Columbia, Department of Surgery, Spine Surgery

Background: The Spinal Instability Neoplastic Score (SINS) was developed to identify patients with spinal metastases who may benefit from surgical consultation. Patients are stratified into 3 groups: score 0-6 (stable spine, no referral), 7-12 (potentially unstable, consider referral), and 13-18 (unstable, referral required). The purposes of this study are: 1) To characterize the scores seen in a consecutive population-based cohort of patients treated with spinal radiotherapy (RT); 2) To assess referral patterns to spinal surgery; 3) To identify whether high SINS was prognostic of worse outcome following palliative RT.

Methods: We retrospectively reviewed consecutive patients receiving palliative spine RT between 2012 and 2013. The SINS was calculated based on the CT scan obtained for RT planning and chart review. Charts were reviewed for baseline clinico-pathologic characteristics, initial referral (pre-RT) to a spinal surgeon, and outcomes following spinal RT. Data was analyzed using Student's t, Chi-Square, Fisher's exact, and Kaplan-Meier tests. Patients were stratified into low (<7) and high SINS (≥7) groups.

Results: 195 patients with median age 66 years and ECOG 2 were included. Median follow-up was 6.1 months in all patients and 28.5 months in living patients. Median (range) SINS score was 7 (1-18). SINS was 0-6, 7-12, and 13-18 in 34%, 59% and 7% of patients. 11 patients had pre-RT referral to spine surgery, with a surgery performed in 0 of 1 patients with SINS 0-6, 1 of 7 with SINS 7-12, and 1 of 3 with SINS 13-18. Stable spine on assessment, intact neurological status, and shorter life expectancy were the most common reasons not to pursue surgery. On univariate analysis, only SINS≥7 and presence of paraspinal tumor were statistically significantly associated with pre-RT referral. Seven patients were referred to a surgeon post-RT with salvage surgery performed in 2 of those patients. Outcomes did not differ between low vs high SINS groups. Median (95% CI) overall survival is 8 months (4-11, low) vs 8 months (3-12, high), p=0.40. Freedom from spinal adverse event (symptomatic vertebral fracture, hospitalization for pain, salvage surgery, interventional procedure, new neurologic symptoms, or cord compression) at 6 months was 91% (84-97, low) vs 85% (85 -85, high), p=0.28. Freedom from subsequent intervention to the same vertebrae at 6 months was 91% (84-98, low) vs 83% (74-92, high), p=0.24. Ambulation at 6 months was 85% (76-94, low) vs 94% (87-99, high), p=0.06.

Conclusion: Higher SINS score was associated with pre-RT referral to a spine surgeon, but most patients with SINS indicating unstable or potentially unstable spines were not referred. Higher SINS was not associated with worse outcome following RT. It is uncertain whether outcomes would be associated with SINS in a cohort with longer life expectancy or higher performance status. Whether and how SINS score should be used to select patients for surgery requires further study.

1500 **Mostafa Fatehi,** Neurosurgery

Title: **Determinants of quality of life improvement after pituitary surgery in patients with acromegaly** *Mostafa Fatehi, Camille Hunt, Ryojo Akagami, Department of Surgery, Division of Neurosurgery, Vancouver General Hospital, University of British Columbia*

Background: Acromegaly is a rare and slowly progressive growth disorder caused by the excessive secretion of Growth Hormone (GH). The vast majority of patients with acromegaly have a slow-growing pituitary tumor which may ultimately cause neurological deficits. However, the pleiotropic effects of GH on many organs causes a myriad of clinical comorbidities, disfigurement and pre-mature mortality. Tumor resection remains the primary treatment modality and good biochemical control is generally reported. However, it is not clear which factors have the greatest impact on quality of life (QoL) after surgery.

Hypothesis: Improvement in QoL is reported rapidly after surgery. This improvement is not driven by biochemical cure of acromegaly.

Methods: A series of 55 patients with acromegaly treated by a single surgeon (RA) at VGH between 2002-2015 were asked to complete a previously validated quality of life questionnaire, the SF-36. The scores were averaged and compared pre- and post-operatively. The impact of various variables on quality of life will be assessed

Results: Analysis of the data reveals significant improvement in patients' perceived general health post-operatively. Most of the improvement occurs in the early post-operative period. Further analysis will determine the most important factors affecting post-operative quality of life.

Simultaneous Session A

A01 **Christopher Honey,** Neurosurgery

Title: **The discovery and cure of hemi-laryngopharyngeal spasm (HELPS) syndrome**

Christopher Honey, Murray Morrison

Background: The first surgical cure of hemi-laryngopharyngeal spasm (HELPS syndrome) was recently described by our team at the University of British Columbia1. The patient had suffered from 4 years of progressive intermittent throat contractions which had escalated to respiratory crisis requiring intubation on two occasions. Investigations revealed a vessel (posterior inferior cerebellar artery) compressing the motor rootlets of her right vagus nerve. A microvascular decompression of this neurovascular conflict eliminated her throat spasms and she has remained asymptomatic for over a year. We now described the first series of patients with HELPS syndrome to better detail their clinical presentations and diagnostic evaluations.

Objectives: The clinical presentations of four patients with HELPS syndrome are reviewed. The evolution of what we believed was their ideal diagnostic investigations are presented.

Methods: Retrospective chart review of prospectively accumulated data.

Results: The clinical presentation and diagnostic evaluation of four patients with HELPS syndrome will be presented. Each patient had a combination of intermittent choking and coughing which progressed in frequency and severity over time eventually occurring while sleeping. One patient was intubated on several occasions for respiratory distress and another had received a tracheostomy. New MRI sequences were developed to visualize the rootlets of the vagus nerve but have proven less than ideal. The response to botulinum toxin injection in the vocal cords is highlighted. Preoperative laryngoscopy is correlated with intraoperative laryngoscopy during vagal nerve root stimulation. Intraoperative video of the procedure and postoperative clinical follow-up will be provided.

Conclusions: Patients with symptoms identical to HELPS syndrome have been previously described in the literature as suffering from "episodic laryngospasm". That condition was felt to be psychogenic or triggered by gastric reflux. We believe that HELPS syndrome will become a clearly defined and widely recognized syndrome with a definitive surgical cure.

A02 **Jordan Wong,** General Surgery

Title: **Management of PET detected thyroid incidentalomas in British Columbia Canada: importance of the PET report**

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Background: It is currently recommended that PET diagnosed thyroid incidentalomas (TI) undergo prompt evaluation due to a high risk of underlying malignancy. The aim of this study was to review physician management and outcomes for PET diagnosed TIs in British Columbia (BC) Canada.

Methods: Reports from all PET scans performed in BC, for non-head and neck indications, between 2011 and 2014 were reviewed, and patients with TIs were identified. Patient characteristics, investigations, and management were reviewed from patient records. Surveys were sent to the physician who ordered the PET scans for patients with limited records available. Statistical analysis was performed to assess which factors were associated with receiving further investigations. Our institution's Research Ethic Board reviewed and approved the study protocol.

Results: 899 of 19,270 PET scans (4.67%) identified focal or diffuse TIs in 802 of 15,229 (5.27%) patients. We were able to obtain adequate data from chart review and mail out surveys on 726 patients. In those with diffuse TIs (n=286), 32.4% (n=134) were included on the PET scan report impression and 4.86% (n=28) underwent an ultrasound (US) or fine needle aspiration biopsy (FNAB). Of those cases investigated, 10.7% (n=3) were found to have malignant cytology. In patients with focal TIs (n=440), 85.7% (n=377) were included on the PET scan report impression and 46.1% (n=203) underwent an US or FNAB. Of those cases investigated, 21.2% (n=43) were found to have malignant cytology. Inclusion of the TI finding in the PET report impression, and recommending further workup within the PET report, are significant factors in predicting further evaluation (p-value <0.05). SUVmax and the patient's primary malignancy are additional factors associated with nodule work up (p-value <0.05) for focal TIs.

Conclusions: Patients with diffuse and focal TIs diagnosed by PET scan are being under-investigated in BC. The most significant factors associated with undergoing further TI workup are PET scan report related. We are developing a reporting protocol that we hope will improve management of PET diagnosed TIs in BC following this study.

A03 **Sam Wiseman,** General Surgery

Title: **Completeness of ultrasound reporting impacts time to biopsy and surgery for benign and malignant thyroid nodules**

Alexandra Inman, MD1, Kaidi Liu, BKin2, Kaye Ong, MSc2, Pari Tiwari, MD3, Patrick Vos, MD3, Adam White, MD1, Sam Wiseman, MD, FRCSC2
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Background: The thyroid ultrasound (US) report is critical for communication of imaging characteristics between the ultrasonographer and treating physician. Associations with malignancy have been found in nodules with the presence of: a solid component, hypoechogenicity, microcalcifications, increased vascularity, irregular or infiltrative margins, and taller-than-wide shape (1, 2). In addition, nodule size (three dimensions), and the presence, number, and size of abnormal lymph nodes should also be reported.

Methods: We aimed to study the frequency of inclusion of guideline recommended elements for thyroid US reporting of nodular disease, and whether element reporting was associated with the time to cytological and surgical diagnosis. US reports of adults who underwent thyroid surgery for benign (n=106) or malignant (papillary or follicular subtypes, n=105) thyroid nodules between 2009 and 2014 were retrospectively reviewed for their inclusion of guideline recommended elements. The date of the initial fine needle aspiration biopsy (FNAB) and operation was also reviewed. Patients were excluded from the study when imaging or biopsy results were unavailable; they had cancer of another subtype, or a prior thyroid biopsy and/or operation.

Results: On average 5.1 elements of 11 (46.4%) were included in US reports of all nodules. An average of 4.9 elements were reported for benign nodules, and 5.4 for cancers (p=0.0012). The setting of the US (academic versus community center) influenced the number of elements reported (6.3 in academic versus 4.9 in community, p<0.001). The average time from initial US to FNAB and to operation was 66 days (range 0-762 days) and 299.2 days (range 42-1351 days), respectively. Academic centers had shorter wait times from initial US to biopsy compared to community centers. Malignant nodules had shorter wait times from initial US to operation compared to benign nodules. A higher number of reported elements was significantly associated with fewer days between initial US and FNAB, and initial US and operation (p=0.002 and p=0.029, respectively).

Conclusion: Guideline-recommended US elements were largely underreported in our study population. This underreporting was associated with delayed cytological diagnosis and surgical treatment of differentiated thyroid cancer (DTC), and this represents an important area to be addressed for improvement of patient care.

A04 **Joshua Gurberg,** Otolaryngology

Title: **The educational effectiveness of "pediatric tracheostomy: student edition" an educational mobile app for healthcare students**

Joshua Gurberg B.Sc. MDCM, Paula Tellez MD, Lisa Kwong B.Sc., Jack Zheng B.Sc. MD, and Jeffrey P. Ludemann MDCM, FRCSC
Division of Otolaryngology–Head & Neck Surgery, BC Children's Hospital, University of British Columbia

Background: The use of Medical Apps has been shown to enhance student learning in the clinical environment and to increase student knowledge.

Objectives: To test the educational effectiveness of a free, interactive mobile app in teaching basic and advanced concepts of pediatric tracheostomy care in a group of healthcare students.

Methods: 3rd year medical students and first year nursing students were recruited on a voluntary basis from class email lists. After informed consent, participants were asked a series of demographic questions then administered a 10-question pre-test evaluating pediatric tracheostomy knowledge. They were then instructed to download and go through the application and complete a post-test consisting of the same questions. Qualitative data such as ease of use of the app and recommendations for improvement were collected.

Results: Six students completed the study. There was a statistically significant improvement in test scores after using the app from a mean of 3 to 7 (paired samples t-test; P=0.002). All students answered that they would use the app again and would recommend it to their peers.

Conclusions: After further analysis in larger samples and in other types of healthcare students (e.g. Respiratory therapy), the "Pediatric Tracheostomy: Student Edition" app may soon be added to Global Tracheostomy Quality of Care Improvement Initiatives.

A05 **Joshua Gurberg,** Otolaryngology

Title: **Acute pediatric supraglotitis – the need to enhance education and redistribute classic management protocols internationally in the post-HiB vaccine era**

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2. Texas Children's Hospital, Baylor College of Medicine, Houston, Texas, United **States**

Background: Since the introduction of the Haemophilus influenzae type B (HiB) vaccine in Canada (1986), the United States (1987), and the U.K. (1992), the number of children admitted to hospital with HiB infections has decreased by 98%, with a concurrent decrease in the incidence and perhaps the severity of acute pediatric supraglottitis (APS). Because not all children receive immunization, fulminant APS still occurs.

Objectives: To describe two recent "near-miss" cases of APS, determine whether the emergency management of APS has become more heterogeneous over time, and characterize current APS education.

Methods: Retrospective case series and cross sectional survey study.

Results: In each "near-miss" case, a toddler presented to a rural hospital with classic APS signs, plus a thumbprint sign on lateral neck x-ray and was transferred to our tertiary center without airway control against specialist advice. 75 physicians responded to the survey and 56% had not seen a case of APS in the past 5 years, while 44% of respondents had managed 1-10 cases, with an average caseload of 2. Out of 81 reported patients managed over the past 5 years, 46% were managed in the OR with Pediatric Otolaryngology and Anesthesia present and 6% were intubated prior to ENT consultation. Importantly, 62% of Otolaryngologists surveyed had performed flexible laryngoscopy for suspected APS in the emergency department at least once over the past 5 years. 68% of respondents had spent no time on APS education over the past year and 51% believed more education was necessary.

Conclusions: The results of this study suggest that the incidence of APS has decreased, while the heterogeneity of its management has increased. Interestingly, there has been a significant trend toward flexible endoscopic airway evaluation in the emergency department, which was classically contra-indicated. Further research is needed to formally evaluate the safety of flexible laryngoscopy in children with APS. Until then, there should be a re-emphasis on formal didactic teaching of classical APS management protocols to avoid further "near-miss" cases of this dangerous illness.

A06 **Jasmine Cheng,** Plastic Surgery

Title: **Modulation of human adipose derived stem cells by acellular dermal matrix for treatment of chronic wounds**

Jasmine ZiJin Cheng, Ali Farrokhi, Aziz Ghahary, and Reza Jalili
Professional Firefighters' Burn & Wound Healing Research Group, Division of Plastic surgery, Department of Surgery, International Collaboration on Repair Discoveries (ICORD), University of British Columbia

Background: Chronic wounds contribute to increased morbidity and mortality and impose a significant financial burden on healthcare systems. The main goal of wound treatment is to achieve a rapid closure of the lesion and promote healing with minimal scaring. In chronic wounds, numerous strategies for skin coverage have been investigated. Among these, extracellular matrix- based biomaterials such as acellular dermal matrices (ADM) are advantageous due to their mechanical strength and retained biological activity when compared with synthetic polymer materials. Further re-cellularizing these ECM scaffolds before implantation, a process known as "revitalization", may help restore graft function and improve healing. Adipose-derived stem cells (ASCs) hold promising for this function because of their relatively ethical and non-invasive autologous stem cells extraction, and are also immunocompatible, highly proliferative, and possess the capacity to differentiate into several mesodermal lineages. There is also growing evidence that ASCs release unique cytokines and growth factors that promote wound healing.

Objective: The aim of our study was to develop an ASC-populated ADM and assess its characteristics in vitro with the ultimate goal of promotion of wound healing.

Methods: In this study, we introduced a novel method of de-cellularizing mouse skin and used this as an ADM scaffold to seed with human ASCs. We cultured this 3D model up to 9 days, and compared it to regular 2D ASC cultured at different time points. Combinations of positive (CD44, CD90, and CD73) and negative (CD31, CD34, CD45) markers were used as stem cell markers. Morphology and myofibroblast differentiation capacity of ASCs were also evaluated.

Results: Our results showed a significant reduction in expression of CD73 and CD44 in ASCs cultured on the 3D ADM compared to cells grown in 2D culture. We found that ASCs cultured under regular 2D conditions mainly shifted towards a myofibroblastic phenotype with increased myofibroblast marker α-smooth muscle actin (α-SMA), and ECM protein type I collagen. In contrast, ASCs cultured on ADM showed a more balanced differentiation pattern with maintenance of some stem cell markers.

Conclusions: Taken together, these findings show that ASC differentiation into myofibroblasts can be regulated by the 3D ADM. This ASC-ADM combination has good potential as a therapeutic approach to reduce fibrosis while maintaining the benefit of natural extracellular matrix wound coverage and the healing capacity of stem cells.

A07 **Connie Drewbrook,** Thoracic Surgery

Title: **Incidence risk and independent predictors of prolonged air leak in 269 consecutive pulmonary resection patients over nine months: a single-center retrospective cohort study**

Connie Drewbrook BASc1, Samarpita Das BSc1, Dorsa Mousadoust3, Basil Nasir1,3 MD, John Yee MD1,3, Anna McGuire MD1,3
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Introduction: Prolonged air leak (PAL) is a common postoperative complication following pulmonary resection. PAL is associated with complications such as pneumonia and empyema, increasing length of hospital stay and health-care costs. The aim of this study is to determine the incidence of PAL following lobectomy and lesser pulmonary resections, risk factors for development of PALs, and the impact of PAL on hospital stay and readmission rates.

Methods: Prospectively collected data for patients undergoing lobectomy and sublobar resections from October 1, 2015 – June 30, 2016 was analyzed retrospectively. Patient characteristics, validated risk scoring systems, and surgical factors were assessed as potential independent predictors. Data was collected on demographics, pulmonary function tests, and transplant recipient status. Validated scoring systems used included the Charlson Comorbidity Index (CCI), Medical Research Council (MRC) dyspnea score, and Eastern Cooperative Oncology Group (EGOC) score. Surgical factors included: surgical technique, unplanned conversion from video-assisted thoracoscopic surgery (VATS) to thoracotomy, location and extent of resection, presence of adhesions, completeness of fissures, and method of fissure completion if incomplete. Length of hospital stay and readmission rates were analyzed. Statistical tests of association performed included univariate and multivariable logistic regression analyses.

Results: Over the 9-month duration of the study there were 269 lung resections, of which 31 (11.52%) had an air leak lasting longer than 4 days. Mean length of stay in hospital was significantly longer in patients with PAL compared to the control group (13 vs 5 days, P<0.001). Significant risk factors for PAL from multivariate analysis include normal BMI (P=0.009), right upper lobectomy (P=0.001), and unplanned conversion from video-assisted thoracoscopic surgery (VATS) to thoracotomy (P=0.023).

Conclusion: The incidence of PAL in our study population is similar to that found in previous studies. PAL prolongs hospital length of stay. Normal BMI, upper lobectomy, and unplanned conversion from VATS to thoracotomy are independent risk predictors for PAL in our population.

A08 **Dorsa Moursadoust,** Thoracic Surgery

Title: **Independent predictors of progression to empyema: A retrospective cohort study of 1766 pneumonia cases at a tertiary-level regional thoracic surgery referral center**

Dorsa Mousadoust3, Connie Drewbrook B.ASc1, Samarpita Das BSc1, Basil Nasir1,3 MD, John Yee MD1,3, Anna McGuire MD1,3

Affiliations: 1-University of British Columbia Faculty of Medicine, 2-University of British Columbia Faculty of Science, 3-University of British Columbia, Department of Surgery, Division of Thoracic Surgery

Background: Parapneumonic Empyema, or bacterial infection of the pleural space, is most commonly caused by untreated pneumonia or post-surgical intervention. It has the potential to result in significant morbidity if not identified and managed by chest tube or surgical drainage. There is a paucity of large well powered studies in the literature identifying patient related risk factors for empyema.

Objective: To quantify the incidence of empyema treated at VGH annually, and identify independent predictors of progression to empyema and potential surgical drainage.

Methods: A retrospective cohort study was conducted for 1766 adult cases of pneumonia treated at VGH between November 1st, 2014 and October 31st, 2015. The primary outcome of interest was risk of progression to empyema. Secondary outcomes included diagnostic and therapeutic pleural intervention rate (thoracentesis, chest tube placement, surgical drainage of empyema). Data was collected on basic patient demographics, in addition to comorbidities in order to calculate individual Charlson Comorbid Index (CCI). Univariable and multivariable logistic regression analysis of variables was conducted, in order to identify independent predictors of empyema development.

Results: The incidence of empyema was 10.76% (n=1766). There is strong evidence that those who developed empyema had increased mean length of hospital stay (37.66 days vs 20.72 days; p< 0.0001). Multivariable analysis identified (odds ratio; 95% CI, p-value): Age≤61 (p<0.0001), COPD (1.4; 1.01-2.0, p=0.04) and particularly PVD (1.9; 1.3-2.8, p=0.02) as strong predictors of empyema. Additionally, multivariable analysis revealed that chronic cognitive impairment (0.28; 0.1-1.2, p=0.08), transplant recipient status (3.06; 1.6-6.0, p=0.001) and moderate to severe liver disease (1.08; 0.6-2.1, p=0.814) were not associated with empyema as they were confounded by age, and CCI to a lesser extent. Regardless, there is very strong evidence that development of empyema was associated with a higher mean CCI (p=0.0004).

Conclusions: The reported incidence rate of parapneumonic empyema at our institution is, 10.76%, approximately twice that reported in the literature. This may be due to the fact VGH is the regional Thoracic Surgical tertiary referral center for the province. Age, peripheral vascular disease, COPD, and high CCI score were identified on as independent predictors of progression empyema.

A09 **James Patrick Jabalee,** Otolaryngology

Title: **Epigenetic silencing of SMPD3 in oral cancer**

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Background: Oral squamous cell carcinoma (OSCC) displays a dismal 5-year survival rate of ~50%. A major contributing factor to OSCC mortality is a lack of early intervention. OSCC commonly develops from pre-malignant lesions. However, only a small percentage of such lesions will progress to OSCC, and it is currently impossible to predict whether or not progression will occur based on histological criteria, which remains the gold standard. This leaves physicians with little choice but to "watch and wait", which can result in missed opportunities for early intervention should progression occur. Thus, a deeper understanding of the molecular events driving the disease are required.

Objectives: DNA methylation has been identified as a promising biomarker for the assessment of progression risk in various cancers. Our previous study identified the SMPD3 promoter as a site of frequent deregulation in early oral tumorigenesis. This study aims to further elucidate the role of SMPD3 in OSCC by testing its role in cell proliferation, response to cell stress, and regulation of cell signaling via secreted microvesicles.

Methods: Whole-genome methylation and expression profiling were performed on matched, patient-derived normal, pre-malignant, and carcinoma in situ (CIS)/OSCC samples using Illumina 27K microarray and Agilent 4x44K microarray, respectively. We also analyzed open-access, patient-derived data from The Cancer Genome Atlas (TCGA). To determine the effects of SMPD3 overexpression, we generated stable, doxycycline inducible OSCC (Cal27, SCC-25) and dysplasia (DOK) cell lines via lentiviral transduction. Cell counting (Trypan blue exclusion) and clonogenic assays were used to determine the effect of SMPD3 on cell proliferation and response to various cell stressors, including growth factor deprivation, radiation, and EGFR inhibition. Finally, microvesicles from conditioned medium were collected and purified via high-speed ultracentrifugation. Cellular and microvesicular microRNA was profiled using TaqMan Low Density Array (TLDA) cards, which allow for profiling of 754 unique human microRNAs.

Results: The SMPD3 promoter was found to be hypermethylated in 6/10 pre-malignant and 10/10 CIS/OSCC patient samples. Hypermethylation is correlated with a decrease in expression in 4/6 pre-malignant and 6/10 CIS/OSCC samples. Additionally, SMPD3 was methylated and silenced in 5/6 oral cancer cell lines examined. Analysis of TCGA data reveals a significant increase in methylation of the SMPD3 promoter in tumor compared to normal tissues, and this increase is negatively correlated with expression. Interestingly, SMPD3 expression is correlated with EGFR amplification status but not tumor grade, pathologic stage, smoking, or survival. SMPD3 methylation did not correlate significantly with any of the clinical factors examined. Overexpression of SMPD3 caused a decrease in the growth rate of the OSCC cell lines Cal27 and SCC-25, but not the dysplasia cell line DOK. Additionally, SMPD3 overexpression was found to alter both the cell response to stress conditions and microvesicles released from the tumor cells.

Conclusions: Our results suggest that hypermethylation-induced silencing of SMPD3 is an early and common event in OSCC progression. SMPD3 appears to play an important role in the cellular response to stress and in the selective packaging and release of microvesicles.

A10 **Jonathan Misskey,** Vascular Surgery

Title: **Transapical delivery of a custom branched aortic arch endograft in an animal model**

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Background: Long working distances, unfavorable anatomy, and aortoiliac occlusive disease can make transfemoral TEVAR in the aortic arch difficult or impossible. The transapical approach offers an alternative route for access in patients with anatomical or physiological conditions prohibiting conventional repair.

Objective: To assess the physiologic and anatomic feasibility of transapical deployment of a custom branched aortic arch endograft in a swine model.

Methods: 6 female adult cross Yorkshire-Landrace pigs (51±3kg) were selected for endograft implantation. Following median sternotomy, transapical access through the left ventricle was obtained into the aortic arch and a 20 Fr introducer carrying a 20x78mm endograft with a single 6x18mm brachiocephalic branch was inserted and deployed. Antegrade branch cannulation was achieved through the left ventricular introducer sheath, and an 8x38mm balloon expandable covered stent (BECS) was deployed. Left ventricular function and aortic valve integrity were assessed in all animals via left ventricular angiography, at necropsy, and 3 were selected for dynamic intracardiac echocardiography (ICE) during the entire procedure.

Results: Transapical deployment of the branched endograft was successful in all animals (6/6). 1 pig developed ventricular fibrillation prior to side-branch cannulation and was euthanized. Antegrade brachiocephalic trunk cannulation was successful in the remaining 5 animals. Mean blood pressure decreased from 41.8±9.4 to 38.7±9.6 mm Hg (P<0.001) with sheath crossing of the aortic valve, and returned to baseline following sheath removal (40.4±16 mm Hg). Mean heart rate rose throughout the procedure from 67±13 to 95 ±36 (p <0.001) and remained elevated at experimental completion. ICE demonstrated no abnormalities in pre or post-implantation cardiac function in the surviving 5 animals, and mild to moderate aortic regurgitation (AR) with sheath crossing that returned to baseline post sheath removal. Ventricular closure was hemostatic in 5/5 pigs, and postoperative necropsy demonstrated no gross damage to the aortic valve, myocardium or aorta in any of the 6 animals.

Conclusions: Transapical branched endograft delivery with antegrade branch cannulation is feasible, well tolerated and does not significantly influence hemodynamic or cardiac parameters in an animal model.

A11 **Kimberly Luu,** Otolaryngology

Title: **Evaluation of a low-fidelity, low-cost ear surgery simulator in a low-resource setting**

Kimberly Luu, Matt Clark, Louise Straatman, Brian Westerberg, UBC Otolaryngology Head and Neck Surgery

Background: The provision of healthcare services in developing world countries is a difficult and complex problem. One challenge is providing effective medical education with the significant resource constraints. Surgical simulation has gained evidence as an effective aid for learning procedural skills. The ear trainer was developed with the specific goal of providing a low cost simulator suited to the needs and practicalities of providing training to those in the developing world. Face and construct validity has already been demonstrated in a developed world setting. If effective as a learning tool, use of the ET should lead to improvement in trainee skill and confidence and potentially patient outcomes.

Objectives: To evaluate the face validity, construct validity, and objective learning of the ear trainer when used in a low resource setting.

Methods: The ear trainer was assessed in two low resource environments. Construct validity was tested at the All Ears Cambodia centre in Phnom Penh, Cambodia. Objective learning was tested at Mbarara University of Science and Technology (MUST) Mbarara, Uganda. Six tasks were developed, starting with headlight foreign body removal through to microscope-orientated tasks of foreign body removal, ventilation tube insertion, tympanomeatal flap raising, myringoplasty, and middle ear manipulation skills. After being shown a video of each task, participants performed on the ET and were video recorded and blindly scored. Differentiation between trainee level by performance was analyzed for construct validity. Skill improvement with practice on the ET was analyzed for objective learning. Face validity was assessed via questionnaires at both centers.

Results: Face validity results confirmed that ET was a realistic representation of the ear. Construct validity results showed a statistically significant trend with experts performing better than novices, with time to completion the most useful differentiator. Objective learning results showed statistically significant improvement in performance scores with practice on the ET.

Conclusions: This study validates ET as a useful training tool for otologic microsurgical skills in developing world settings.

A12 **Mahshid Ebtia,** Plastic Surgery

Title: **Evaluation of the anti-glucotoxic effects of leech saliva extract (LSE) on mouse and human pancreatic islets**

Mahshid Ebtia 1, Sanaz Mahmoudi 1, Ahmed Merzouk 2, Suzanne Stratton 2, Reza B. Jalili 1, Aziz Ghahary 1
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Introduction: Leech Saliva Extract (LSE) has been shown to improve a variety of medical conditions including diabetes. Our research is designed to evaluate antiglucotoxic effects of LSE, derived from Hirudo medicinalis, on mouse and human pancreatic islets in vitro.

Hypothesis: Treatment of pancreatic islets with LSE prevents/reverses detrimental effects of glucotoxicity.

Methods: Human and mouse islets were cultivated in regular (6.1 mmol/L) or high glucose (15 mmol/L) conditions for 72 hours in the presence or absence of LSE. The viability, cell survival ratio, and function of islet beta cells were then tested using Live/Dead staining, MTT assay, and glucose stimulated insulin release assay (GSIS), respectively.

Results: Incubating both mouse and human islets in high glucose conditions significantly decreased their viability and function compared to those cultured in normal glucose concentrations. MTT assays revealed ~ 20% increase in the viability of human islets treated with high concentrations of LSE under glucotoxic conditions, compared to low or no LSE treatments. Similarly, mouse islets treated with continuous high concentrations of LSE showed ~25% increase and those treated simultaneously with high concentrations of LSE showed ~15% increase in viability. However, no significant improvements were observed when LSE was added after mouse islets were exposed to the high glucose concentrations. Moreover, GSIS was increased by more than two folds in mouse and human islets treated with high concentrations of LSE under high glucose conditions.

Conclusion: Our results suggest that LSE partially prevents the effects of glucotoxicity on islets, in a dose dependent manner, but does not reverse already established toxic effects. Both cell viability and insulin secretion are partially preserved after preventative LSE treatment under glucotoxic culture conditions. With further research, LSE might serve as a novel approach to prevention of diabetes mellitus progression, namely at the pre-diabetic stage.

A13 **Aaron Van Slyke,** Plastic Surgery

Title: **Outpatient burn care at BC Children's Hospital burn treatment room: A 3-year review**

Rayleigh Chan, Aaron Van Slyke, Marija Bucevska, Cindy Verchere, UBC Division of Plastic Surgery

Background: The Burn Treatment Room (BTR) at BC Children's Hospital (BCCH) is run by a multi-disciplinary team, providing sedation to burn patients undergoing dressing changes in a monitored setting. The purpose of this study is to review the safety and efficacy of the BCCH BTR in conjunction with a qualitative analysis of staff experience.

Methodology: A retrospective chart review of all patients treated in the BTR from 2013 to 2015 was conducted as well as qualitative interviews with BTR staff.

Results: 59 patients (average age 4.0 years old) with a total of 216 BTR visits (average visit time 64.75 minutes) were included. Scald burns were the most common mechanism of injury (76%), followed by flame (14%) and contact burns (7%). Most burns were superficial dermal (54%) and initially estimated at 5-10% TBSA (57%). A total of 38% of patients received surgical intervention. The majority of patients required intravenous sedation during dressing changes (72%), with the most common medication used for intravenous sedation being propofol (83%). Nine patients were converted from oral to IV sedation, 2 had short apnea periods that recovered spontaneously and 2 had prolonged sedation. Overall, there were no major sedation related complications. Interviews with 11 staff members revealed an overall positive experience and few safety concerns.

Conclusion: Our findings are consistent with current reports from other burn facilities. The BTR at BCCH is a safe and effective way to treat burn patients, preventing what would historically require inpatient management.

A14 **Alysha Rasool,** Otolaryngology

Title: **Retrosphenoid air cell: case series and description of a new cell in the paranasal sinuses**

Anali Dadgostar MD1, Alysha Rasool BSc1,Jamil Manji MSc1,2, Fahad Alasousi MD1, and Amin Javer MD1
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Background: Despite the well-appreciated variability in sphenoid sinus anatomy, there are no documented cases of retrosphenoid cells in the literature to date. Mischaracterization of these cells as sphenoethmoidal air cells (aka Onodi cells) may lead to incomplete surgery, increased risk of intraoperative complications, and ongoing patient symptomatology necessitating revision surgery.

Objectives: 1. To describe the novel anatomy of a retrosphenoid air cell and its anatomic relationship to the sphenoid sinus. 2. To discuss our experience in the diagnosis, surgical technique, and ongoing management of a retrosphenoid air cell.

Methods: A retrospective case-series of 2 adult patients and 1 pediatric patient was performed. The adult patients (AB and RG) presented with recalcitrant unilateral headaches while the pediatric patient presented with fever, headache and diplopia. All had evidence of a true isolated retrosphenoid cell on CT. The adult patients underwent image-guided sinus surgery with the aim of developing an anatomic communication from the sphenoid sinus to the retrosphenoid cell. The pediatric patient was treated conservatively with intravenous antibiotics and corticosteroids.

Results: Post-operatively, patient AB had significant improvement in headaches. At 5 weeks post-operatively, patient RG noted a significant reduction in right-sided facial pressure and pain. The pediatric patient continues to be treated with medical management for TB meningitis.

Conclusion: To our knowledge, this is the first description in the literature of a retrosphenoid cell. Careful review of pre-operative imaging is critical in the identification of this important anatomic variant, particularly in patients presenting with recalcitrant headaches.

A15 **Anali Dadgostar,** Otolaryngology

Title: **The use of polydiaxanone (PDS) plates for endoscopic skull base repair** *Fahad Al-Asousi, Christopher Okpaleke, Anali Dadgostar, Amin Javer,*

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Background: Synthetic materials have been introduced as an option to reduce and avoid donor site morbidity in endoscopic endonasal skull-base repair. Polydiaxonone (PDS™) plate is an absorbable plate designed for nasal septal reconstruction. It has the ability to retain strength for at least 10-weeks and absorbs in 6-months.

Objectives: 1) To describe the use of PDS™ plates in endoscopic skull-base defect and cerebrospinal fluid (CSF) leak repair. 2) To describe our experience with the surgical technique and postoperative management.

Methods: A retrospective case series of patients with sinonasal inflammatory disease or skull-base tumors who underwent endoscopic skull-base repair (between 05/2013 and 12/2015) utilizing PDSTM plates in an underlay fashion and mucosal membrane grafts with or without adjuvant materials in an overlay fashion. The patients were reviewed at 6-days, 6-weeks and 3-months postoperatively. Postoperative adverse events including CSF leak, infection, bleeding, headache and graft failure were recorded.

Results: Seven patients (5-females, 2-males, mean age: 53.9 years) were reviewed. Five patients underwent sinonasal skull-base tumor resection and two underwent repair for CSF leak. The mean skull-base defect size was 16.4mm (Range: 5-35mm). There was no evidence of post-operative CSF leak and lumbar drains were not used. One patient reported transient headache and facial pressure at the 6-week follow-up visit. The surgeons' experience with PDS™ plate placement, postoperative healing and follow-up was satisfactory.

Conclusions: PDSTM plates can be used in endoscopic skull-base repair for small and moderate size defects. These early results, while promising, will require validation in clinical trials.

A16 **Rocky Shi,** General Surgery

Title: **Investigating the importance of anti-apoptotic Bcl-xL for mitochondrial networking and function in pancreatic β-cells**

Rocky Shi, Ahsen Chaudhry, Michal Aharoni-Simon, Alexis Shih and Dan S. Luciani, Department of Surgery/General Surgery, UBC. BC Children's Hospital Research Institute

Background: High levels of fatty acids (lipotoxicity) promote failure and death of insulin-secreting pancreatic β-cells, and this is a significant factor in the development of type 2 diabetes (T2D). Glucose-stimulated insulin secretion depends on mitochondrial oxidative metabolism and mitochondrial dysfunction contributes to T2D. Mitochondria exist as dynamic networks and the control of mitochondrial biomass, motility and fusion/fission kinetics is essential for cellular health and function. In β-cells, it has been reported that mitochondrial networking affects their ability to withstand lipotoxicity. We recently demonstrated that the anti-apoptotic protein Bcl-xL dampens β-cell mitochondrial metabolism and studies in other cell types suggest Bcl-xL regulates mitochondrial biomass and dynamics. Lipotoxic stress and T2D are both associated with reduced Bcl-xL levels in β-cells. Clarifying the involvement of Bcl-xL in β-cell mitochondrial homeostasis may therefore provide new insight into the etiology of T2D.

Hypothesis: Bcl-xL is important for β-cell adaptation to lipotoxic stress by regulating mitochondrial dynamics, biogenesis, and turnover.

Methods: To determine the roles of Bcl-xL, we use in vitro over-expression and study β-cell-specific Bcl-xL knockout mice. Mitochondria are visualized by 2D/3D confocal imaging, and we are developing image analysis methods to quantify changes to mitochondrial structure and volume. To estimate mitochondrial motility and fusion events we use time-lapse microscopy and track the distribution of mitochondria-targeted photoactivatable GFP. Glucose-stimulated Ca2+ responses and mitochondrial oxygen consumption are measured to evaluate β-cell function.

Results: Bcl-xL overexpression causes β-cell mitochondria to lose their normal tubular network structure, aggregate and become motionless. These changes to network morphology and kinetics are associated with a decrease in total mitochondrial volume and a marked impairment of β-cell O2 consumption and Ca2+ responses to glucose. Using the ImageJ/Fiji image processing program, we have developed a robust analysis pipeline for quantifying changes to mitochondrial network morphology (number, area, circularity, aspect ratio and branching), and verified this using control conditions known to promote mitochondrial fusion or fission. In preliminary experiments we have confirmed our ability to photo-label select mitochondria in primary β-cells and track their time-dependent movement and fusion with other parts of the mitochondrial network.

Conclusion: Our in vitro overexpression data strongly suggest a significant role for Bcl-xL in the control of mitochondrial networking and function in pancreatic β-cells. Using our established assays, we will compare mitochondria in Bcl-xL KO and WT β-cells under control conditions and under palmitate-induced lipotoxic stress. Mitochondrial mass will be further estimated by quantifying the mitochondrial/nuclear DNA ratio. Using qPCR, we will compare the expression of known fusion/fission regulators Drp1, Opa1, Mfn1/2 and hFis1, as well as PGC-1α and TFAM, which control mitochondrial biogenesis. Associations between effects on mitochondrial structure and function/failure will guide additional experiments to establish causality, which may include knockdown of fusion/fission proteins.

A17 **Ameen Amanian,** Otolaryngology

Title: **The safety of long-term intranasal budesonide delivered via the mucosal atomization device for chronic rhinosinusitis**

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Background: While short-term use (≤2 months) of atomized topical nasal steroids has been shown to be safe and effective, the long-term safety, especially when using the mucosal atomization device (MAD), has yet to be demonstrated.

Objective: 1. To determine the impact of long-term (>6months) topical budesonide treatment via the MAD on the hypothalamic-pituitary-adrenal axis (HPAA) and intraocular pressure (IOP).

Methods: A cross-sectional study of patients with chronic rhinosinusitis (CRS) +/- nasal polyposis managed with daily nasal budesonide via MAD was conducted at a tertiary rhinology centre. Patients using systemic steroids within 3 months of assessment were excluded. HPAA impact was assessed using the cosyntropin stimulation test for adrenal function and a survey of relevant symptomatology. Patients also underwent tonometry to assess for elevated IOP potentially related to corticosteroid use. Treatment adherence was subjectively assessed using a medication adherence scale (MMAS-8) to evaluate the validity of steroid exposure estimates.

Results: A total of 100 CRS patients were recruited with mean budesonide treatment duration of 23.5 months (range, 6-37 months). Stimulated cortisol response was diminished in three patients (3%). No patients with adrenal suppression experienced relevant symptomatology. IOP was elevated in six patients (6%). A mean MMAS-8 score of 6.8 indicated moderate-high treatment adherence behavior among this population.

Conclusion: These findings suggest that long-term use of topical budesonide via MAD is generally safe. However, given that a small proportion of patients were found to have adrenal insufficiency and elevated IOP, otolaryngologists should consider periodic surveillance of these outcomes in this patient demographic.

A18 **Alysha Rasool,** Otolaryngology

Title: A comparison of silastic and gloved merocel middle meatal spacers following functional endoscopic sinus surgery: a randomized controlled trial

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Background: Spacers inserted into the middle meatal space following functional endoscopic sinus surgery (FESS) prevent lateralization of the middle turbinate, scarring and synechiae.

Objective: To determine if postoperative pain, discharge, pain during removal, scarring and incidence of synechiae differed between nasal cavities receiving Silastic or gloved-Merocel spacers following FESS.

Methods: A double-blind randomized controlled trial was conducted in adult subjects requiring bilateral FESS for chronic rhinosinusitis with or without nasal polyposis. The middle meatus of each participant was randomly allocated to receive Silastic or gloved-Merocel spacers. Insertion into the middle meatal space was performed intraoperatively and left in situ for 6 days. Participants were reviewed at 6-days, 5 and 12-weeks postoperatively. Pain, discharge and pain during spacer removal were assessed using a visual analogue scale (0–10). The presence of scarring and synechiae were evaluated endoscopically. Outcomes were assessed independently for each cavity.

Results: Forty-eight participants (96 nasal cavities) were recruited. Pre-operatively, Lund-Mackay CT scores were similar between Silastic and gloved-Merocel treated cavities (6.38 ± 2.35 versus 6.18 ± 2.17).One-week post-FESS, pain during spacer removal was significantly greater for Silastic than gloved-Merocel spacers (2.13 ± 1.34 versus 1.51 ± 1.23, p=0.020). Pain prior to removal and extent of discharge did not significantly differ between cavities. Five- and twelve-weeks post-FESS, no significant difference was observed in scarring or incidence of synechiae.

Conclusion: Following FESS, patients report less pain during removal of gloved-Merocel than Silastic spacers. The likelihood of adverse clinical outcomes does not differ between either spacer modality.

A19 **Paul Orban,** General Surgery

Title: Genetic surgery to improve function and viability of stem-cell-derived insulin producing cells

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Background: In experimental treatment of patients with type 1 diabetes, islet transplantation has been shown to provide better glycemic control than does insulin therapy, and to greatly reduce the risk of life-threatening hypoglycemic episodes. The potential demand for this treatment, however, greatly exceeds the available supply of human islets. Moreover, despite immunosuppression, the majority of recipients return to insulin-dependence by 5 years post-transplant. A factor thought to significantly contribute to graft failure is the aggregation, and resultant toxicity to the beta cell, of islet amyloid polypeptide (IAPP), an amyloidogenic product of beta cells co-secreted with insulin. Pig and rodent IAPP have substitutions of amino acids crucial to this aggregation, and a polypeptide similar to the rodent form, pramlintide, is used in the treatment of diabetes, to slow gastric emptying, promote satiety, and suppress inappropriate glucagon secretion. Stem-cell-derived insulin-producing cells could provide a virtually limitless source of transplantable tissue, and the stem-cells from which they are derived are amenable to genetic modification.

Hypothesis: Insulin-producing cells derived from stem cells in which the sequence encoding IAPP is replaced with a sequence encoding the pramlintide polypeptide will function and survive longer than control cells in immune-deficient diabetic mouse transplant models.

Methods: CRISPR/Cas9 in combination with a long single-stranded DNA oligomer is used to replace both alleles of the endogenous hIAPP sequence with sequence encoding pramlintide in H1 human embryonic stem cells. After in vitro differentiation, insulin-producing cells derived from these and mock-manipulated control H1 stem cells are transplanted under the kidney capsule of streptozotocin-induced diabetic immune-deficient (NSG) mice, and graft function and survival assessed at intervals thereafter.

Results: In a pilot study, we obtained one stem cell clone with heterozygous substitution, and one with a homozygous substitution of the IAPP sequence, of 26 clones analysed. Unfortunately, the commercially-supplied oligomer contained an error such that the resulting IAPP coding sequence contained an additional substitution that rendered these clones useless for the planned experiments.

Conclusions: At the time of abstract submission, clones obtained with a second, error-free oligomer were being analysed.

A20 **Alysha Rasool,** Otolaryngology

Title: Esthesioneuroblastoma of the maxillary sinus antrum presenting as SIADH: a case report

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Introduction: Esthesioneuroblastoma (olfactory neuroblastoma) is a rare neoplasm that typically arises from the olfactory neuroepithelium within the sinonasal cavity. Patients often present with nasal obstruction, headache, and epistaxis. In rare cases, patients may also exhibit signs of a paraneoplastic syndrome. SIADH manifests as hyponatremia, with symptom severity ranging from fatigue to hyponatremia-induced seizure

Objective: We present a rare case of syndrome of inappropriate antidiuretic hormone (SIADH) secondary to esthesioneuroblastoma arising from the maxillary sinus antrum..

Methods: A 28-year old female (DB) presented to our tertiary rhinology clinic with a 6-month history of nasal congestion, post-nasal discharge and headache, on a background history of progressive fatigue, weakness, and hyponatremia refractory to fluid restriction and oral sodium chloride tablets. PET scan revealed a single mixed-attenuation lesion in the right maxillary sinus, further characterized as a homogenous enhancing mass on MR imaging. The patient subsequently underwent image-guided sinus surgery and complete excision of the right maxillary sinus mass.

Results: Histopathology confirmed a diagnosis of esthesioneuroblastoma with clear margins. Normalization of hyponatremia occurred within 24 hours post-operatively and was maintained at the 6-week assessment, with considerable improvement in energy levels. Sinonasal symptoms resolved within 3-months post-operatively, with sustained normalization of osmoregulation. No further surgical or radiotherapy was required.

Conclusion: We present a rare case of an esthesioneuroblastoma identified outside of the typical location in the olfactory cleft and skull base, presenting as SIADH. Although rare, SIADH-associated esthesioneuroblastoma should be considered in patients presenting with hyponatremia of undefined etiology with concomitant sinonasal symptoms.

A21 **Harman Parhar,** Otolaryngology

Title: **Incidence patterns of parotid gland carcinoma in the United States by histologic type: a population-based analysis of 11,959 cases**

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Background: Parotid gland malignancies make up the majority of salivary gland malignancies and represent a heterogenous group of histologies and biological behaviours. Very little is known regarding the risk factors for their development and studies to date have been limited to smaller single institution reports spanning over decades.

Objective: We aimed to perform a large population level comparative analysis to investigate the demographic features that define this malignancy by histological subtype and to present population-based patterns of incidence.

Methods: The Surveillance, Epidemiology, and End Results (SEER) Database was queried (2000 to 2013). The 5 most common histologies and a heterogenous 'other type' were analyzed. Incidence rates were expressed per 100,000 person-years, man-years, or woman-years. Age-adjusted incidence ratios were standardized to the 2000 U.S. population.

Results: 11,959 parotid carcinomas were diagnosed between 2000 and 2013 (1.22 per 100,000 person years): 2800 cases of mucoepidermoid carcinoma (0.24 per 100,000 person years), 2540 cased of squamous cell carcinoma (0.22 per 100,000 person years), 1534 cases of acinar cell carcinoma (0.13 per 100,000 person years), 1121 cases of adenocarcinoma (0.10 per 100,000 person years), 710 cases of adenoid cystic and cribriform carcinoma (0.06 per 100,000 person years), and a very heterogenous group of 3254 other carcinomas. Men had higher incidence rates (1.58 per 100,000 man years) than women (0.97 per 100,000 woman years). This difference was most pronounced in squamous cell carcinoma (0.44 per 100,000 man years, 0.07 per 100,000 woman years) and adenocarcinoma (0.13 per 100,000 man years, 0.07 per 100,000 woman years). Whites had higher incidence rates (1.26 per 100,000 person years) than Blacks (0.94 per 100,000 person years) or Asians (0.88 per 100,000 person years). This difference was most pronounced in squamous cell carcinoma (0.25 per 100,000 person years for Whites, 0.08 per 100,000 person years for Blacks, 0.06 per 100,000 person years for Asians). Age-adjusted incidence rates increased with age: age 0 - 19 (0.08 per 100,000 person years), age 20 - 39 (0.42 per 100,000 person years), age 40 - 59 (1.16 per 100,000 person years), age 60 - 79 (3.94 per 100,000 person years), age over 80 (7.38 per 100,000 person years). Parotid carcinomas tended to present with localized disease (0.47 per 100, 000 person years local, 0.32 per 100,000 person years regional, 0.17 per 100, 000 person years distant). This was especially true for mucoepidermoid, squamous cell, acinar cell and adenoid cystic carcinomas but adenocarcinomas had higher incidence rates of more regional or distant disease.

Discussion: There are significant variations in the age-specific patterns by gender and race across histologic types of parotid carcinoma that warrant further etiologic investigation.

A22 **Brendan Sorichetti,** Otolaryngology

Title: **Child abuse and the otolaryngologist: a systematic review of the literature**

Brendan D. Sorichetti BSc., Julie Pauwels BSc., Marcela Fandiño MD MSc., Joshua Gurberg MD CM, Neil Chadha MD, Frederick K. Kozak MD

Introduction: seventy-five percent of child abuse cases involve injuries to the head and neck.

Methods: A comprehensive review of the literature was performed for cases of child abuse that involved the specialty of Otolaryngology. Utilizing the MeSh terms child abuse, otolaryngology, Munchausen syndrome by proxy, hypopharyngeal and non-accidental injury as well as review of references from papers obtained from the initial search, a total of 43 articles were retrieved and reviewed in detail.

Results: 62 cases of child abuse were identified that involved otolaryngology. The majority (47%) of these cases were injuries sustained to the hypopharynx and larynx followed by otologic (23%) injuries. Other areas included the neck and nose. Munchausen syndrome by proxy was identified in 15% of abuse cases.

Discussion: The index of suspicion for child physical abuse must remain high for any unusual injury to the hypopharynx, larynx, and ears in an infant or child. Otolaryngologists can play an important role in recognizing symptoms caused by child abuse. The unique position of an Otolaryngologist is their ability to identify and provide successful intervention medically for these injuries and socially contribute to a positive future outcome for the child. Physicians who have contact with children must be familiar with the common signs of and risk factors for child abuse.

A23 **Aaron Van Slyke,** Plastic Surgery

Title: **Perioperative and long-term smoking behaviors in cosmetic surgery patients**

Perioperative and Long-term Smoking Behaviors in Cosmetic Surgery Patients, Aaron Van Slyke, Michael Carr, Aaron Knox, Krista Genoway, Nick Carr, UBC Division of Plastic Surgery

Background: In patients undergoing surgical procedures, strong evidence exists to indicate that cigarette consumption increases post-operative complications. Currently, there is no research investigating perioperative smoking cessation behaviors in cosmetic surgery patients.

Methods: This is a retrospective, cross-sectional cohort study. All patients who identified themselves as active smokers during their preoperative consult, and who received cosmetic surgery from the senior author between 2007-2014, were included in this study. Patients underwent rhytidectomy, abdominoplasty, and/or mastopexy with or without augmentation. In order to be eligible for surgery, all patients were required to refrain from smoking for two weeks prior to their surgery otherwise their operation would be delayed. Patients were not given formal smoking cessation interventions, but were free to pursue these on their own. Patients were administered an online-survey structured around the WHO MONICA project smoking cessation questionnaire, in conjunction with questions specific to smoking cessation and cosmetic surgery.

Objectives: To explore the perioperative and long-term smoking behaviors of patients who have received cosmetic surgery; specifically, investigating smoking cessation after cosmetic surgery and compliance with preoperative smoking cessation instructions.

Results: 72 active smokers underwent the above cosmetic procedures. 37 patients completed the survey for a response rate of 51%. The average follow-up after cosmetic surgery was 6 years. Five of the respondents did not smoke cigarettes on a daily basis prior to their surgical consultation and were removed from the study, giving us a sample size of 32 daily smokers. The smoking cessation rate within our cosmetic practice at follow-up was 40.6% (13/32). 78.1% (25/32) of patients agreed that discussing the adverse effects of smoking on their surgical outcome influenced their ability to quit or reduce their cigarette consumption, whereas 56.3% (18/32) of patients were influenced by a discussion about the adverse effects of smoking on their overall health. Despite all patients at the time of their surgery stating that they had complied with the two-week preoperative period of cigarette abstinence, when asked at follow-up, 53.1% (17/32) of patients stated that they did not quit smoking for the requested time prior to their operation.

Conclusions: While rates of perioperative and long-term smoking cessation have been studied in the non-cosmetic surgical population, this study is the first to report a long-term smoking cessation rate from a cosmetic surgery practice. Cosmetic surgery may be an independent motivator to help patients quit or reduce smoking, but additional studies are needed to confirm this. Finally, compliance with preoperative smoking cessation instructions is low, suggesting a role for routine urine cotinine testing for all smokers undergoing elective operations.

A24 **Nick Dawson,** General Surgery

Title: **Design and optimization of mass cytometry to measure immune reconstitution post-hematopoietic stem cell transplant**

Nicholas AJ Dawson, Laura Cook, Raewyn Broady, Megan K Levings, BC Children's Hospital Research Institute; Departments of Medicine and Surgery, University of British Columbia

Background: Hematopoietic stem cell transplant (HSCT) is an effective cancer immunotherapy treatment for patients with hematological malignancies. While HSCT is a curative treatment, patients are at high risk of developing graft-versus-host disease (GVHD). Understanding immune reconstitution post-HSCT is important for discerning the mechanisms controlling the desired graft-versus-leukemia effect versus GVHD, as well as understanding the mechanisms of action of common immunosuppressive therapies used in HSCT, such as anti-thymocyte globulin (ATG). Immune reconstitution is a complex process involving multiple cell types and subsets, making it challenging to measure in limiting samples from lymphopenic patients.

Methods: We aimed to develop a new mass cytometry-based method to measure expression of up to 37 parameters measured simultaneously on a single cell, creating a comprehensive immune reconstitution panel that would not be possible using conventional fluorescence flow cytometry. Because reconstitution of regulatory T cells (Tregs) has a major impact on transplant outcomes, we first focused on developing a novel protocol that enables simultaneous detection of FOXP3, the Treg lineage-defining transcription factor, cell surface markers and cytokines on cryopreserved PBMCs.

Results: We first tested the conventional protocol to detect FOXP3, which is optimized for fluorescence flow cytometry, and found that it failed to optimally detect FOXP3 by mass cytometry. We therefore tested a variety of different methods to fix and permeabilize cells, and then created a new protocol that allows robust and sensitive detection of FOXP3. This new protocol is more sensitive than commercially available protocols optimized for mass cytometry and best preserves other cell surface markers and functional proteins, such as cytokines.

Conclusion: With this optimized method, we are now able to measure expression of FOXP3 together with 36 other proteins and experiments to measure how immune reconstitution is affected by ATG in patients who have undergone a hematopoietic stem cell transplant.

Simultaneous Session B

B01 **Ardalan Akbari,** Otolaryngology

Title: **Luc's abscess: the spectrum of disease including the first reported case with associated intracranial abscess**

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Introduction: Luc's Abscess is defined as an extracranial subperiosteal temporal abscess, arising for acute otitis media (AOM). In 1900, Dr. Henri Luc first described this disease as being "particularly benign." We present 2 cases, including one in which the patient had significantly greater morbidity than previously reported.

Objective: To illustrate the clinical spectrum Luc's Abscess and outline its management.

Materials: Retrospective case review

Results: Case 1: A 4 year-old male presented with 2 weeks of left-sided otalgia followed by fever, left temporal skin swelling, otorrhea, and papilledema. Computerized tomography (CT) scan revealed a 3.0 x 1.5 x 2.0 cm Luc's abscess and 4.6 x 2.7 x 2.5 cm temporal lobe abscess with lateral sinus thrombosis and resultant intracranial hypertension. Both abscesses were drained and the patient was treated with intravenous (IV) antibiotics and anti-coagulation. Streptococcus pyogenes was diagnosed on molecular testing. The patient fully recovered after 6 weeks of medical therapy. Case 2: A 7 year-old female had a more classic form of Luc's abscess, which was successfully treated as an outpatient, with oral antibiotics. Her relatively more benign clinical course was likely related to her timely diagnosis and treatment.

Conclusion: These cases illustrate the spectrum of Luc's abscess, which has the potential to be life-threatening. Luc's abscess has previously been reported with associated lateral sinus thrombosis; but to our knowledge, this is the first documented case of Luc's abscess plus intracranial abscess in English-language literature. Although Luc's Abscess usually follows a relatively benign clinical course, early diagnosis and treatment remain essential in order to prevent life-threatening disease progression.

B02 **Christina Rui Zhang,** Radiation Oncology

Title: **Lymphoma cancer internet patient information: a systematic evaluation of the quality of online resources for lymphoma patients**

Christina Zhang, BSc.1, Paris-Ann Ingledew, M.D.2,3 1Faculty of Medicine, University of British Columbia, 2Department of Surgery, Faculty of Medicine, University of British Columbia, 3Department of Radiation Oncology, British Columbia Cancer Agency – Fraser Valley Centre

Introduction: Hodgkin (HL) and non-Hodgkin lymphoma (NHL) patients represent a currently growing population. Yet few studies have examined the educational needs of this group, and the scarce existing data point to the need for improved educational materials for lymphoma patients. For many cancers, Internet based information can be an essential resource for patients. Past studies have investigated the quality of online information in other cancer sites, but no such study exists for lymphoma.

Objectives: The objective of this study is to systematically evaluate the quality of online lymphoma resources using a validated structured rating tool.

Methods: >500 web pages were retrieved using Google.ca and meta-search engines (Dogpile.com, Webcrawler.com). A list of the top 100 unique websites was compiled using pre-determined inclusion and exclusion criteria and their quality was evaluated using a validated structured rating tool. This tool was modified to accommodate the various types of lymphoma, including Hodgkin, non-Hodgkin, and their subtypes. Website administration, accountability, authorship, site organization, readability, content and accuracy were evaluated.

Results: Of the 100 sites evaluated, 62% were not commercially affiliated, 94% used 4 or more structural tools, 91% had a search engine, 94% an option for queries for webmaster, and 84% a discussion forum available (often social media). However, only 54% of sites identified their authors, and even fewer identified author affiliation (32%) and credentials (40%). 54% did not disclose their date of update or creation or were out of date. The average readability grade levels were high at 11.6 (Flesch Kincaid grade level score) and 10.7 (SMOG), and >90% of websites required more than an elementary education level to understand. With respect to content, 97% HL/97% NHL had a definition, 89% HL/87% NHL described symptoms, and 89% HL/87% NHL described treatment. However, few sites contained information about prevention. Symptom and treatment accuracy were high but definitions were slightly less complete for non-Hodgkin. 66% HL/69% NHL of sites had inaccurate or incomplete information with respect to prognosis and 61% HL/46% NHL had similarly incomplete information regarding etiology.

Conclusions: This study reveals strengths and weaknesses in the quality of online lymphoma resources. Strengths include lack of commercial affiliation, structure, and interactivity, but weaknesses include attribution of authorship and disclosure of currency. Furthermore, readability grade level is far in excess of recommendations made by AMA, NIH, and CDC. Content-wise, symptom, and treatment were reliable and well-covered, but prognosis, etiology and prognosis can be improved. These statistics can inform physicians of gaps and overlaps in patient knowledge to better optimize the doctor-patient communication and improve future lymphoma patient resources. A parallel study is currently also being conducted, characterizing patient online lymphoma resource usage patterns.

B03 **Stahs Pripotnev,** Plastic Surgery

Title: **Split thickness skin graft meshing ratio indications and common practices**

Stahs Pripotnev and Anthony Papp, UBC Division of Plastic Surgery

Background: Split thickness skin grafting is a commonly used technique in burn surgery for resurfacing wounds that are unlikely to heal without scarring. Meshing and expanding skin grafts allows for reconstruction of larger wounds with smaller donor sites.

Methods: A retrospective chart review was performed of 212 patients with burns equal to or greater than 20% total body surface area admitted to Vancouver General Hospital between 1998 and 2014. Charts were reviewed to collect data on patient and burn demographics. A survey was sent to Canadian plastic surgeons registered with the CSPS to collect data on common practices in burn surgery nationwide.

Results: The patients that received 3:1 or higher meshed grafts were all flame burns, had a significantly higher average TBSA (52.46% vs 29.13%), and a significantly higher full thickness burn TBSA (23.33% vs 5.74%). There were no significant differences in gender, age, or burn location between the 1.5:1 and 3:1 meshing ratio groups. The survey of plastic surgeons performing burn surgery in Canada revealed that 60% of responders had experience with skin grafts using meshing ratios of 3:1 or higher. Of these surgeons, 100% felt that burn size and 40% felt that burn location would influence their decision to use a 3:1 or higher meshing ratio.

Conclusions: A larger burn size is the major influencing factor for the use of higher skin graft meshing ratios by Canadian burn surgeons. Furthermore, burn location determines the choice of donor and recipient sites in these cases.

B04 **Shahrzad Joharifard,** Pediatric General Surgery

Title: **Pleurectomy versus pleural abrasion for primary spontaneous pneumothorax in children**

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[1] Division of General Surgery, Department of Surgery, University of British Columbia
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Background: Primary spontaneous pneumothorax (PSP) represents a common indication for urgent surgical intervention in children. First episodes are often managed with thoracostomy tube, whereas recurrent episodes typically prompt surgery involving apical bleb resection and pleurodesis, either via pleurectomy or pleural abrasion.

Purpose: The purpose of this study was to assess whether pleurectomy or pleural abrasion was associated with lower post-operative recurrence.

Methods: The records of patients undergoing surgery for PSP at BC Children's Hospital between February 2005 and December 2015 were retrospectively reviewed. Recurrence was defined as an ipsilateral pneumothorax requiring surgical intervention. Bivariate logistic regressions were used to identify factors associated with recurrence.

Results: Fifty-two patients underwent 64 index operations for PSP (12 patients had surgery for contralateral pneumothorax and each instance was analyzed separately). The mean age was 15.7 ± 1.2 years and 79.7% (n=51) of patients were male. In addition to apical wedge resection, 53.1% (n=34) of patients underwent pleurectomy, 39.1% (n=25) underwent pleural abrasion, and 7.8% (n=5) had no pleural treatment. The overall recurrence rate was 23.4% (n=15). Recurrence was significantly lower in patients who underwent pleurectomy rather than pleural abrasion (8.8% vs. 40%, $p<0.01$). In patients who underwent pleural abrasion without pleurectomy, the relative risk of recurrence was 2.36 [1.41-3.92, $p<0.01$].

Conclusion: Recurrence of PSP is significantly reduced in patients undergoing pleurectomy compared to pleural abrasion.

B05 **Tyler Omeis,** Plastic Surgery

Title: **Autologous reconstruction of the inframammary fold in aesthetic and reconstructive breast surgery**

Tyler Omeis, Adil Ladak, Jon Scott Williamson, Sheina Macadam, Stanley Valnicek

Background: The inframammary fold (IMF) is one of the most important landmarks of an aesthetically pleasing breast. Disruption of the IMF during breast augmentation or reconstruction can yield unacceptable aesthetic results including a "double-bubble" deformity or implant displacement. Standard techniques for correcting IMF deformities may result in further external scarring and carry a significant risk for recurrent "bottoming out", ptosis or inferior displacement of the reconstructed IMF. Use of alloplastic materials such as dermis or mesh adds considerable expense and increased risk of infection.

Objective: The authors report a useful technique with clinical outcomes for reconstruction of the IMF using a rectus-fascia turnover (RFT) flap.

Methods: A retrospective case series was performed on 18 patients who underwent IMF reconstruction between May 2012 and December 2014. Demographics, perioperative complications, patient satisfaction and aesthetic results were recorded. A cadaver dissection was performed to illustrate the gross anatomy and technique.

Results: Mean follow-up was 30 weeks. Postoperative complications were limited to postoperative discomfort at the surgical site and a single case of hematoma. Two Patients developed capsular contracture on their irradiated side requiring reoperation. One patient required reoperation for implant displacement. There were no cases of infection or implant malpositioning. All patients reported that they were pleased with their results. Aside from one reoperation, there have been no relapses to date (March 2016).

Conclusion: The rectus fascial turnover flap is a reliable and cost effective surgical technique for stabilization or repair of the IMF in both cosmetic and reconstructive surgery.

B06 **Kyle Arsenault,** Vascular Surgery

Title: **Management of the left subclavian artery during thoracic endovascular aortic repair**

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Objectives: Management of the left subclavian artery (LSA) during Zone 2 or more proximal thoracic endograft deployment remains controversial. The method of revascularization and proximal LSA control varies widely in the literature and there are limited comparative studies. We sought to review our experience and outcomes with LSA revascularization during thoracic endovascular aortic repair (TEVAR).

Methods: We performed a retrospective chart review of all TEVARs at our institution from March 2005 to February 2016. We included all patients that had a Zone 2 or more proximal landing zone. Patient characteristics, anatomical considerations, operative techniques, and outcomes were collected from paper charts, electronic medical records and an imaging database. We compared methods of LSA revascularization for the outcomes of mortality, stroke, spinal cord ischemia, endoleak, and need for re-intervention. A composite endpoint of stroke, spinal cord ischemia, Type Ia or Type II endoleak, need for re-intervention due to the LSA, occlusion of the left vertebral artery, and thrombosis of the LSA revascularization was used to compare methods of proximal LSA control. Continuous variables were analyzed using the Student's t-test or the Mann-Whitney U test, as appropriate. Categorical variables were analyzed using the chi-squared test. A p value of less than 0.05 was considered statistically significant.

Results: Eighty-five patients underwent TEVAR with Zone 2 or more proximal landing zones during the study period. Thirty-two (37.6%) procedures were for aneurysmal disease and 32 (37.6%) for aortic dissection. Eighteen patients (21.2%) had TEVAR for traumatic aortic injury while 3 had repair of other aortic pathologies. Thirty-day mortality was 5.9%. Median followup was 21.6 months [interquartile range: 6.2-55.9]. Management of the LSA included: no revascularization in 16 (18.8%), carotid-subclavian bypass in 65 (76.5%), subclavian-carotid transposition in 1 (1.2%) and in-situ fenestration in 3 (3.5%). There was no significant difference in the rate of mortality, stroke, spinal cord ischemia, endoleak or the need for revascularization between these groups. Of the patients undergoing carotid-subclavian bypass, control of the proximal LSA included: no occlusion in 8 (12.3%), surgical tie in 5 (7.7%), suture ligation in 10 (15.4%), neurosurgical aneurysm clip in 4 (6.2%), locking Hemoclip in 18 (27.7%) and Amplazter plug in 20 (30.8%). The composite endpoint was reached in 6 patients with no proximal LSA occlusion (75.0%), 2 patients with surgical ties (40.0%), 2 patients with suture ligation (20.0%), 3 patients with neurosurgical aneurysm clips (75.0%), 4 patients with locking Hemoclips (22.2%) and 10 patients with Amplatzer plugs (50.0%). Suspected cranial nerve injury was documented in 5 patients with locking Hemoclips (27.8%) and 2 patients with suture ligation (20.0%).

Conclusions: This retrospective cohort study demonstrates no significant differences in outcomes between different methods of revascularization of the LSA. However, there were few events overall and the non-bypass groups had small sample sizes. There is a trend towards an increase in the composite outcome with LSA control with neurosurgical aneurysm clips and Amplazter plugs compared to suture ligation or locking Hemoclips. However, there may be an

increased risk of cranial nerve injury with these latter two methods. This study provides vascular surgeons some guidance in management of the LSA during TEVAR.

B07 **Oliver Ayling,** Neurosurgery

Title: Dissociation of early and delayed cerebral infarction after aneurysmal subarachnoid hemorrhage

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Purpose: Cerebral infarction after aneurysmal subarachnoid hemorrhage (aSAH) is a significant cause of substantial morbidity and mortality. Since early and delayed cerebral infarction after aSAH may be mediated by different processes we evaluated if aneurysm securing methods contributed to these infarcts and whether long-term outcomes differ for patients with early and delayed infarcts.

Methods: A post-hoc analysis of the Clazosentan to Overcome Neurological iSChemia and Infarction Occurring after Subarachnoid hemorrhage (CONSCIOUS-1) study was performed. Using multivariate logistic regression analysis and propensity-matching, independent clinical risk factors associated with infarctions were identified and the contribution of cerebral infarcts to long-term outcomes was evaluated. Predictive thresholds of infarction volume were defined using Receiver Operator Characteristic (ROC) curves.

Results: Within the cohort of 413 subjects, early infarcts were present in 76 (18%), while delayed infarcts occurred in 79 (19%), and 36 (9%), had new infarctions that were present on both early and delayed imaging. Propensity-score matching revealed a significantly higher proportion of early infarcts after clipping (OR 4.62. 95% CI 1.99-11.57, p=0.00012). Multivariate logistic regressions identified clipping as an independent risk factor for early cerebral infarction (OR 0.26, 95% CI 0.15-0.48, p<0.001), and angiographic vasospasm was an independent risk factor for delayed cerebral infarction (OR 1.79, 95% CI 1.03-3.13, p=0.039). Early infarcts were a significant independent risk factor for poor long-term at 3 months (OR 2.34, 95% CI 1.18-4.67, p=0.015). ROC curves demonstrated that an infarct volume of 10 cm3 (sensitivity: 50.0, specificity: 70.3) predicted poor long-term outcomes.

Conclusions: Clipping is an independent risk factor for the development of early cerebral infarcts, while delayed cerebral infarcts are associated with angiographic vasospasm. Early cerebral infarcts are stronger predictors of worse outcome than delayed infarction.

B08 **Aysha Ayub,** Otolaryngology

Title: A systematic review of extra-tympanic electrocochleography (ET ECochG) in Ménière's disease (MD) diagnosis

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Background: Ménière's disease (MD) is an inner ear disorder characterized by tinnitus, hearing loss and vertigo that affects 20-200 per 100 000 persons globally. The American Academy of Otolaryngology and Head and Neck Surgery (AAO-HNS) classifies MD by diagnostic certainty based on hearing loss and characteristic symptoms. Electrocochleography (ECochG) is a diagnostic test for MD that has not been widely adopted. Extra-tympanic (ET) ECochG avoids the risks of the initially developed invasive trans-tympanic electrode placement method. The applicability of this modification and impact of advances in test hardware and strategies on the usefulness of the ECochG test in clinical practice are reviewed.

Objective: To analyze the sensitivity and specificity of ET ECochG in the diagnosis of MD.

Methods: Key word searches of the Pubmed, Cochrane Library, and Web of Science databases were undertaken including "electrocochleography," "ECochG," "ECoG," "Ménière's Disease," and "Idiopathic Endolymphatic Hydrops." Abstracts meeting the inclusion criteria ET ECochG methodology, English language publication between January 1st 2002 and December 31st 2015, and utilizing the 1995 AAO-HNS MD diagnostic classification were identified. The full articles were obtained and systematically reviewed. Study design, number of participants, AAO-HNS classified level of MD in the sample groups, mean ages of patient and control groups, ECochG stimulus parameters, sensitivity and specificity data were collected. Meta-analysis was conducted when possible.

Results: 16 articles; prospective, retrospective, or case studies, satisfied the inclusion criteria. Patient sample sizes ranged from 1 to 178 suspected, possible, probable, or definite MD cases.

Specificities ranged from 85% to 97%. Using single SP/AP amplitude ratio criterion, sensitivities for probable and possible MD patients ranged from 34% to 63% and 54% to 79% for definite MD patients. With combination criteria, sensitivities for definite MD patients ranged from 92% to 100% and 87.5% for the possible and probable group.

Conclusion: ET ECochG can be a helpful test in MD diagnosis; however, studies show widely varying sensitivity. ECochG testing sensitivity increases with combination criteria rather than the single SP/AP amplitude ratio in definite MD patients.

B09 **Serge Makarenko,** Neurosurgery

Title: Multimodality management of trigeminal schwannomas and quality of life outcomes – a single institution experience

S. Makarenko, V. Ye, R. Akagami

Background: Trigeminal schwannomas are the second most common among intracranial schwannomas. These can arise from anywhere between the root and the distal extracranial branches of the trigeminal nerve. Clinical presentation depends on location and size, including but not limited to facial hypoesthesia or pain, headaches, dizziness, ataxia, and diplopia. Literature is strikingly scant discussing the natural history of these lesions, while the treatment goals are heavily dependant on tumour presentation. Management decisions have to be individualized to each tumour and each patient, while attempting to maximize the quality of life. We present a unique look at single institution management of these lesions, whether by surgery, radiation, or by serial imaging, report on the quality of life of patients diagnosed with trigeminal schwannomas.

Methods: Between 2001 and 2015, 28 patients (64.3% female) with trigeminal schwannomas were diagnosed and managed with trigeminal schwannomas at Vancouver General Hospital. We analyzed the clinical presentation, surgical results, resection rates, patient quality of life, and complications. To complete the evaluation, we prospectively collected SF-36 Quality of Life assessments from patients and compared post-treatment quality of life assessments with those completed by patients at the time of the initial clinic visit.

Results: We were able to identify 12 patients treated with a craniotomy and surgical resection, 6 who had radiation treatment, while 10 patients were followed by observation. Mean age of study cohort was 52.1 years (range 23-82 years), and most patients presented with facial hypoesthesia (53.6%) and headaches (39.3%) while 32.1% were incidental. There were no major differences in patient demographics between three groups. Patients offered surgery had larger lesions (mean diameter 3.4 cm) when compared to those that were irradiated or observed, and were more likely to have extracranial extension. There were no neurologic or medical complications of surgical treatment, while 66.7% patients had worsening of symptoms following radiation treatment requiring steroid use. Overall patient quality of life perception improved in the cohort following surgery (ΔSF-36 +8.4), while those patients that underwent radiation or were observed started with an overall higher SF-36 score (66.1 and 61.1 respectively).

Conclusions: The treatment goals of trigeminal schwannomas focus on improvement in neurologic symptoms, relief of mass effect, and preservation of cranial nerve function. These must be balanced against preservation of patient quality of life, which we demonstrate only marginally improves with treatment interventions. Individualization of management strategies on a case by case bases should be conceptualized by a dedicated skull base team. Where possible, a complete surgical resection should be the treatment of choice but advancements in radiosurgical techniques have opened up possibilities for primary management of smaller lesions as well as for postoperative residuals or recurrences.

B10 **Ali Farrokhi,** Plastic Surgery

Title: Application of a Indoleamine 2,3-dioxygenase (IDO) expressing allogenic dermal fibroblast populated within an acellular skin substitute as a biological wound coverage

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Acute and chronic wounds contribute to increased morbidity and mortality in affected people and impose significant financial burdens on healthcare systems. Despite of advantages of skin grafts, problems such as complications at the donor site, contracture, loss of elasticity, sensory impairment and undesirable cosmetic results including hypo- or hyper-pigmentation resulted in emerge of tissue- engineered alternatives. Among these, acellular dermal matrix (ADM) as an extracellular matrix-based biomaterial has significant mechanical strength with retained biological activity. Further, repopulating dermal fibroblasts into ADM before transplantation may help the graft to restore its function by synthesizing essential extracellular matrix components, growth factors and cytokines, which are important for wound healing. To prepare ready-to-use skin substitute harboring live fibroblasts, it is not feasible to use autologous dermal fibroblasts and using allogeneic fibroblasts can cause immunologic rejection. Although systemic immunosuppressive drugs are widely used for prevention of allorejection, their side effects are of main concern.

Here, we hypothesized that application of indoleamine 2,3-dioxygenase (IDO) expressing allogenic dermal fibroblast populated within an ADM is sufficient to create an immune-privileged area, within the wound, to protect from rejection while providing a rich source of nutrients and growth factors by fibroblasts, in addition to ADM which is serving as wound coverage. To test this hypothesis, ADMs were prepared using a new detergent–free method, recellularized with IDO-expressing or control fibroblasts, and were transplanted on splinted full thickness murine skin wounds.

Investigating the wound healing process in these mice revealed that ADM significantly enhanced the wound healing process within three weeks. Application of IDO-expressing fibroblasts reduced infiltration of CD4+IL-17+TH-17 and CD4+IFN-G+TH-1 immune cells to the grafts. Further, local expression of IDO resulted in decreased allo- response and enhanced immune-tolerance toward allogenic fibroblasts. The finding of this study shows a correlation between local expression of IDO by fibroblasts and improved wound healing in an experimental model of allogeneic skin substitute grafting. Further studies are on the way to investigate whether application of this pre-made non- rejectable biological skin substitute is a viable option for treatment of chronic wounds.

B11 **Jonathan Misskey,** Vascular Surgery

Title: Endovascular management of extent II-IV thoracoabdominal aortic aneurysms in patients unfit for open repair

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**Principal Investigator*

Background: Open surgery provides a safe and durable reconstruction for patients with Extent II-IV thoracoabdominal aortic aneurysms. For patients unable to tolerate open repair due to extreme physiologic risk, endovascular repair has been utilized using either custom-made or off-the-shelf branched devices.

Objectives: This report describes our initial experience with endovascular branched graft repair of Extent II-IV thoracoabdominal aortic aneurysms in patients deemed to have prohibitive open surgical risk.

Methods: Retrospective analysis of all patients undergoing endovascular treatment of extent II-IV thoracoabdominal aortic aneurysms considered unfit for open repair. Pre-operative patient characteristics, as well as aneurysm etiology, size and extent were recorded. Endovascular graft configuration and number of branches were recorded. Intraoperative details and follow up to a mean of 22 ±13 months was available.

Results: Twenty-two patients underwent endovascular repair of extent II (55%), III (19%) and IV (27%) thoracoabdominal aortic aneurysms from 2009 to 2015. Graft configuration was 4 branched devices in 18 (82%) and three branches in 4 (18%). Grafts were custom-made in 10 patients and off the shelf in 12 patients. Three patients were treated with a planned perfusion branch. Median age was 9 years and 14 patients (64%) were male. There were 2 ruptures (9%) with all other patients having elective repair. There were no intraoperative deaths and 3 patients (14%) died prior to discharge. There were 2 (9%) conversions to open repair and 2 (9%) cases of paraplegia. There were 11 (50%) patients with postoperative endoleak of which 8 required an intervention for an endoleak at the site of a branch. 7 patients (32%) were noted to have ongoing aneurysm sac enlargement on follow up imaging.

Conclusion: Endovascular repair is an evolving treatment modality for patients with thoracoabdominal aortic aneurysms and has allowed treatment to be extended to those considered unfit for open surgery. A trend towards decreased perioperative morbidity with endovascular repair will continue to force surgeons to determine if the less definitive nature of the treatment is worth the benefit, and whether endovascular repair should be offered to patients suitable for open repair.

B12 **Connie Drewbrook,** Thoracic Surgery

Title: Incidence risk and independent predictors of prolonged air leak in 269 consecutive pulmo-nary resection patients over nine months: a single-centre retrospective cohort study

Connie Drewbrook BASc, Anna McGuire MD FRCSC, Division of Thoracic Surgery, University of British Columbia

Introduction: Prolonged air leak (PAL) is a common postoperative complication following pulmonary resection and is associated with additional complications such as pneumonia and em-pyema, and increased length of hospital stay and health-care costs. Intraoperative techniques have been developed to mitigate the risk of developing a PAL, but for their use to be efficient and economical, identification of patients at risk for PAL is necessary. The aim of this study is to determine the incidence of PAL following lobectomy and lesser pulmonary resections, risk fac-tors for development of PALs, and the impact of PAL on hospital stay and readmission rates.

Methods: Prospectively collected data for patients undergoing lobectomy and sublobar resec-tions from October 1, 2015 – June 30, 2016 was analyzed retrospectively. Patient characteristics, scores on validated scoring systems, and surgical factors were analyzed as potential risk factors. Patient characteristics include age, sex, body mass index (BMI), FEV1 percent predicted, FEV1/FVC ratio, DCLO percent predicted, and transplant recipient status. Validated scoring systems include Charlson Comorbidity Index (CCI), Medical Research Council (MRC) dyspnea score, and Eastern Cooperative Oncology Group (EGOC) score. Surgical factors include surgical technique, unplanned conversion from video-assisted thoracoscopic surgery (VATS) to thoracot-omy, location and extent of resection, presence of adhesions, completeness of fissures, and method of fissure completion if incomplete. Length of hospital stay and readmission rates were analyzed. Statistical tests performed on the data include univariate and multivariate logistic re-gression analyses.

Results: Over the 9 month duration of the study there were 269 lung resections, of which 31 (11.52%) had an air leak lasting longer than 4 days. Mean length of stay in hospital was signifi-cantly longer in patients with PAL compared to the control group (13 vs 5 days, P<0.001). Sig-nificant risk factors for PAL from multivariate analysis include normal BMI (P=0.009), right up-per lobectomy (P=0.001), and unplanned conversion from video-assisted thoracoscopic surgery (VATS) to thoracotomy (P=0.023).

Conclusion: The incidence of PAL in our study population is similar to that found in previous studies. PAL prolongs hospital length of stay. Normal BMI, upper lobectomy, and unplanned conversion from VATS to thoracotomy are risk factors for PAL.

B13 **Kimberly Luu,** Otolaryngolgy

Title: **Characterization of global and sino-nasal morbidity in CRS patients with and without a concomitant chronic airway condition** *Kimberly Luu, Trafford Crump, Guiping Liu, Jason Sutherland, Arif Janjua, UBC Otolaryngology Head and Neck Surgery*

Background: Patients with Chronic Rhinosinusitis (CRS) can suffer from a significant decline in their quality of life. CRS patients have a high prevalence of comorbid conditions and it is important to understand the impact of these conditions on their CRS-related quality of life.

Objective: This study measures the impacts of chronic pulmonary comorbidities on quality of life, pain, and depression scores among patients with CRS awaiting Endoscopic Sinus Surgery (ESS).

Methods: This study is based on cross-sectional analysis of prospectively collected patient-reported outcome data collected pre-operatively from patients waiting for ESS. Surveys were administered to patients to assess sino-nasal morbidity (SNOT-22), depression and pain. The impact of pulmonary comorbidity on SNOT-22 scores, pain and depression was measured.

Results: 253 patients were included in the study, 91 with chronic pulmonary comorbidity. The mean SNOT-22 scores were significantly higher among patients with chronic pulmonary comorbidities than among patients without (37 and 48, respectively). This difference is large enough to be clinically significant. Patients with chronic pulmonary comorbidities reported slightly higher depression scores than those without.

Conclusions: This study found that among CRS patients waiting for ESS, chronic pulmonary comorbidities are strongly associated with significantly higher symptom burden.

B14 **Mary Fossey,** Plastic Surgery

Title: **Polyaspartic acid nanofiber material loaded with silver: antimicrobial activity and cell viability of human adipose stem cells**

Mary Fossey, Frank Ko, Aziz Ghahary, and Reza Jalili

Burn and Wound Healing Research Group, Division of Plastic Surgery, Department of Surgery, International Collaboration on Repair Discoveries (ICORD), University of British Columbia

Introduction: Chronic wounds do not readily heal, and complications commonly arise due to secondary infections. Would healing is an intricate process that requires a specific sequence of events. Adipose stem cells have been used for their ability to help facilitate and accelerate this process. Yet, to have the most efficient wound care, it is necessary to have a high water absorbency material with antimicrobial activity. Polyaspartic acid nanofiber mat is a biocompatible material that can be manufactured via electrospining and is used for making bioengineered skin substitutes. To increase antimicrobial activity, the addition of metal nanoparticles is required. Silver has strong bactericidal effect and has been widely used to prevent and treat wound infections.

Objectives: The aim of this study was to optimally increase the antimicrobial activity of biomaterials by finding an adequate concentration of silver that could prevent bacterial contamination and at the same time have a low cytotoxicity effect on human adipose stem cells (hASCs). These are pilot experiments, which are part of a larger study, which aims to observe the healing effects of polyaspartic acid nanofiber material with silver directly on a skin substitute.

Methods: The antimicrobial activity and cytotoxicity of polyaspartic acid nanofiber material was tested with three different concentrations of silver 0.5%, 1.0% and 1.5% on Escherichia coli and on hASCs. Bacterial contamination was quantified by measuring the absorbency of the cultured wells with a spectrophotometer. While the cell viability and the morphology of hASCs were monitored with MTT assays and live-dead staining.

Results: All concentrations of silver-NFM resulted in a significant decrease in bacterial contamination. However, there was no significant difference between the different concentrations. MTT assays showed that both intact and pre-washed 0.5% Ag-NFM seem to be the best treatments in terms of cell viability as 1.0% and 1.5% Ag-NFM resulted in decreased cell viability. For live-dead staining, hASCs treated with 0.5% Ag-NFM had the closest results compared to the control. In terms of morphology, as the concentration of silver increased, more hASCs were seen to succumb to the cytotoxicity of silver, lose a healthy morphology and cease to function.

Conclusion: All the various concentrations of silver had significant antimicrobial activity but there was no significant difference in their effectiveness between the various concentrations. For cell viability, the concentrations of 1.0% and 1.5% silver resulted in increased hASCs death. Overall, the treatment group with the best outcome was seen to be the concentration of 0.5% Ag as it successfully inhibited bacterial infection without significantly harming the hASCs.

B15 **Christopher Dickman,** Otolaryngology

Title: **Secreted miRNAs and their role in promoting oral cancer**

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Background: Packaging of small molecular factors, including miRNAs, into extracellular vesicles (EVs) may contribute to malignant phenotypes and facilitate communication between cancer cells and tumor stroma. The process by which miRNAs are enclosed in EVs may be selective rather than indiscriminate, with selection governed by specific miRNA sequence.

Objective: We aim to identify the miRNAs selectively secreted from oral cancer cells and to determine their function.

Methods: Using RT-PCR on a panel of 4 coral cancer and one dysplasia cell line we determine which miRNAs are selectively excreted. Using over-expression of miR-142 in mouse tumors we identify the function of secreted miRNAs and the effect on blood vessel density.

Results: We describe the selective packaging and removal via EVs of four miRNAs (miR-142-3p, miR-150-5p, miR-451a, and miR-223-3p). Inhibition of exosome export protein Rab27A increased intracellular concentration of these miRNA candidates and prevented their exclusion via EVs. Increased intracellular miR-142-3p specifically was found to target TGFBR1, causing a decrease in TGFBR1 expression in donor cells and a reduction of malignant features such as growth and colony formation. Conversely, increased excretion of miR-142-3p via donor cell EVs and uptake by recipient endothelial cells was found to reduce TGFBR1 activity and cause tumor-promoting changes in these cells in vitro and in vivo.

Conclusion: This is the first report to demonstrate that a single miRNA undergoing selective exclusion via EVs can simultaneously enhance malignant phenotypes in both donor and recipient cells.

B16 **Colin Naiqian Tan,** Otolaryngology

Title: **Perceptions and attitudes towards children with hearing aids**

Colin N. Tan1,2, Julie Pauwels2, Frederick Kozak1,2, Neil K. Chadha1,2

1University of British Columbia, 2BC Children's Hospital

Background: Hearing loss is one of the most common congenital conditions in Canada, and hearing aids are critical for the normal development of many hearing impaired children. However, stigma has played a major role in why patients reject the use of hearing aids. Previous research since the 1970s has reported overall negative impressions when adults and children rated images of kids wearing hearing devices. This may lead to negative psychosocial consequences for such children in terms of bullying and lower self-esteem. In recent years wearable technology has become more commonplace, especially with the advent of devices like in-the-ear headphones and Bluetooth earpieces. As wearable technology becomes increasingly ubiquitous, we hypothesize there is a similar trend in greater acceptance towards children with visible hearing devices.

Objectives: In this prospective cross-sectional study, we investigate the perceptions of non-hearing impaired children and parents towards children with visible hearing aids compared to children without.

Methods: 6 subjects between the ages of 8 and 10 were photographed, once wearing a conventional behind-the-ear hearing aid and once not. Subjects for photographs were from different ethnicities, but with the same facial expression, distance, angle, and background. A survey was then administered to parents/legal guardians and children in various clinics at B.C. Children's Hospital showing these pictures. Inclusion criteria for surveyed children was ≥5 and

≤17 years of age. Participants were randomly shown 3 images of a child, with at least 1 child (and no more than 2) wearing a hearing aid. They were asked to rate the pictures across 5 attributes: healthiness, friendliness, intelligence, happiness, and physical fitness on a 0-100 scale. Participants were not told of the true intentions of the study until after completion of the survey. Data analysis included a paired, one-tailed t-test.

Results: A total of 113 subjects, 62 parents (mean age = 42.9 years) and 51 children (mean age = 12.2 years), were enrolled in August 2016. Across all 5 attributes, children wearing hearing aids were rated slightly more positively than children without for both adults (63.1 vs. 58.0) and children (55.5 vs. 54.5). While there was a statistically significant difference in the mean ratings towards children with hearing aids vs. children without in adults (p-value=0.0008), it was not the case in children (p-value=0.28).

Conclusions: Based on these results, our study shows a lack of negative bias towards children with visible hearing aids compared to their normal hearing peers. Potential response bias may influence the ratings in adults, although this does not seem to be the case in children. This suggests a trend towards acceptance of children with visible hearing aids in the general population.

B17 **Jieun Cha,** General Surgery

Title: **Delay between neoadjuvant chemoradiation and surgery on rectal cancer outcomes**

Jieun Cha, Jane McLeod, P. Terry Phang, Manoj J. Raval, Carl J. Brown, and Ahmer A. Karimuddin
Department of Surgery, University of British Columbia & St. Paul's Hospital

Background: Neoadjuvant chemoradiation followed by total mesorectal excision (TME) is the standard of care for locally invasive rectal cancer. Delay between chemoradiation and surgical resection is required for adequate tumour regression. During this time, the acute tissue reaction from the radiation decreases, theoretically decreasing the likelihood for perioperative complications. In Canada, long-course neoadjuvant chemoradiation has been widely adopted for locally invasive rectal cancer, with typical delay to surgery of 6-8 weeks with occasional longer delays. Current literature comparing various time intervals between neoadjuvant therapy and surgery reports conflicting results on pathologic response, perioperative complications, and disease-free survival. A recent meta-analysis (Pitrelli et al, 2013) demonstrated no difference in sphincter preservation, wound complications and anastomotic leak events between different time intervals. Individual studies suggest more perineal wound complications and anastomotic leakage with a shorter interval between radiation and surgery (Glimelus, 2014; Kerr, 2008). In contrast, a recent large-population based study demonstrated delays greater than 60 days have increased positive surgical margins, decreased rate of sphincter preserving therapy, and decreased survival compared to shorter time periods (Huntington et al., 2016).

Objective: This study's objective is to investigate the role of delay between neoadjuvant chemoradiation and surgery on surgical and oncologic outcomes in rectal cancer patients.

Methods: Patients with non-metastatic rectal cancer were identified from an institution-approved colorectal database at St. Paul's Hospital. Patients were divided into two groups according to the interval between neoadjuvant chemoradiation and surgery: ≤56 days and > 56 days. Data on neoadjuvant-surgery interval, type of surgery, pathology, postoperative complications, length of hospital stay, disease recurrence and survival were reviewed. Primary outcomes were composite outcome measure comprised of complete mesorectal excision, clear circumferential resection margin, and clear distal margins. Secondary outcomes included disease-free survival, recurrence rates and perioperative complications. Results were compiled and analyzed through quantitative analysis. Demographic data will be compared using univariate Chi square analyses. Tumor-specific data, timing of surgery, and primary and secondary outcomes will be quantified through multivariate analyses. We collaborated with the St. Paul's Centre for Health Evaluation and Outcome Sciences (CHEOS) throughout the analysis to determine the appropriate statistical methodology.

Results: A total of 138 patients were included in the short-interval group, and a total of 133 patients were included in the long-interval group. There was no significant difference in demographic data including gender, age, BMI, and ASA between the groups. We also analysed tumour characteristics including stage and tumour height, which did not differ significantly between groups. Type of operation performed as well as total length of hospital stay were also comparable between groups. Perioperative complications including overall complications according to Clavien-Dindo classification, pelvic abscess, wound dehiscence and readmission rates were compared between groups. Full statistics on the composite endpoint (complete mesorectal excision, clear circumferential resection margin, and clear distal margins) as well as secondary outcome measures (disease-free survival, recurrence rates and perioperative complications) will be available following full statistical analysis and will be presented on research day.

Conclusions: This study investigates the impact of delay between neoadjuvant chemoradiation and surgery in rectal cancer in terms of surgical and oncologic outcome. Final conclusions will be drawn once results from multivariate analyses are available.

B18 **Grace Sooeun Yi,** Otolaryngology

Title: **Pediatric patients with cochlear implants: obstacles to full-time utilization**

Grace Yi, Paula Tellez, Ruth Chia, Julie Pauwels, Frederick Kozak
Division of Pediatric Otolaryngology, Department of Pediatric Surgery, BC Children's Hospital

Background: The majority of children with cochlear implants (CI) are full time users. However, some choose to either use it occasionally or to discontinue use despite being considered appropriate candidates prior to implantation. "Partial use" refers to CI recipients who use the implant for fewer than all waking hours and "non-use" refers to complete rejection of the implant. It is not well understood why some children choose not to use their CI or do not use it to its full capacity.

Objectives: The aim of this study was to determine the proportion and characteristics of pediatric cochlear implant patients who are currently partial or non-users, as well as the reasons behind less than full-time use.

Methods: To identify partial or non-users, audiology and medical records were reviewed for patients who had received a cochlear implant at BCCH between January 1, 1989 and May 31, 2016, and were under 18 years of age as of June 30, 2016. A follow up telephone survey was completed with this population to determine actual hours of CI use and barriers to full-time use.

Results: Charts of 150 patients were reviewed and 35 patients were identified as either partial or non-users. Thirty families were subsequently interviewed (86% response rate). Of these, 23 patients had unilateral CI and 7 had bilateral CIs. Of the unilateral CI patients, 15 were part-time users, 3 were non-users, and the remaining 5 patients reported that they were currently full-time users, indicating our screening via chart review was imperfect. Among the bilateral CI patients, 6 patients used one CI full-time and were either a partial or non-user of the other, and 1 was a non-user of both CIs. Main reasons reported for decreased/non-use were fatigue from the effort of listening, loudness intolerance, magnet irritation, autism and complex medical conditions, physical barriers to wearing CIs, lack of support services at school and for speech-language therapy, parents' desire for children to be part of the Deaf/American Sign Language community, and perceived lack of benefit.

Conclusions: A small but significant (25/150; 16.7%) portion of BCCH pediatric cochlear implant patients are less than full-time users of their CIs. There was a wide range of stated reasons, from physical barriers to psychosocial factors to the lack of support services in the community. These findings suggest closer follow up of this population is required.

B19 **Mark Kearns,** Cardiac Surgery - will absent during Chung Research Day

Title: **The donor heart after withdrawal of life support: understanding and preventing cardiac injury associated with the DCD protocol**

Mark J. Kearnsa,b, Sally Millera, Anson Cheungb, Michael A. Seidmanb,c, John H. Boydb,d
UBC Centre for Heart & Lung Innovation, UBC Division of Cardiovascular Surgery, UBC Dept. of Pathology, UBC Faculty of Medicine

Background: Cardiac transplantation is plagued by a shortage of donor organs, with an attendant 10% annual mortality for patients on the waiting list. Donation after circulatory death (DCD) is an alternative mode of organ donation that can potentially boost the number of hearts available for transplantation. The DCD protocol requires withdrawal of life support measures in appropriate candidates, following which the donor vital signs deteriorate until they can be declared legally deceased. This process is, by necessity, associated with organ injury and very little is known about the suitability of these hearts for transplantation. DCD organ donation has proven a successful strategy for lung, liver, and kidney transplantation. It is known that some immune-based stimuli can confer cardioprotection to hearts undergoing ischemic injury. Of particular interest is stimulation of the innate immune system via toll-lie receptor 9 (TLR-9) using a clinically well-tolerated agonist (CpG oligodeoxynucleotide (ODN)). Our group hypothesized that, using clinically relevant endpoints, we could identify signatures of myocardial injury that would distinguish viable from non-viable transplant hearts. Furthermore, we hypothesized that donor pre-treatment with low-dose CpG ODNs would mitigate cardiac injury associated with the DCD protocol.

Methods: Sprague-Dawley male rats were used for all experiments. Experimental groups consisted of negative Beating Heart Controls (BHC), Positive Ischemic Controls (PIC), and DCD subjects exposed to increasing warm ischemic times by varying an acirculatory standoff period (5/10/20min). The major endpoints were systolic and diastolic cardiac function ex vivo, histology, biochemistry (total protein and cardiac troponin-I (cTnI) in coronary effluent), and gene expression (based on a derivation set of genes previously studied in our lab). We initially examined hearts immediately after the DCD protocol and cardiac harvest. Subsequently we examined hearts after exposure to normothermic crystalloid ex vivo heart perfusion (EVHP) in unloaded and loaded perfusion modes. We repeated the EVHP experiments in rats that had been pre-treated with a TLR-9 agonist (a stimulatory 22-mer CpG ODN) or control (scrambled 22-mer CG-rich ODN).

Results: Prior to EVHP, there were no striking differences between experimental groups. Following EVHP, striking differences emerged. With increasing warm ischemic time, fewer hearts were capable of generating a load on EVHP. By the DCD20 time-point, only 40% of hearts were functionally viable. There was a graded decrease in measures of cardiac function, with DCD20 being the most depressed. Histology scoring and cTnI immunoassay revealed a graded increase in injury among DCD groups, with a sharp increase in the level of TnI eluted at the DCD20 time-point. Among a panel of 4 gene transcripts (Jun, Myc, heme-oxygnase 1, heat shock protein-90) previously studied, 3/4 were strikingly elevated only in the DCD20 group. Pre-treatment with a stimulatory CpG ODN (TLR-9 agonist) doubled the number of functionally viable hearts (80%, DCD20) and improved measures of function significantly. Injury in the DCD20 hearts became indistinguishable from controls by histology scoring and cTnI immunoassay, and the relative expression of the 3 genes previously elevated in the DCD20 group were rendered indistinguishable from other experimental groups.

Conclusions: Across 4 clinically relevant endpoints, we demonstrate a pattern of cardiac injury associated with a prolonged warm ischemic time exposure (DCD20) in a pathophysiologically complex milieu. Despite the current lack of a feasible system for external validation, we suggest that the injury signature we demonstrated is indicative of a threshold of viability for cardiac transplantation. Furthermore, we demonstrate that donor pre-treatment with a TLR-9 agonist (stimulatory CpG ODN) eliminates much of the injury signature associated with the DCD 20 group, doubles the number of viable hearts, and improves their function. These results can be readily scaled to investigate human DCD hearts, with potential for a positive near-term impact on the shortage of donor hearts.

B20 **Yi-Chun Chen,** General Surgery

Title: **ER stress and lipotoxicity impair processing of pro-islet amyloid polypeptide in beta cells**

Yi-Chun Chen, Jaques Courtade, and Bruce Verchere, Department of Surgery, University of British Columbia

Background: Islet amyloid polypeptide (IAPP) is a hormone secreted by pancreatic beta cells, made from its precursor proIAPP, via sequential processing by prohormone convertases (PC1/3 and PC2), carboxypeptidase E (CPE) and an amidating enzyme (peptidylglycine α-amidating monooxygenase, PAM), to its mature form. Human IAPP, unlike rodent IAPP, is amyloidogenic and aggregates to form toxic oligomeric species and amyloid fibrils in pancreatic islets, which are associated with the development of type 2 diabetes (T2D). Incomplete processing of proIAPP may facilitate the formation of islet amyloid. **Objectives:** We aim to investigate whether pathological factors present in T2D alter the proIAPP processing machinery in beta cells, and whether alternatively processed forms of IAPP promote accumulation of IAPP oligomers or amyloid fibrils.

Methods: We treated rodent islets with thapsigargin or palmitic acid, to induce ER stress or to create a lipotoxic environment to mimic the islet milieu in T2D, and assessed IAPP processing enzymes and characterized the alternatively modified forms of IAPP.

Results: Both thapsigargin-induced ER stress and palmitate led to a reduction of PC2, CPE, and PAM protein expression. The level of mature IAPP in islets is also reduced, concurrent with an accumulation of proIAPP, partially processed (N-terminal extended) form of IAPP, and non-amidated IAPP. Conclusions: Our findings indicate that proIAPP processing is altered by ER or metabolic stress and suggest a mechanism by which these beta cell stressors may trigger pathways that lead to IAPP aggregation.

B21 **Heather Denroche,** General Surgery

Title: **Deletion of TLR2 or MyD88 does not ameliorate islet amyloid induced beta cell dysfunction**

Heather C. Denroche1, Imelda W. Suen1, Kiana Yau2, and C. Bruce Verchere1,2
Departments of Surgery1 and Pathology and Laboratory Medicine2, BC Children's Hospital, University of British Columbia, Vancouver, Canada.

Background: Insoluble aggregates of beta cell-derived islet amyloid polypeptide (IAPP) are thought to contribute to beta cell dysfunction in type 2 diabetes, however, the mechanism is unclear. We previously found that IAPP aggregates recruit macrophages to pancreatic islets and induce secretion of pro-inflammatory cytokines, contributing to islet inflammation and impaired beta cell function in mice. In vitro, the induction of pro-inflammatory programmes in macrophages by IAPP aggregates is mediated by toll like receptor 2 (TLR2) and its downstream adaptor molecule Myeloid Differentiation Primary Response Gene 88 (MyD88).

Objective: Determine whether IAPP aggregates induce beta cell dysfunction and subsequent diabetes in vivo through TLR2-dependent signalling.

Methods: Mice expressing a human IAPP transgene in beta cells (hIAPP Tg/0 mice) which develop robust islet amyloid, islet inflammation, and a type 2 diabetes-like phenotype, were crossed with Tlr2-/- mice. In addition, as IAPP aggregates could induce islet inflammation through redundant TLR pathways, many of which signal through MyD88, we generated hIAPP Tg/0 mice with a myeloid-specific deletion of MyD88 via the Cre-lox system.

Results: hIAPP Tg/0 mice displayed similar weight gain, but were significantly hyperglycemic and glucose intolerant relative to hIAPP 0/0 controls (which lack an aggregating form of IAPP). Surprisingly, TLR2 deficiency had no protective effect on glucose intolerance, diabetes incidence, islet dysfunction or islet inflammation in hIAPP Tg/0 mice. Moreover, myeloid-specific deletion of MyD88 did not ameliorate hIAPP-induced beta cell dysfunction or diabetes development.

Conclusion: These data reveal that whereas TLR2 and MyD88 are necessary for the pro-inflammatory response to IAPP aggregates in vitro, alternate innate signalling pathways likely contribute to islet amyoid-induced inflammation in vivo.

B22 **Al-Salihi Salahaldin,** Otolaryngology

Title: **The use of topical anaesthetic in Poloxamer-407 gel for the treatment of recalcitrant atypical facial pain**

Anali Dadgostar, Fahad Alasousi, Christopher Okpaleke, Amin Javer
Division of Otolaryngology, University of British Columbia, St. Paul's Sinus Centre, Vancouver, British Columbia, Canada.

Background: Poloxomer-407 is a gel-like polymer with unique thermoreversible properties that remains liquid in cool temperature but reverts to a gel at higher temperatures. It can be loaded with topical anaesthetics (bupivacaine, cocaine) and applied to target neuropathic pain sites within the sinuses in patients with chronic headache and atypical facial pain. The advantage to its use is the prolonged contact time with the sinus mucus membrane (2-5 days).

Objective: This study aims to examine the effectiveness of topical anaesthetic impregnated poloxamer-407 in the treatment of recalcitrant atypical facial pain.

Methods: A retrospective review of post-functional endoscopic sinus surgery patients with no evidence of sinus inflammation (Lund-Kennedy Score=0) and recalcitrant atypical facial pain was performed. Topical anesthetic impregnated poloxamer-407 was applied to the ipsilateral sphenopalatine ganglion region. Visual analog scores (VAS) for pain (0-10) was obtained pre and post-application. Paired t-test was used to test the difference in VAS pre and post-application.

Results: Thirteen patients (11-females, 2-males; mean age=53.6 years) were reviewed. There was a significant reduction in VAS for pain (mean difference=5.75, 95% CI=3.62-7.88, p-value=0.0002). The mean application interval was 10.6 days and duration of relief of >24 hours was seen in 75% of patients. No systemic absorption or adverse events were reported.

Conclusion: Poloxamer-407 impregnated with topical anaesthetic is an effective treatment option for patients with recalcitrant headache and atypical facial pain. Poloxamer-407 offers the advantages of application under direct visualization in the office setting, longstanding pain control, and reduced need for systemic pain therapy.

B23 **Oleksandr Butskiy,** Otolaryngology

Title: **ThroatUnwrap - computer optimization of anterolateral thigh flap design for circumferential pharyngeal reconstruction: a cadaveric proof of principle study**

Oleksandr Butskiy, BSc, MD 1, 2; Vladimir G. Kim, PhD 3; Donald W Anderson, MD, FRCSC 1, 2
Eitan Prisman, MD, FRCSC 1, 2 1Division of Otolaryngology – Head and Neck Surgery, Vancouver General Hospital; 2University of British Columbia, Vancouver, Canada; 3Creative Technologies Lab, Adobe Research, Seattle, U.S.A

Background: Over the last decade, the anterolateral thigh (ALT) free flap has become popular for circumferential pharyngectomy reconstruction. To reconstruct a circumferential pharyngeal defect, the ALT flap is folded into a conical frustum (a cone with the top removed).

The simplest ALT shape that accommodates folding into a conical frustum is a trapezoid. However, harvesting a trapezoid shaped flap leaves the donor leg with a defect that is not amenable to primary closure. An alternative to a trapezoid is a lens shaped ALT flap. However, the shape and the folding pattern of a lens shaped flap are difficult to predict intraoperatively.

Objectives: (1) To design software that: (a) uses simple intraoperative measurements to produce printable lens shaped pharyngoesophageal reconstruction templates, and (b) optimizes the template shape for primary closure of the donor site. (2) To compare the percentage of donor site surface area that achieves primary closure between the software generated lens shaped flap and the traditional trapezoid shaped ALT flap.

Methods: Software description - A circumferential pharyngectomy defect was modeled as a conical frustum defined by three intraoperative measurements: defect height (H) and circumference of the proximal (C1) and distal anastomosis (C2). Alpha ( ) was defined as an angle of the cut through the frustum with respect to the distal anastomosis that unfolds the frustum into a two dimensional shape. A mathematical model and a software algorithm (ThroatUnwrap) were developed that use H, C1, C2 and to predict all possible two dimensional flap templates. To maximize donor site primary closure, the ThroatUnwrap software then selects the narrowest allowable template.

Cadaver experiment - A laryngectomy along with circumferential pharyngectomy was performed on a fresh frozen cadaver, measurements of the defect were taken, and two corresponding ALT flaps were harvested: a trapezoid shaped flap, and a lens shaped flap generated by the ThroatUnwrap software. The same surgical team attempted primary closure of each donor leg defect and compared the degree of achieved primary closure.

Results: Both the trapezoid shaped and the software-predicted flaps were accurate in reconstructing the cadaveric circumferential pharyngeal defect. The surgical team was able to achieve 7% primary closure of the trapezoid shaped donor wound, and 75% of the software predicted donor wound.

Conclusion: The ThroatUnwrap software is the first software to allow printing of personalized ALT templates for intraoperative use in circumferential pharyngectomy reconstruction. Using the ThroatUnwrap software templates will minimize donor site morbidity by maximizing primary closure of the donor site wound.

B24 **Chan-Kyung Cho,** Radiation Oncology

Title: **Palliative radiotherapy for bone metastases in patients dying of prostate cancer: the British Columbia experience**

Chan-Kyung J. Cho, Katherine Sunderland, Tom Pickles, Francois Bachand, Kim Chi, Scott Tyldesley

Background: Prostate cancer resulted in approximately 4100 deaths in Canada in 2015 and the majority of metastatic prostate cancer cases involve bone metastases. Radiotherapy can provide cost-effective and safe palliation for symptomatic bone metastases. The advent of new systemic agents for treatment of metastatic castration-resistant prostate cancer demonstrating overall survival benefits has changed the landscape of care, and may impact the demand for and provision of palliative radiation to bone (PRTB) in this population.

Objectives: To describe the use of PRTB in patients who died of prostate in British Columbia between 2003 and 2015.

Methods: All patients that died of prostate cancer in the time period were identified from a population-based provincial cancer registry. Exclusion criteria included: other sites of cancer diagnosis, lack of adenocarcinoma histology, RT to non-bone sites or of non-palliative intent. Patient and treatment characteristics were analyzed using SAS. PRTB use for the first and last courses was calculated by year of death, overall, and by region. Survival was calculated for the following: from first course of PRTB to death, from last course of PRTB to death, and by treatment year. To assess the adequacy of provision of PRTB in this population, the geographical distribution of the incidence of prostate cancer was compared with the treatment frequency across the province.

Results: Out of 23,260 prostate cancer patients who died between 2003 and 2015, 5,701 had prostate adenocarcinoma as their only primary cancer diagnosis. The median age at the time of death was 81 and median survival since diagnosis was 5.2 years. Utilization of PRTB prior to death was 38.6% (2,203 patients), with a trend to increase overtime from 29% (95%CI: 25-33%) in 2003, to 44% (95%CI: 25-33%) in 2015. Multiple courses of PRTB were frequent, with patients receiving two, three, four or more courses of PRTB in 24%, 14%, and 22.7% of cases respectively. Patients with longer survival tended to receive multiple courses of treatments. Survival after first course of PRTB to prostate cancer death was 38.6% at 1 year, and 2.3% at 5 years, and a median of 8.5 months. Median survival after first course of PRTB was mostly unchanged for those dying of prostate cancer in 2003-4 (63 months), compared to 2013-14 (55 months). For last course of PRTB, 2% were treatment within the last 4 weeks of their life. The fractionation pattern shows a significant change over time, favouring single-fraction treatments since 2010. Rural areas with lower use of PRTB were identified.

Conclusion: Only 38.6% of patients that died of prostate cancer received palliative RT to bone (PRTB) prior to death, but this increased overtime to 44% by 2015. It is difficult to know the proportions of prostate cancer patients that have indications for PRTB, and whether this utilization reflects appropriate access. This study shows that majority of patients that die of prostate cancer do so within a year of their first course of palliative RT to bone, and only a minority of patients are treated within 4 weeks of death.

2016 Department of Surgery Faculty Achievement Awards

Hjalmar Johnson New Investigator Award – Dr. Neil K. Chadha

Dr Neil K Chadha MBChB(Hons) MPHe BSc(Hons) FRCS
Division of Pediatric Otolaryngology-Head and Neck Surgery
B.C. Children's Hospital, Clinical Associate Professor
University of British Columbia

Dr. Neil K Chadha joined UBC in July 2010 as a full-time clinician and Director of the Pediatric Otolaryngology Research Unit. Prior to this he undertook a two-year Pediatric Otolaryngology Fellowship at The Hospital for Sick Children in Toronto. His Otolaryngology residency was in the Bristol and Bath region of the United Kingdom where he obtained Fellowship of the Royal College of Surgeons of England, and he completed Medical School and post-graduate surgical training in Manchester and London, respectively.

Dr. Chadha's clinical special interests include pediatric head and neck surgery, voice disorders, and endoscopic sinus surgery, salivary gland surgery and minimally invasive techniques. He has set-up and directed the BC Pediatric Voice Program and the BC Pediatric Bone Conduction Surgery Program. Examples of new surgical techniques he has introduced to BC Children's Hospital include extended trans-nasal endoscopic skull base surgery, endoscopic salivary duct surgery and endoscopic approaches to congenital branchial anomalies. In 2012 he took over as Director of the UBC Pediatric Otolaryngology Clinical Fellowship program.

Dr. Chadha has a Masters Degree in Public Health and to date has published 70 peer-reviewed research articles and 3 book chapters. As clinical researcher trained in epidemiology and evidence-based medicine, his research focus is on exploring the efficacy and safety of novel treatments and technologies, revisiting dogmas, and addressing controversies in diagnosis and management. Some ongoing research projects include sialendoscopy surgery for childhood parotid disease, maxillary expansion for pediatric sleep apnea, and improved visualization in the operating room.

Richard J Finley Senior Investigator Award – Dr. Morad Hameed

Dr. Morad Hameed, MD, MPH, FRCSC, FACS
Division of General Surgery, Associate Professor of Surgery and Critical Care Medicine Section Head, Trauma/ICU/Acute Care Surgery, Vancouver General Hospital

Dr. Morad Hameed is a trauma surgeon and intensivist at the Vancouver General Hospital (VGH) and an Associate Professor of Surgery at the University of British Columbia (UBC). He completed medical school and surgical residency at the University of Alberta, graduate studies in public health at Harvard University, and fellowships in Trauma Surgery and Surgical Critical Care at the University of Miami. He spent three years on the surgical faculty at the University of Calgary, before moving to Vancouver.

He is a former Director of the UBC General Surgery Residency Program, and currently serves as the Section Head and Fellowship Director for Trauma and Acute Care Surgery at UBC, the Secretary of the Trauma Association of Canada, and the President of the Canadian Association of General Surgeons.

Dr. Hameed's research focuses on systems of trauma care and acute care surgery, including electronic injury surveillance. Dr. Hameed's research teams have received grants from the Canadian Institutes of Health Research, the Michael Smith Foundation for Health Research, Grand Challenges Canada and other funding agencies for their work on disparities in injury risk and access to trauma systems. The development of partnerships with trauma investigators at the University of Cape Town and the University of Pittsburgh has recently extended this work to South Africa and Latin America

A History of WB & MH Chung Lectureship

In 1995 Madeline and Wally Chung made a generous donation to the Department of Surgery at the University of British Columbia.

The purpose of the donation was to support an annual UBC Department of Surgery research day and invite the W.B. & M.H. Chung Lecturer to present new academic work as well as judge academic productivity, not only by the Residents but also by the Faculty.

The format was directed toward the new work developed by the Residents, Fellows, Basic Scientists and Faculty. Each paper was 10 minutes in duration and a five minute discussion period followed for each paper.

The visiting professor presented original research as part of the day as well as judged the clinical and basic science presentations.

The first visiting professor was Lloyd D. MacLean, MD, FRCSC, FACS who was head of the Department of Surgery at McGill University as well as President of the American College of Surgeons.

Each of the Research Days has been attended by Dr. Chung who has been actively involved in the Department for almost fifty years.

Dr. Chung was heartened by the active interests of the Residents as well as Basic Scientists and Faculty in exchanging information at the Research Day. The Department is grateful for this wonderful legacy that Madeline and Wally Chung have left for the Department.

1995 Lloyd MacLean, McGill University
1996 John Duff, University of Western Ontario: *"Multisystem organ failure: manifestations and mediators"*
1997 K. Wayne Johnston, University of Toronto
"Issues in the management of abdominal aortic aneurysms in a rapidly changing health care environment"
1998 Charles H. Tator, Professor and Chair, Division of Neurosurgery, The Toronto Hospital: *"The breadth of surgical research in the 1990's"*
1999 Garth Warnock, Chief General Surgery, University of Alberta Hospitals, Director, Division of Surgical Research, University of Alberta
"Progress in transplantation of insulin-secreting tissues for diabetes mellitus"
2000 Paul Walker, Vice President, Toronto General Hospital
Professor of Surgery and Laboratory Medicine, Pathobiology, University of Toronto
"The continuing challenge of sepsis"
2001 James C. Thompson, Ashbel Smith Professor of Surgery, University of Texas Medical Branch
"Endocrine tumors of the pancreas"
2002 Richard J. Finley, Professor, Department of Surgery
Head, Division of Thoracic Surgery, University of British Columbia
"Future of image guided minimally invasive thoracic surgery"
2003 Douglas W. Wilmore, Frank Sawyer Professor of Surgery, Department of Surgery
Brigham and Women's Hospital, Boston, Massachusetts
"The pathophysiology and treatment of intestinal failure"
2004 John Wong, Chair of Surgery & Head, Department of Surgery
University of Hong Kong Medical Centre, Queen Mary Hospital, Hong Kong
"Complications of esophagectomy: confess and remember"
2005 Richard K. Reznick, R.S. McLaughlin, Professor and Chair, University of Toronto
Department of Surgery , Banting Institute, Toronto, Ontario
"Surgical training in 35 hours per week: laudable or lunacy?
2006 James T. Rutka, Janes Visiting Professor in Surgery, Dan Family Chair in Neurosurgery, Professor and Chairman,
Division of Neurosurgery, University of Toronto
"Astrocytoma invasiveness: molecular mechanisms form the leading edge"
2007 Markus W. Büchler, Professor of Surgery, Division of General Surgery
Chairman Surgical Unit, University of Heidelberg
"Evidence based pancreatic surgery"
2008 Thomas M. Krummel, Emile Holman Professor and Chair, Stanford University School of Medicine, Department of Surgery
Susan B. Ford Surgeon in Chief, Lucile Packard Children's Hospital, Stanford, CA
"From Blood and Guts to Bits, Bytes and Beyond-- Upgrading the Surgical Apprentice Model"
2009 Andrea L. Pusic, Assistant Attending Surgeon, Plastic and Reconstructive Surgery, Memorial Sloan-Kettering Cancer Center, New York
"Measuring patient reported outcomes in surgery"
2010 Yvan Douville, Chief, Department of Surgery, University of Laval
"Evolution of Stentgraft for Treatment of Abdominal Aortic Aneurysms"
2011 Gerald Fried, Chair, Department of Surgery, McGill University
"Teaching Billy how to operate: can we do better?"
2012 Haile Debas, Executive Director of UCSF Global Health Sciences (GHS); former Dean of the UCSF School of Medicine (1993-2003); former Chair, UCSF Department of Surgery . *"Precious Times"*
2013 Lorelei Lingard, Professor and Director of the Centre for Education Research & Innovation, Schulich School of Medicine & Dentistry, Western University, London, ON
"Beyond communication skills: A rhetorical approach to communication for advancing the practice and teaching of teamwork"
2014 Thomas Waddell, Chair, Division of Thoracic Surgery, University of Toronto, Professor, Department of Surgery, University of Toronto
Head, Division of Thoracic Surgery, UHN, Senior Scientist, Toronto General Research Institute, UHN
"The role of research training in surgical education".
2015 Garnett Sutherland, Professor, Clinical Neurosciences, University of Calgary, Founder and Director, Seaman Family MR Research Centre, Alberta Heath Services. *"Magnetic resonance imaging and robotic surgery."*