



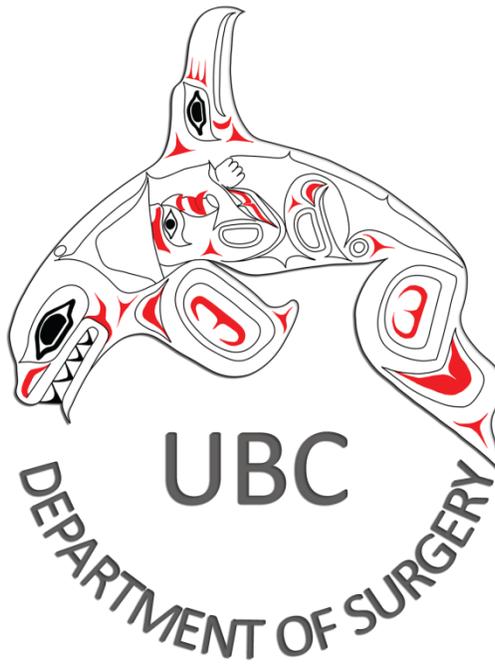
# THE SURGICAL TIMES

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UBC Department of Surgery

November 4, 2019

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The 25<sup>th</sup> Annual

**WB & MH Chung**

**Lectureship and Research Day**



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*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 communications, the Surgical Times is now only printed in paper form once a year for Chung Research Day.*

## Message from the Department Head, Dr. Gary Redekop



The WB & MH Chung Research Day is our annual 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 this year includes topics ranging from pure basic science to translational research, education, and clinical outcome studies.

Our 2019 Chung Lecturer, Dr. Grantcharov, is a Professor of Surgery at the University of Toronto. He holds the Keenan Chair in Surgery at St. Michael's Hospital in Toronto and a Canada Research Chair in Simulation and Surgical Safety. Dr. Grantcharov developed the surgical black box concept, which aims to transform the safety culture in medicine and introduce modern safety management systems in the high-risk operating room environment.

I would like to acknowledge 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 the 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 Meredith Edwards, our Interim 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 2019

## Learning Objectives

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.

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.

Accredited by UBC CPD



CONTINUING PROFESSIONAL DEVELOPMENT  
FACULTY OF MEDICINE

# Research Day Schedule

## Plenary sessions

### MORNING SESSION Paetzold Lecture Theatre

*\*8 minute paper with 2 minute discussion*

08:00		<b>Gary Redekop</b>	Chung Research Day Welcome
08:05	317	<b>Craig, Michael</b>	Neurosurgery Performance of the Subaxial Cervical Spine Injury Classification tool: A retrospective review across centres in Australia, Canada, and New Zealand
08:15	320	<b>Ayling, Oliver GS</b>	Neurosurgery The effect of peri-operative adverse events on long-term patient reported outcomes after lumbar spine surgery: A Canadian multi-centre prospective study
08:25	322	<b>Sasaki, Shugo</b>	General Surgery Engineering Human Stem Cell-Derived Pancreatic Beta Like Cells To Protect From Immune Attack
08:35	329	<b>Landry, Evie C.</b>	Otolaryngology Early Health Economic Modelling of Novel Therapies in Hearing Loss: Accelerating Access and Implementation
08:45	330	<b>Van Slyke, Aaron</b>	Plastic Surgery Something Stinks! Finding Ways to Manage Noxious Odours in the Operating Room: A Randomized Controlled Trial
08:55	333	<b>Karimi, Navid</b>	Plastic Surgery In Vivo Application of The First Generation of MeshFill-Plus; A Liquid Wound Healing Scaffold with Inherent Antimicrobial Properties
09:05	340	<b>Que, Jessica</b>	Pediatric Surgery The Impact of Daily Probiotics on the Incidence and Severity of Necrotizing Enterocolitis in Very Low Birth Weight Infants
09:15	342	<b>Li, Yunyuan</b>	Plastic Surgery Targeting M-CSF-mediated myeloid cells as treatment option for skin autoimmune disease (alopecia areata)
09:25	345	<b>Luc, Jessica G.Y.</b>	Cardiac Surgery Effect of Operating Room Personnel Generation On Perceptions and Responses to Surgeon Behavior
09:35	346	<b>Luc, Jessica G.Y.</b>	Cardiac Surgery Social Media Improves Cardiothoracic Surgery Literature Dissemination: Results of a Randomized Trial
09:45	350	<b>Alghunaim, Essa</b>	Thoracic Surgery Impact of Carbohydrate Loading Enhanced Recovery After Surgery Protocol On Adverse Cardiopulmonary Events In A Thoracic Surgery Population
09:55	364	<b>Maleki, Saeideh</b>	Otolaryngology Epigenetic silencing of SMPD3 in oral cancer alters cell migration, invasion, and drug response
Refreshment Break (10:05 – 10:20)			
10:20	351	<b>Keyes, Mira</b>	Radiation Oncology Patterns of prostate cancer recurrence after brachytherapy imaged with PSMA-targeting 18F-DCFPyL PET/CT
10:30	353	<b>Singh, Navneet</b>	Otolaryngology The Efficacy of Topical 0.3% Hydrogen Peroxide Solution Rinse in the Management of Biofilm-Associated Chronic Rhinosinusitis
10:40	355	<b>Sarwal, Gautamn</b>	Vascular Surgery The physical toll of working in operating rooms: A survey of the Canadian Society of Vascular Surgery
10:50	357	<b>Sagorin, Zach</b>	General Surgery Gender-Based Compensation Disparity Among General Surgeons in British Columbia
11:00	360	<b>Amanian, Ameen</b>	Otolaryngology Assessing Post-Operative Patient-Centred Care Education Administration in Head and Neck Cancer Patients – A Pilot Study
11:10	362	<b>Skarsgard, Peter</b>	Cardiac Surgery Percutaneous Mitral Valve Repair: Proof of Concept for a Novel Medical Device
11:20	372	<b>Joshua, Temitope Grace</b>	Otolaryngology A systematic review on treatments outcomes of patients with sudden sensorineural hearing loss
11:30	373	<b>Hsiang, York</b>	Vascular Surgery The development of a smart stent to detect in-stent restenosis.
11:40:00		<b>Grantcharov, Teodor</b>	<b>CHUNG LECTURE: Surgical innovation, surgical education and patient safety</b>

## 12:40 SIMULTANEOUS SESSIONS & LUNCH

### AFTERNOON SESSION Paetzold Lecture Theatre

*\*8 minute paper with 2 minute discussion*

13:55	376	Lalande, Annie	General Surgery	Standardizing peri-operative VTE prophylaxis in orthopedic trauma patients at VGH – is there room for improvement?
14:05	377	Dhatt, Saroop	Pediatric Surgery	Improving the Diagnostic Accuracy of Pediatric Appendicitis using a Multidisciplinary Pathway
14:15	378	Lalande, Annie	General Surgery	Reflecting on 5 years of Primary Trauma Care course experiences in Gondar, Ethiopia.
14:25	381	Lalande, Annie	General Surgery	Stewardship of laboratory investigations and rational resource utilization in acute care surgery.
14:35	384	Lie, Jessica Jin	General Surgery	Emergency Use of Group A Plasma in Trauma Patients at a Level 1 Trauma Center
14:45	386	Roller, Janine Michele	Plastic Surgery	A Clinical and Histological Analysis of Double Capsules and Adherence in Augmentation Mammoplasty with Textured Implants
14:55	387	Butt, Abdalla	Vascular Surgery	Evaluating the Role of Perioperative Medicine Consult on Clinical Outcomes in Vascular Surgery Patients
15:05	389	Mak, Nicole	General Surgery	Intraoperative Parathyroid Hormone Measurement During Parathyroidectomy For Treatment of Primary Hyperparathyroidism: When Should You End The Operation?
15:15	395	Rokui, Sorush	Otolaryngology	Adventures in Surgery: preliminary results and insights from interactive, case-based surgical education modules for medical students.
15:25	396	Fatehi, Mostafa	Neurosurgery	Low grade gliomas: to operate, or not to operate?
15:35	397	Guo, Ru	Neurosurgery	Next-Generation Sequencing and Functional Studies for Rare, Highly-Penetrant Mutations in Familial Intracranial Aneurysms
15:45	399	Salterio, Nicholas	Neurosurgery	Short- & Long-Term Gait and Cognitive Outcomes After Primary Endoscopic Third Ventriculostomy in Adult Obstructive Hydrocephalus

### 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

Paetzold Multipurpose Room, 12:30 – 1:45 pm

*\*2.5 minute paper with 0.5 minute discussion*

Submitting Author	Division	Abstract	Abstract Title
Urban, Ryan	Radiation Oncology	316	PET Scan Assessment of Response 12 weeks Post Radical Radiotherapy in Oropharynx Head and Neck Cancer: The Impact of p16 Status
Verly, Myriam Maude	General Surgery, Plastic Surgery	318	Topical Application of a Novel Powdered Scaffold for Rapid Treatment of Skin Injuries
Mordhorst , Alexa	Vascular Surgery	319	Vascular Access Complications Following Transcatheter Aortic Valve Implantation (TAVI)
Pripotnev, Stahs	Plastic Surgery	323	Destination Design msTRAM – For Greater Reconstructive Certainty
D'Souza, Karan	General Surgery	324	Evaluating Management and Outcomes of Blunt Cerebrovascular Injuries at a Canadian Level-1 Trauma Center: Are we meeting the grade?
Dandurand, Charlotte	Neurosurgery	325	Quality of life measured with SF36 and EQ5D5L in patients diagnosed with unruptured cerebral aneurysm: prospective cohort study
Mankowski, Peter	Plastic Surgery	326	Outcome assessment of facial orthopedics with taping for cleft lip deformities using 3D stereophotogrammetry.
Mankowski, Peter	Plastic Surgery	327	Reporting Outcome and Outcome Measures in Male-to-Female Transgender Chest Surgery: A Systematic Review
Landry, Evie C.	Otolaryngology	328	Systematic Review and Network Meta-analysis of Cognitive and/ or Behavioral Therapies (CBT) for Tinnitus
Allen, Laura Katheline	Otolaryngology	331	A systematic review of the Harmonic Scalpel in parotidectomy
Medikeri, Gaurav	Otolaryngology	332	Frontal Ostium Grade (FOG): A Novel CT Grading System for a Safe Endoscopic Approach to the Frontal Sinus
Dhillon, India	Otolaryngology	334	A Phase I Tolerance Evaluation of Topical Nitric Oxide Sinus Irrigation (NOSi) Dose Escalation in Individuals with Recalcitrant Chronic Rhinosinusitis (RCRS)
Adebola, Stephen O	Otolaryngology	335	Use of confocal microscopy and clinical data to understand Chronic Rhinosinusitis (CRS)
Zivkovic, Irena	Pediatric Surgery	336	Surgical Capacity and Trauma System Functionality in Rural Uganda
Choi, Sally Hye Ji	Vascular Surgery	337	Evaluation of aortic zone 2 landing accuracy during TEVAR following carotid-subclavian revascularization
Wong, Jordan	Radiation Oncology	338	Validation of Deep Learning-based Auto-Segmentation for Organs at Risk in Lung Stereotactic Body Radiotherapy Using Retrospective Radiotherapy Plans
Muathen, Sumaiya	Otolaryngology	339	Subcutaneous Nucala Injection: An adjunctive Treatment for Recalcitrant Allergic Fungal Rhinosinusitis
Li, Yunyuan	Plastic Surgery	341	De novo sweat gland-like structures generated at dorsal skin of Balb/C mice upon dermal injury
Adreak, Najah	Cardiac Surgery	343	Short- and long-term survival rate of mini-sternotomy vs full sternotomy in aortic valve replacement: The St. Paul's Hospital experience
Luc, Jessica G.Y.	Cardiac Surgery	344	Valvectomy Versus Replacement for the Surgical Treatment of Infective Tricuspid Valve Endocarditis: A Systematic Review and Meta-Analysis
Boroditsky, Matthew	Plastic Surgery	347	How good is the Mustarde Otoplasty?
Mousa-Doust, Dorsa	General Surgery	349	Excision of breast Fibroepithelial lesions: when is it still necessary?
Zhao, Kevin	Otolaryngology	352	Factors Associated with Failure of Botulinum Toxin Injection in Adductor Spasmodic Dysphonia
Ollek, Sita Oza	General Surgery	354	Location of the Primary Tumor within the Breast: A Unique Predictor for Local Recurrence After Skin Sparing Mastectomy with Immediate Reconstruction
Taqi, Kadhim Mustafa	General Surgery	356	Trends for acute surgical consultations for oncology patients in British Columbia.
Angeli Ji	Plastic Surgery		Dr Google: Quality of Internet Resources on Ganglion Cysts

## Simultaneous Session B

Paetzold Lecture Theatre, 12:30 – 2:00 pm

*\*2.5 minute paper with 0.5 minute discussion*

Submitting Author	Division	Abstract	Abstract Title
Kapur, Hannah	General Surgery	358	Calculating quality indicators for mastectomy at Mount Saint Joseph Hospital
Sagorin, Zach	General Surgery	359	Quarter Century Evaluation of General Surgery Residency at the University of British Columbia
Deane, Emily Catherine	Otolaryngology	361	Voice Outcomes following Secondary Tracheoesophageal Puncture in Gastric Pull-up Reconstruction following Total Laryngopharyngectomy
Mocanu, Victor	Otolaryngology	365	Pilot Study for Development of a Descriptive and Clinically Relevant Endoscopic Sinus Scoring System
Samson, Laura	Otolaryngology	366	Vitamin D Supplementation and Reduction of Severity and Frequency of Epistaxis in Hereditary Hemorrhagic Telangiectasia
Sit, Daegan	Radiation Oncology	367	Treatment and Outcomes in pT4 Well-Differentiated Thyroid Carcinoma
Amanian, Ameen	Otolaryngology	368	Bone Mineral Density in Recalcitrant Chronic Rhinosinusitis Patients on Long-Term Intranasal Budesonide via Mucosal Atomization Device: A Cross-Sectional Study
Wijesinghe, Printhha	Otolaryngology	369	Role of oxidative stress-related miRNAs in idiopathic sudden sensorineural hearing loss (SSNHL) etiopathogenesis.
Al Muqaimi, Nawaf	Plastic Surgery	370	Hospital Length of Stay after Cleft Palate Surgery: An Analysis of 200 Consecutive Cases.
Fatehi, Mostafa	Neurosurgery	371	Early and Delayed Functional Outcomes after the Treatment of Posterior Inferior Cerebellar Aneurysms
Liu, Alice	Otolaryngology	374	The effectiveness of motivational interviewing on hearing aid use
Roshan, Aishwarya	Pediatric Surgery	375	Back (Door) to the Future: Dorsal Lumbotomy for Pediatric Upper Pole Hemi-Nephrectomy
Talbot, Martha L	General Surgery	379	Population-based treatment, regional recurrence patterns and survival in Merkel cell carcinoma: a 15-year review
Knight, Paige	Plastic Surgery	380	Pre-operative tranexamic acid reduces peri-operative blood loss: A meta-analysis
Wiseman, Sam	General Surgery	382	Limited clinical utility of intraoperative frozen section during parathyroidectomy for treatment of primary hyperparathyroidism
Brar, Shanjot	General Surgery	383	Discharge VTE Prophylaxis Prescribing Patterns of VGH Trauma and Orthopedic Surgeons Following Orthopedic Trauma Surgery at Vancouver General Hospital
Fouladirad, Saman	Neurosurgery	385	Challenges Associated with Transitioning from Pediatric to Adult-Care for Youths with Hydrocephalus
Mak, Nicole	General Surgery-Otolaryngology	388	Relationship Between Thyroid Surgical Oncological Quality Indicators
Zhang, Zach	Plastic Surgery	391	Perioperative predictors of digital replantation success rate - A review of institutional experience
Webb, Mitchell Allan	General Surgery	392	Damage Control in Liver Transplantation: a strategy in managing hemorrhage
Oh, Justin	Radiation Oncology	393	Association between Nutritional Risk Index and Outcomes for Head and Neck Cancer patients receiving Concurrent Chemo-Radiotherapy
Lim, Jonathan Zhu-En	Radiation Oncology	394	Late effects assessment in survivors of pediatric brain tumors and rhabdomyosarcoma
Webb, Mitchell Allan	General Surgery	398	Caval Reconstruction in Orthotopic Liver Transplantation: is there a superior technique?
Steinbok, Paul	Neurosurgery	400	Upper Extremity Performance Changes in Children with Spastic Cerebral Palsy following Lumbo-sacral Selective Dorsal Rhizotomy
Forbes, Diana	Plastic Surgery	401	Practice pattern among Canadian plastic surgeons on the use of hyaluronidase for treating complications related to HA fillers.
Lustig, Daniel Ben	General Surgery	348	Preoperative Calcium and Parathyroid Hormone Levels Affect Dual Energy Computed Tomography (DECT) and Conventional Preoperative Localization Studies in Patients with Primary Hyperparathyroidism

## 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.

## Chung Keynote Speaker 2019



**Dr. Teodor Grantcharov**

*Professor of Surgery, University of Toronto*

Dr. Teodor Grantcharov completed his surgical training at the University of Copenhagen, and a doctoral degree in Medical Sciences at the University of Aarhus in Denmark. He holds the Keenan Chair in Surgery at St. Michael's Hospital in Toronto & Canada Research Chair in Simulation and Surgical Safety.

Dr. Grantcharov's clinical interest is the area of minimally invasive surgery, with a focus on foregut disease including cancer and bariatric surgery. Dr. Grantcharov's area of academic interest is in the field of surgical innovation, surgical education and patient safety. He has become internationally recognized as a leader in this area with his work on curriculum design, assessment of competence and impact of surgical performance on clinical outcomes. Dr. Grantcharov developed the surgical black box concept, which aims to transform the safety culture in medicine and introduce modern safety management systems in the high-risk operating room environment.

Dr. Grantcharov has more than 170 peer-reviewed publications and more than 180 invited presentations in Europe, South- and North America. He sits on the Board of Governors of the American College of Surgeons (ACS) and on numerous committees with Surgical Professional Societies in North America and Europe. He sits on the Editorial Boards of the British Journal of Surgery and Surgical Endoscopy.

## Abstracts

**316 Dr. Ryan Urban** Radiation Oncology

**Title:** PET Scan Assessment of Response 12 weeks Post Radical Radiotherapy in Oropharynx Head and Neck Cancer: The Impact of p16 Status

*Ryan Urban MD<sup>1</sup>, Tassia Godoy MD<sup>2</sup>, Robert Olson MD<sup>3</sup>, Jonn Wu MD<sup>1</sup>, Eric Berthelet MD<sup>1</sup>, Eric Tran MD<sup>1</sup>, Kimberly DeVries MSc<sup>4</sup>, Don Wilson MD<sup>3</sup>, Sarah Hamilton MD<sup>1</sup>*

<sup>1</sup>Department of Radiation Oncology, BC Cancer Vancouver Centre, Vancouver, British Columbia, Canada

<sup>2</sup>Department of Functional Imaging, BC Cancer Vancouver Centre, Vancouver, British Columbia, Canada

<sup>3</sup>Department of Radiation Oncology, BC Cancer Centre for the North, Prince George, British Columbia, Canada

<sup>4</sup>Department of Population Oncology, BC Cancer Vancouver Centre, Vancouver, British Columbia, Canada

**Background:** The epidemiology of oropharynx cancer is evolving with the increasing prevalence of human papillomavirus (HPV) related disease characterized by p16 positivity on immunohistochemistry. Metabolic response to definitive radiotherapy in oropharynx cancer is assessed by positron emission tomography (PET) scans completed 12 weeks post radiotherapy. Stratification of the predictive value of post-radiotherapy PET scans based on p16 status has yet to be investigated in a large cohort.

**Objective:** To evaluate the predictive value of PET scans for detection of residual disease after radical radiotherapy for patients with squamous cell carcinoma (SCC) of the oropharynx, comparing p16 positive (+) versus p16 negative (-) disease. Given the excellent outcomes in p16+ oropharynx cancer, we hypothesized that the risk of a false positive post-radiotherapy PET scan was higher in p16+ versus p16- disease.

**Methods:** A retrospective analysis of patients with SCC of the oropharynx at our institution treated with radical radiotherapy between 2012 to 2016 was performed. The primary and lymph node metabolic responses were evaluated independently on the post-treatment PET. The reference standard was pathology when available, subsequent post-treatment PET results or clinical follow-up.

**Results:** Median follow-up time was 32 (30-34) months. 556 patients had p16+ disease and 92 had p16- disease. The median time of post-treatment PET was 96 (45-744) days after radiotherapy completion: 68% had complete metabolic response (CMR), 10% residual primary disease, 11% residual regional lymph node disease, 5% residual primary and regional disease, and 6% distant metastatic disease. The local positive predictive value (PPV) was 26% for p16+ versus 54% for p16- ( $p=0.01$ ) and the regional PPV was 31% for p16+ versus 58% for p16- ( $p=0.01$ ). The local negative predictive value (NPV) was 100% regardless of p16 status and the regional NPV was 100% for p16+ versus 99% for p16- ( $p=0.33$ ). For p16+ cases, regional specificity was 76.2% versus 91.1% ( $p=0.0003$ ), local PPV was 0 versus 30% ( $p=0.06$ ) and the regional PPV was 12% versus 35% ( $p=0.06$ ) for PET scans performed at  $\leq 12$  weeks versus  $>12$  weeks. Five-year overall survival for those with CMR was 87% versus 51% without CMR ( $p<0.001$ ).

**Conclusions:** Metabolic response on post-treatment PET has excellent NPV regardless of p16 status. The PPV is significantly lower in those with p16+ versus p16- disease, with a significantly reduced regional specificity and a trend towards inferior predictive value if performed  $\leq 12$  weeks. CMR predicts for a significantly improved overall survival.

**317 Dr. Michael Craig** Neurosurgery

**Title:** Performance of the Subaxial Cervical Spine Injury Classification tool: A retrospective review across centres in Australia, Canada, and New Zealand

*Richard Cowley<sup>1</sup>, Tom Inglis<sup>1,2</sup>, Michael Craig<sup>3</sup>, Paul Phillips<sup>4</sup>, Josh Chamberlain<sup>5</sup>, Alpesh Patel<sup>5</sup>, Rowan Schouten<sup>1</sup>, Marcel Dvorak<sup>2</sup>*

<sup>1</sup>Christchurch Hospital, Christchurch, NZ

<sup>2</sup>Division of Spine Surgery, University of British Columbia, Vancouver, Canada

<sup>3</sup>Division of Neurosurgery, University of British Columbia, Vancouver, Canada

<sup>4</sup>Royal Adelaide Hospital, Adelaide, AUS

<sup>5</sup>Middlemore Hospital, Auckland, NZ

**Background:** Cervical spine injuries, especially facet dislocations, often warrant surgical treatment to restore mechanical stability. The optimal method of surgical stabilization is contentious. The Subaxial Injury Classification (SLIC) tool is meant to offer guidance on this. However, it remains unclear whether adherence to the SLIC recommendations correlates with achieving mechanical stability.

**Objectives:** We sought to estimate adherence rates to the SLIC recommendations for cervical facet dislocations, and whether adherence affected the rate of surgical construct failure. We also sought to identify risk factors for surgical construct failure.

**Methods:** We retrospectively reviewed operative cases of cervical facet dislocation at four centres. Patients with ankylosing conditions, and pathological or extension-type fractures were excluded. Adherence to the SLIC algorithm was compared to mechanical failure of the surgical construct at one year, based on radiological criteria or need for reoperation, using Student's t-test.

**Results:** 469 patients achieved inclusion criteria. Of these, 67% of cases were adherent with the SLIC recommendations. Overall construct failure rates at 1 year were not different (4% in adherent group vs 7% in non-adherent group,  $p=0.3$ ). The degree of anterolisthesis was correlated with construct failure ( $p=0.03$ ). No significant differences in failure rate were detected between centres.

**Conclusions:** Cervical facet dislocations had a similar rate of construct failure regardless of whether they adhered to the SLIC algorithm. The SLIC algorithm should be considered more broadly in terms of availability of local resources, and in context of the other surgical goals at hand, such as preservation of neurological status.

**318 Dr. Myriam Maude Verly** General Surgery, Plastic Surgery

**Title:** Topical Application of a Novel Powdered Scaffold for Rapid Treatment of Skin Injuries

*Myriam Maude Verly, Reza Jalili, Emily Mason, Breshell Russ, and Aziz Ghahary*

*Burn and Wound Healing Research Lab, Division of Plastic Surgery, Department of Surgery, University of British Columbia*

**Introduction:** Wound healing is a complex and dynamic process involving not only cell-cell interaction, but also cell-matrix signalling. In large skin injuries, lack of matrix deposition impedes timely healing process. The longer a wound remains open, the greater is the risk of infection, non-healing, and other complications. It is therefore crucial to find effective means to promote rapid closure of skin defects. Our group has previously developed a liquid in situ-forming nutritional scaffold, known as MeshFill (MF). MF has been proven to be very effective in accelerating the wound repair process, notably that of complex wounds. However, MF is limited in its application to deep and tunnelling wounds, and requires reconstitution with a solvent as well as maintenance at cold temperature until application. To address these limitations, our group has developed a powdered form of MF for rapid topical application on superficial skin injuries such as dehisced surgical wounds.

**Objectives:** Our goal was to investigate whether a powdered form of MF could be directly applied onto the wounds to accelerate healing. It was thought that the powdered MF would absorb the moisture within the wound environment and reconstitute into the gel form in situ.

**Methods:** We examined the efficacy of powder MF (PMF) compared to reconstituted gel MF (GMF) and to a standard dressing protocol. To do so, splinted full thickness wounds were generated on the back of mice and treated with either PMF or GMF or were bandaged with no treatment (NT). The healing process was monitored until wounds were fully closed. Clinical wound measurements and histological assessments were performed to compare different treatment regimens.

**Results:** Application of both PMF and GMF accelerated wound epithelialization at days 7 and 14, compared to NT, and had faster wound closure times. On average, the PMF treatments healed 17% faster than the NT control, and the GMF treatments healed 21% faster than the NT control. No significant difference between PMF and GMF was found for any outcomes. Additionally, our results suggest that epidermis formation was more effective in P and MF conditions compared to NT. **Conclusion:** These findings suggest that topical application of a powdered form of MeshFill is as effective as standard reconstituted MeshFill gel in accelerating the healing process of skin injuries. As such, topical application of PMF may be a very convenient and practical method for rapid treatment of large superficial wounds such as dehisced surgical wounds and filling gaps in meshed skin grafts.

**319 Dr. Alexa Mordhorst** Vascular Surgery**Title: Vascular Access Complications Following Transcatheter Aortic Valve Implantation (TAVI)**

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**Background:** Transcatheter aortic valve implantation (TAVI) procedures have revolutionized the treatment of aortic stenosis. However, due to large sheaths, improperly deployed closure devices, and the comorbidities and challenges innate to this population, vascular access complications can be devastating.

**Objective:** The objective of this study is to evaluate vascular access complications in one of the largest TAVI sites in North America.

**Methods:** This was a retrospective single centre review between January 2014 and December 2018 of vascular access complications necessitating operative intervention by vascular surgery. Patient demographics and pre-operative comorbidities were collected. Type of vascular access complication, types of repair, closure device used, and post-operative outcomes were analyzed.

**Results:** A total of 37 cases out of a total of 985 TAVI procedures were identified. TAVI was carried out in the operating suite (70%) or the catheterization lab (30%). Consults to vascular surgery were requested intraoperatively (60%), immediately post-operative (14%), later in the day of the TAVI (20%), and on post-operative day 1 (6%). The location of injury included common femoral artery (49%), superficial femoral artery (11%) and external iliac artery (41%), with some cases injuring multiple vessels. Closure devices were found in the subcutaneous tissue (26%), anterior wall (37%), posterior wall (11%), intraarterial (11%), closing the anterior to the posterior wall (16%), and in the inguinal ligament (5%). Injuries included tears (11%), dissections (38%), and vessel rupture (19%). The majority of repairs were done primarily (64%), with patch (28%) and bypass (8%) less frequently. Four patients died perioperatively (11%), two from hemorrhage, one from cardiac arrest, and one from progressive respiratory disease.

**Conclusion:** Access complications during TAVI procedures predispose complex patients to increased risk of morbidity and mortality. Careful patient selection, proper access techniques, and performing high risk patients in the operating suite with vascular surgery is fundamental in minimizing complications.

**320 Dr. Oliver Ayling** Neurosurgery**Title: The effect of peri-operative adverse events on long-term patient reported outcomes after lumbar spine surgery: A Canadian multi-centre prospective study**

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**Background and Purpose:** Peri-operative adverse events (AE) lead to patient disappointment, increased resource utilization and greater healthcare costs. There is a paucity of data on how adverse events affect long-term patient reported outcomes (PRO). The purpose of this study is to examine peri-operative adverse events and their long-term impact on PROs after lumbar spine surgery.

**Methods:** 3556 consecutive patients undergoing elective spine surgery for degenerative lumbar spine disorders enrolled in the Canadian Spine Outcomes and Research Network (CSORN) prospective database were analyzed. Adverse events (AEs) were classified using the validated Spine Adverse Events Severity system (SAVES), as minor (grade 1-2) or major (grades 3-6). Perioperative adverse events were analyzed for lumbar disc disease, degenerative spondylolisthesis, spinal stenosis, and lumbar degenerative deformity. We assessed the impact of AEs on dimensions of physical function: (Owestry Disability Index (ODI), SF-12 Physical (PCS)); pain (leg and back pain visual analog scale (VAS)); quality of life: (SF-12 Mental (MCS), Euroqol-5D (EQ5D)); and satisfaction at 3 and 12 months post-operatively.

**Results:** Adverse events occurred in 767 (21.6%) patients, 85 (2.4%) suffered major AEs, and 682 (19.2%) experienced minor AEs. Patients with major AEs had significantly worse post-operative disability scores (ODI) and did not reach minimum clinically important differences at 1 year (Baseline: no AE: 47.5±15.5, major: 48.2±14.8, vs. 1 year: no AE 25.5±19.5, major: 37.3±19.3, p<0.001). SF12 PCS were significantly lower after major AEs (Baseline: no AE 32.6±8.2, major: 30.4±7.9, vs. 1 year: no AE: 43.6±9.6, major: 37.7±8.5, p=0.002). Negligible differences between groups were found on measures of pain, and quality of life (EQ5D and SF12 MCS). Major adverse events were independently associated with worse disability scores on multivariable linear regression (p=0.011). At 1 year post-operatively patients that faced a major AE had significantly lower rates of satisfaction (no AE: 83.5%, major: 71.6%, minor: 82.8%, p<0.01).

**Conclusions:** Data from this prospective, multi-centre study demonstrate that major adverse events during hospital admission after elective lumbar spine surgery lead to significantly worse long-term functional outcomes and lower rates of patient satisfaction. This information highlights the need to implement strategies aimed at reducing in-hospital adverse events.

**322 Dr. Shugo Sasaki** General Surgery**Title: Engineering Human Stem Cell-Derived Pancreatic Beta Like Cells To Protect From Immune Attack**

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**Background:** Rates of type 1 diabetes have been on the rise globally. Islet transplantation has brought us tantalizingly close to a functional cure for type 1 diabetes, but is still limited by the supply of cadaveric organ donors, the need for lifelong systemic immune suppression, and graft failure in a significant proportion of transplant recipients due to both primary graft dysfunction and allo- and auto-immune rejection. Differentiation of beta cells from human embryonic stem cells (hESCs) provides a potentially limitless source of insulin-producing cells for transplantation. Previously, it was found that viral overexpression of CCL22, a chemokine that attracts regulatory T cells, in islets prevented onset of diabetes in mice and islet graft rejection.

**Objectives:** In this study, we generated CRISPR-Cas9-edited hESCs that can be differentiated to beta cells that express CCL22 in order to protect hESC-derived islet cell graft from immune attack.

**Methods:** We designed 4 strategies to enable hESC derived beta-cells to secrete CCL22 and engineered these cells using CRISPR-Cas9-stimulated homology directed repair.

**Results:** The expression of CCL22 gene is elevated in edited clones once they are differentiated to insulin-producing cells. 132 genes were analyzed by nCounter® Technology (NanoString Technologies) to confirm whether gene editing and CCL22 expression altered hESC-derived insulin-producing cell function, and it was revealed that differentiated clones maintain expression of key beta cell genes.

**Conclusions:** We engineered hESCs to protect the beta-cell graft from immune attack. In future studies, we will test if the CCL22 introduced by genome-editing is functional and if CCL22 expression improves stem cell derived insulin-producing cell engraftment following transplantation.

**323 Dr. Stahs Pripotnev** Plastic Surgery**Title: Destination Design msTRAM - For Greater Reconstructive Certainty**

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**Purpose:** Women have a 1 in 8 lifetime risk of developing breast cancer and currently, 1 in 5 women undergo breast reconstruction after mastectomy. Free tissue transfer from the abdomen using either a TRAM or DIEP flap is considered the gold standard autologous reconstruction. Performing delayed reconstruction to a unilateral breast initially treated with a simple or skin sparing mastectomy while simultaneously performing a balancing reduction/mastopexy on the contralateral side can be the most difficult situation to achieve symmetry. We present here a novel approach to free TRAM based unilateral delayed breast reconstruction using reverse planning and subunit principles with simultaneous balancing reduction mastopexy and

immediate nipple reconstruction. This new technique offers consistent results in a single stage with significantly reduced revision rates.

**Methods:** A retrospective chart review and a BREAST-Q questionnaire of a single surgeon's practice was performed to compare revision rates and patient satisfaction following Destination Design msTRAM reconstruction compared to a historical cohort of patients that received traditional free TRAM reconstruction.

**Results:** The chart review identified 39 patients treated with the traditional technique from 1997-2004 and 88 patients treated with the novel technique from 2004-2017. Chart review results showed that traditional technique patients had a breast revision rate of 64.1% and a nipple revision rate of 42.3% after secondary nipple reconstruction. Destination Design patients had a breast revision rate of 44.3% ( $p=0.0403$ ) and a nipple revision rate of 37.9% ( $p=0.687$ ) after primary nipple reconstruction. Rates of minor and major TRAM necrosis between both methods were statistically non-significant (minor 10.2% and major 5.1% in the traditional group and minor 13.5% and major 5.6% in the Destination Design group). The BREAST-Q questionnaire was sent to 12 traditional technique patients with 11 responses (92%), and 35 Destination Design patients with 23 responses (66%). Survey results showed that traditional technique and Destination Design patients had an overall breast satisfaction rate of 67.5% and 63.9% respectively.

**Conclusions:** The novel described Destination Design msTRAM unilateral delayed breast reconstruction technique leads to a statistically significant reduction in breast flap revisions and allows for equally accurate immediate nipple reconstruction compared to traditional methods with no additional complications. Overall patient satisfaction with the final result is comparable with both techniques.

**324 Dr. Karan D'Souza** General Surgery

**Title: Evaluating Management and Outcomes of Blunt Cerebrovascular Injuries at a Canadian Level-1 Trauma Center: Are we meeting the grade?**

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**Introduction:** Traumatic blunt injuries to the carotid or vertebral artery, collectively termed blunt cerebrovascular injury (BCVI), are uncommon but potentially devastating events. The incidence of blunt cerebrovascular injury in patients sustaining blunt trauma is estimated to be 3–6%. Untreated BCVI is associated with high mortality rates (23-28 percent), with a significant portion of survivors suffering permanent severe neurologic deficits. Despite improvements in characterizing BCVIs, optimal treatment modalities and long-term progression remain unclear.

**Objective:** The purpose of the study is to investigate incidence of BCVI, and understand the current in-hospital and post-discharge management of these patients in the province of British Columbia.

**Methods:** The Trauma Services BC Registry was retrospectively reviewed to identify all trauma patients greater than 18 years old, who suffered any grade of BCVIs from January 2013 to December 2018. The registry, hospital databases and patient charts were used to summarize patient demographics, fulfillment of screening guidelines, choice and initiation of appropriate therapy, adherence to treatment recommendations after discharge, and post-discharge follow-up.

**Results:** From 2013 to 2018, a total of 196 patients were identified and included in the study. The incidence of BCVI was 3%. Patients were predominately male (68%), with a mean age of  $49 \pm 20$  years (range 18-97). Mechanism of injury was primarily motor vehicle collisions ( $n = 132$ ). The majority of BCVIs were BIFFL Grade 1-2 ( $n = 179$ ). The expanded Denver Criteria was the most sensitive screening tool identifying 88% of BCVIs. Majority of patients were treated with ASA 81mg (71.1%), while larger doses of ASA, heparin, and other anti-thrombotic were used as well. Repeat scans in 7 days to reassess the injury and guide duration of therapy were only completed in 39% of patients. Twenty-five patients (16%) developed strokes. Only 59.2% of patients had appropriate follow-up plans in regards to medication regimens, follow-up imaging and appointment timing listed in their discharge summaries.

**Conclusions:** BCVI, although rare, carries a high mortality and may be functionally debilitating. Therefore, prompt diagnosis and effective therapy is critical in the management of BCVI. The incidence of BCVI in B.C. is approximately 3 percent in line with what others have reported in literature. In collaboration with the stroke prevention clinic, we plan to implement a BCVI protocol to better identify these patients and streamline their care. We hope to study this cohort prospectively and inform future guidelines for BCVI in trauma.

**325 Dr. Charlotte Dandurand** Neurosurgery

**Title: Quality of life measured with SF36 and EQ5D5L in patients diagnosed with unruptured cerebral aneurysm: prospective cohort study**

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**Background:** Living with the diagnosis of an unruptured cerebral aneurysm can understandably cause anxiety for a patient. The goal of preventive treatment of an aneurysm is to increase the number of years with good quality of life (QoL).

**Objective:** This study aimed at measuring the effect of unruptured intracranial aneurysm treatment on QoL scores measured by SF36 and EQ5D5L.

**Methods:** We prospectively collected SF-36 and EQ-5D-5L in patients with unruptured intracranial aneurysm at three time-points over 1 year in 2 groups: observation and treatment (microsurgical and endovascular). Multivariable linear regression and propensity score was used to examine treatment group differences in the mean change scores from baseline to 1 year when adjusted for covariates

**Results:** 92 patients were included in the observation group and 68 patients were included in the surgical group for a total of 160 patients. The treatment group had lower SF-36 total scores at baseline ( $p=0.001$ ) and at 1 year ( $p=0.02$ ). EQ visual analogue scale did not differ between groups at all timepoints. With multivariate linear regression models, the effect of treatment on mean change score from baseline to 1 year was not statistically significant ( $p=0.4$ ). When performing propensity score matching, the effect of treatment on mean change scores from baseline to 1 year did not reach statistical significance ( $p=0.07$ ).

**Conclusion:** In this large prospective study, preventive aneurysm treatment was not associated with a significant change in QoL score compared to observation measured by SF36 and EQ5D5L. Further studies are needed to explore the lower QoL scores in patients undergoing treatment and its impact on management decision making.

**326 Dr. Peter Mankowski** Plastic Surgery

**Title: Outcome assessment of facial orthopedics with taping for cleft lip deformities using 3D stereophotogrammetry.**

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**Background:** Prior to surgical correction of a cleft lip deformity, facial taping is a type of presurgical orthopedics (PSO) that is used to improve soft tissue alignment and facilitate surgical repair. Dynacleft and 3MTM taping are two commercially available taping systems that can be utilized with or without nonalveolar molding. Determining how these tapes differ in their ability to manipulate soft tissue is useful in optimizing the care of cleft lip and/or palate patients.

**Objective:** The purpose of this study was to evaluate two cleft lip taping devices, 3M and Dynacleft, for their ability to impact nasolabial shape and symmetry during the treatment of the cleft lip deformity.

**Methods:** A retrospective cohort study of 70 CLP patients was conducted including patients that have received either Dynacleft or 3M facial taping as a component of their PSO treatments. 3D stereophotogrammetry images were obtained at three time-points: prior to treatment, after receiving taping

and after surgical repair. 3D images were annotated with 31 landmarks on the nasal and upper lip region using 3DMD Vultus software (Atlanta, GA). The landmarks were then used in conventional morphometric analysis with previously validated facial measurements (linear distances, ratios and angles) to describe and compare the two cohorts at each stage. Geometric morphometrics using Procrustes ANOVA analysis was also conducted to compare the nasolabial asymmetry between the two taping groups.

**Results:** Both taping devices demonstrated progressive improvement in multiple facial metrics after taping and after surgery. Although variability in the degree of improvement was noted in the evaluated facial metrics after PSO between the two taping groups, no differences were found between these metrics after surgery. ANOVA comparison of the nasolabial region after Procrustes analysis also found no significant difference in facial shape between the two taping cohorts after surgical cleft lip repair (p-value = 0.80). However, nasolabial shape after PSO (p-value = 0.02) and after surgery (p-value = 0.02) was found to differ depending if patients received formal PNAM treatment with their taping or taping alone.

**Conclusions:** PSO with facial taping reduces the severity of facial deformity prior to surgical correction across multiple facial measurements. Both 3M and Dynacleft taping devices result in similar facial alignment post operatively suggesting either can be successfully utilized. Given the significant cost differences between the two systems, our data may provide support for greater uptake of 3M taping for PSO.

**327 Dr. Peter Mankowski Plastic Surgery**

**Title: Reporting Outcome and Outcome Measures in Male-to-Female Transgender Chest Surgery: A Systematic Review**

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**Background:** The process of breast construction as a component of gender affirmation incorporates surgical procedures such as breast augmentation and fat grafting to address the specific anatomical characteristics of a previously male chest. Currently, consistency in reporting outcomes associated with the individual surgical interventions involved in this process is needed to improve clinical decision making.

**Objective:** The purpose of this study was to complete a systematic review of gender affirming male to female chest surgeries to identify relevant outcomes that can serve as future appraisal metrics of these procedures.

**Methods:** A systematic literature review was conducted utilizing three electronic publication databases (Pubmed, Ovid MEDLINE, Embase) to identify studies detailing male to female transgender breast construction procedures. Articles were reviewed for their case number, patient demographics, surgical technique, follow up, reported complications and additional metrics of post-operative appraisal including psychosocial wellbeing.

**Results:** A total of 7 studies met our inclusion criteria representing 439 patients who received breast construction procedures. Inframammary placed implant construction was the most commonly documented procedure represented in the literature. Unplanned revisions (8.4%) was the most frequently reported undesirable outcome and was linked to a reduction in patient wellbeing. Various metrics for psychosocial evaluation were utilized to quantify the impact of chest feminization and supported its ability to improve wellbeing and self-esteem post-surgery.

**Conclusions:** The results of this review summarize the procedures of breast construction being utilized and profiles their expected post-operative outcomes. Consistently in psychosocial wellbeing of transgender patients who solely received chest procedures has yet to be fully demonstrated.

**328 Dr. Evie Landry Otolaryngology**

**Title: Systematic Review and Network Meta-analysis of Cognitive and/ or Behavioral Therapies (CBT) for Tinnitus**

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**Objective:** To evaluate the efficacy of cognitive and/or behavioral therapies in improving health-related quality of life (HRQOL), depression and anxiety associated with tinnitus.

**Data Sources:** EMBASE, MEDLINE, Pubmed, PsycINFO and the Cochrane Registry were used to identify english studies from database inception until February 2018.

**Study Selection:** Randomized controlled trials (RCTs) comparing cognitive and/or behavioral therapies to one another or to waitlist controls for the treatment of tinnitus were included.

**Data extraction:** Quality and risk were assessed using GRADE and Cochrane's Risk of Bias tool respectively.

**Data synthesis:** Pairwise meta-analysis (12 RCTs:1,144 patients) compared psychological interventions to waitlist controls. Outcomes were measured using standardized mean differences (SMDs) and 95% confidence intervals (CI). I2 and subgroup analyses were used to assess heterogeneity. Network meta-analysis (NMA) (19 RCTs:1,543 patients) compared psychological therapies head-to-head. Treatment effects were presented by network diagrams, interval plots and ranking diagrams indicating SMDs with 95% CI. Direct and indirect results were further assessed by inconsistency plots.

**Conclusions:** Results are consistent with previously published guidelines indicating that CBT is an effective therapy for tinnitus. While guided self-administered forms of CBT had larger effect sizes (SMD:3.44; 95% CI:-.022,7.09; I2:99%) on tinnitus HRQOL, only face-to-face CBT was shown to make statistically significant improvements (SMD:0.75; 95%CI:0.53,0.97; I2:0%). Guided self-administered CBT had the highest likelihood of being ranked first in improving tinnitus HRQOL (75%), depression (83%) and anxiety (87%), though statistically insignificant. This NMA is the first of its kind in this therapeutic area and provides new insights on the effects of different forms of cognitive and/or behavioral therapies for tinnitus.

**329 Dr. Evie Landry Otolaryngology**

**Title: Early Health Economic Modelling of Novel Therapies in Hearing Loss: Accelerating Access and Implementation**

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**Background:** A key challenge facing health systems today is to identify and avoid unnecessary health innovations and accelerate access those that are necessary. This process can be guided by applying health economic modelling at the early stages of development of new therapeutics to direct product development, market access, and pricing. This is very relevant and timely to the field of age-related sensorineural hearing loss (ARHL), where biotechnology, pharmaceutical and device companies have identified an unmet market need and have dedicated sizeable investments in the development of novel (drugs, genes, cells) hearing therapeutics.

To assess the potential added value of these novel hearing therapeutics, we developed an early health economic model comparing novel regenerative hearing therapeutics with the current standard of care for people with ARHL.

**Methods:** A decision analytic model was developed to assess the costs and effects of using novel regenerative hearing therapeutics in patients over the age of 50 with ARHL. This was compared to the current standard of care, including hearing aids and cochlear implants. Input data was derived from systematic literature searches and expert opinion. The study adopted a healthcare perspective of the UK National Health Service (NHS). Four different but related analyses were conducted: 1) headroom analysis to explore the maximum potential value; 2) threshold analysis to search for the minimum effectiveness needed for the innovation to be cost-effective; 3) formal cost-effectiveness to assess the cost per quality adjusted life-year (QALY) gained; and 4) sensitivity analyses, including both deterministic and probabilistic, and scenario analyses to evaluate relevant uncertainty.

**Results:** The decision model showed that novel therapeutics for ARHL have potential value both in terms of improved patient outcomes, as well as cost-effectiveness. The base case analysis revealed an ICER of £11,690/QALY (95% CI: £8,810/QALY-£19,058/QALY) for regenerative hearing therapeutics compared with the current standard of care. Results of the threshold analysis revealed that novel hearing therapeutics had to be 75% effective or

greater at restoring hearing to the normal range (pure tone average of  $\square$  25dB) to remain cost-effective. Finally, the most important uncertainties identified were the estimates of efficacy, uptake and cost of the novel hearing therapeutics used in the model.

**Conclusions:** Early health economic modelling shows that with novel regenerative hearing therapeutics for ARHL, QALYs can be gained in a cost-effective fashion under current willingness to pay thresholds.

**330 Dr. Aaron Van Slyke** Plastic Surgery

**Title: Something Stinks! Finding Ways to Manage Noxious Odours in the Operating Room: A Randomized Controlled Trial**

Authors: Aaron C. Van Slyke \*2, Lindsay Bjornson \*1, Marija Bucevska3,4, Rebecca Courtemanche3,4, Jeffrey Bone5, Aaron Knox6, Cynthia Verchere3,4, James C. Boyle2,7

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**Background:** The operating room can be saturated with noxious smells. Anecdotally, medical staff apply products to surgical masks to lessen the impact of these smells.

**Objective:** This study aimed to identify an odour-masking product that is pleasant, inexpensive, and accessible.

**Methods:** This is a randomized, single-blinded crossover study. Participants were exposed to an experimental odour in lieu of a noxious surgical odour.

**Inclusion criterion:** age 19-30 years. **Exclusion criteria:** active allergies, upper respiratory tract infection, alteration to sense of smell, or failure of olfactory screen. Eighty-one individuals were recruited; one was excluded following a failed olfactory function test. After smelling the experimental odour without barriers, participants were re-exposed to the odour using five surgical masks in randomized order. Each mask was lined with a test product (cherry lip balm, tincture of benzoin, Mastisol®, mint toothpaste, and control (plain mask)). Participants rated the effectiveness of products at masking the experimental odour from 0-100 (0 = completely ineffective, 100 = completely effective). Participants also rated the pleasantness of the products, recorded if the products made them feel unwell, and identified their preferred product overall.

**Results:** Eighty participants were included in the study (33 male, 47 female), averaging 24.2 years of age. Cherry lip balm was the most preferred odour-masking product (29 participants), followed by mint toothpaste (22), Mastisol® (14), tincture of benzoin (10), and control (5). Mean odour-masking effectiveness for cherry lip balm was 66.5 ( $\pm$ 24.6), tincture of benzoin: 62.6 ( $\pm$ 25.0), Mastisol®: 61.3 ( $\pm$ 23.9), mint toothpaste: 57.5 ( $\pm$ 27.4), and control: 21.9 ( $\pm$ 21.8). All products performed better than the control (p-value: <0.001), but there was no significant difference in performance between products.

**Conclusions:** All tested products demonstrated odour-masking abilities. We recommend that healthcare professionals find the odour-masking product that works best for them, starting with cherry lip balm.

**331 Dr. Laura Allen** Otolaryngology

**Title: A systematic review of the Harmonic Scalpel in parotidectomy**

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**Introduction:** The Harmonic Scalpel® (HS) is commonly used in head and neck surgery. Parotidectomy is a complex and intricate surgery that requires careful dissection of the facial nerve. Our objective was to compare surgical outcomes in parotidectomy using the HS with traditional scalpel and cautery (SC). We performed a systematic review with meta-analysis of 7 studies that compared the HS to SC in parotidectomy.

**Methods:** A systematic review of the literature was performed with subsequent meta-analysis of 7 studies that compared the use of HS to SC in parotidectomy. Outcome measures included: temporary facial paresis, operating time, intraoperative blood loss, post-operative drain output, and length of hospital stay.

**Results:** A total of 7 studies representing 675 patients were identified: 372 were treated with HS and 303 with SC. Statistically significant outcomes favoring the use of the HS over SC included operating time, intra-operative blood loss, and post-operative drain output. Outcome measures that did not favor either treatment included facial nerve paresis and length of hospital stay.

**Conclusions:** Overall, the HS was found to reduce operating time, intra-operative blood loss, and post-operative drain output.

**Key Words:** Harmonic scalpel, salivary gland, facial nerve, parotidectomy.

**332 Dr. Gaurav Medikeri** Otolaryngology

**Title: Frontal Ostium Grade (FOG): A Novel CT Grading System for a Safe Endoscopic Approach to the Frontal Sinus**

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**Introduction:** The location and size of the internal frontal sinus ostium is critical in endoscopic sinus surgery. The frontal ostium, defined as the narrowest point between the anterior buttress and upturn of the skull base, can be variable in its location and size based on the position of these 2 anatomical points. This variability is evident on a sagittal CT scan cut placed at the most medial aspect of the lacrimal bone just inferior to the frontal ostium. We propose a novel CT grading system (FOG) that is easy and specific to the anatomical position of the frontal sinus ostium on the sagittal plane.

**Objective:** The objective of this study is to create a novel frontal ostium grading (FOG) system based on pre-operative Computerized Tomography (CT) imaging studies. The FOG system will allow for another layer of pre-surgical planning and preparation for frontal sinus surgery.

**Method:** FOG is based on marking two vertical lines parallel to each other on the defined sagittal CT cut. The first line (Reference/R-line) is standardised and drawn at the level of the anterior buttress. The Second line (S-line) is variable and drawn at the point of upturn of the anterior skull base. If the R-line is anterior to the S-line, we term this frontal ostium grade as positive. If the R and S-lines overlap, we classify it as FOG Neutral (0-grade). If the R-line is posterior to the S-line, we classify it as a FOG -ve. A FOG +ve grade is predicted to be a surgically easier dissection than a FOG neutral, which is predicted to be an easier dissection than a FOG -ve grade.

**Results:** Using this grading method, 90 frontal sinuses underwent primary endoscopic frontal sinusotomies. Of these 48 were FOG +ve, 21 were FOG neutral and 21 were FOG -ve. A statistically significant difference in mean surgical time was found between the FOG +ve (9.96 min.), FOG neutral (11.42 min.) and FOG -ve (16.05 min.) groups (p<0.05).

**Conclusion:** This novel FOG system indicates applicability in predicting difficulty during frontal ostium dissection.

**333 Dr. Navid Karimi** Plastic Surgery

**Title: In Vivo Application of The First Generation of MeshFill-Plus; A Liquid Wound Healing Scaffold with Inherent Antimicrobial Properties**

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**Background:** Wound repair and healing is often implicated by pathological microorganisms and biofilms. Treatment of chronic wounds, such as burn, pressure ulcers, and diabetic wounds, is challenging. The presence of cavities and void spaces in these wounds makes them difficult to treat with conventional skin grafts, sheets of skin substitutes, or scaffolds. Our group has recently developed MeshFill (MF): a liquid bioengineered collagen-based scaffold, which exhibits a higher tensile strength, faster fibril formation, and less contraction than other formulations and gels. In a clinical pilot study, we realized that recurrent wound infection is a limitation for application of MF in complex wounds. Indeed, the optimal management of complex wounds must also include a therapeutic approach that conveys antimicrobial properties. Silver nanoparticle (AgNP) have shown to serve as antimicrobial agents that can effectively control (prevent) colonization of bacteria and infections in wounds. Silver containing dressings are widely used for controlling infections, however, conventional dressings are not appropriate for deep wounds and also reveal varying concentrations of silver and degrees of tissue injury after prolonged use. Our group has developed the idea that the incorporation of silver nanoparticles (AgNPs) into MF and its application to wounds would prevent/treat infections which in turn can decrease healing time. In our previous set of in vitro experiments, by incorporating AgNPs into MF, hence introducing antimicrobial properties to MF, we developed and optimized a new generation of MF known as MeshFill-Plus. This was done via testing different forms and concentrations of AgNPs to achieve optimal antimicrobial activity while maintaining optimal biocompatibility.

**Objective:** The objective of this study was to test in vivo efficacy and safety of the first generation of MeshFill-Plus in an infected rat wound model.

**Methods:** Monodisperse spherical silver nanoparticles were synthesized in the lab using a kinetically controlled seeded-growth approach via the reduction of silver nitrate. MeshFill-Plus was then prepared by loading different concentrations of AgNPs into liquid matrix in a controlled manner. Rat infected closed wound model was generated by inserting a titanium implant into a small subcutaneous pocket in the dorsal skin in the presence of bacteria (either *Pseudomonas aeruginosa* or *Staphylococcus aureus*). The pockets were filled with either MeshFill alone or MeshFill-Plus before being closed with sutures. After 5 days, rats were euthanized, titanium implants were retrieved and analyzed for presence of bacterial biofilm on their surface. In another set of experiments, MeshFill-Plus was applied on mice with splinted full thickness open wounds to investigate the safety of MeshFill-Plus during the wound healing process.

**Results:** Preliminary results of this study showed that MeshFill-Plus with 600 PPM AgNP was very effective to clear wound infections induced by  $10^6$  *P. aeruginosa*. AgNPs were also effective on *S. aureus*. The project is ongoing to confirm these promising findings and to fine tune the composition of MeshFill-Plus. Mouse open Wound healing experiments showed that MeshFill-Plus is safe to use and AgNPs would not interfere with the healing process.

**Conclusion:** These results provide support for the application of MeshFill-Plus (MeshFill equipped with AgNPs) as a promising method to promote wound healing as well as preventing / treating wound infections.

**334 Dr. India Dhillon** Otolaryngology

**Title: A Phase I Tolerance Evaluation of Topical Nitric Oxide Sinus Irrigation (NOSi) Dose Escalation in Individuals with Recalcitrant Chronic Rhinosinusitis (RCRS)**

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**Background:** Recalcitrant chronic rhinosinusitis (RCRS) is a persistent inflammatory condition despite surgery and aggressive medical therapies. Nitric Oxide (NO) is an endogenously produced molecule that exhibits antimicrobial & anti-inflammatory properties.

**Objectives:** This prospective, pilot study aims to determine the tolerance and safety of escalating dose treatments of NO sinus irrigation (NOSi) in RCRS adults.

**Methods:** 5 adult subjects with RCRS irrigated their sinuses twice daily for 12 days with NOSi with dose escalation every 2 days. Safety monitoring on days 3, 5, 7, 9 and 11 included tolerability as reported by Visual Analogue Scale (VAS), adverse events (AE), methemoglobin (MetHb), O<sub>2</sub> saturation (SaO<sub>2</sub>) and ambient NO<sub>2</sub>. Changes to Modified Lund-Kennedy (MLK) endoscopic score, sinonasal mucosal culture, olfaction, mucociliary function, and quality of life as measured by Sino-Nasal Outcome Test (SNOT-22) were recorded at baseline and day 13.

**Results:** 4/5 subjects tolerated the highest dose of NOSi twice daily. No AE or changes to ambient NO<sub>2</sub>, MetHb, or SaO<sub>2</sub> outside of normal range were reported. 3/5 subjects exhibited improvements in total MLK score (baseline median=13, mean=9.25; day 13 median=10, mean=9.2). Reduced growth of bacterial & fungal organisms was reported in 3/5 subjects. SNOT-22 score improved in all subjects (baseline median=49, mean =49.4; day 13 median=26, mean=26.6). Increases in mucociliary clearance time within normal ranges were noted in 3/5 subjects. No significant changes to olfaction or mucosal tissue were reported.

**Conclusion:** Preliminary results suggest NOSi is a tolerable and safe sinus irrigation and could provide an efficacious treatment for RCRS.

**335 Dr. Stephen O Adebola** Otolaryngology

**Title: Use of confocal microscopy and clinical data to understand Chronic Rhinosinusitis (CRS)**

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**Background:** Chronic rhinosinusitis (CRS) is a common condition in North America.

**Objective:** To examine the bacterial and fungal load in recalcitrant CRS using confocal microscopy.

**Methods:** Sinus mucus aspirates and mucosal biopsy were obtained from patients with recalcitrant CRS. Bacteria and fungi load were examined using confocal microscopy. Comparative clinical microbiology studies and Modified Lund and Kennedy (MLK) scores were also conducted.

**Results:** Nineteen patients were recruited (mean age 51.6 years ± 9.8). Confocal imaging revealed bacterial and fungal organisms in 8/19 and 5/9 patient's aspirates respectively, within a few hours after fixing for a 24-hour period. Sinus culture yielded bacterial and fungal organisms for 7/19 and 5/19 patient's aspirates respectively after a culture period of 48 hours to 4 weeks. Main bacterial and fungal organisms identified were *Pseudomonas aeruginosa*, *Haemophilus influenzae* and *Aspergillus* species. MLK scores were significant in all cases.

**Conclusions:** The study methods described could potentially become a more prompt and accurate diagnostic tool, when compared to conventional microbiology methods, for determining bacterial and fungal load in CRS patients.

**336 Dr. Irena Zivkovic** Otolaryngology

**Title: Surgical Capacity and Trauma System Functionality in Rural Uganda**

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**Background:** Soroti Regional Referral Hospital (SRRH) in Soroti, Uganda is the partner institution of a long-standing collaboration with the BC Children's Hospital Department of Surgery, Office of Pediatric Surgical Evaluation and Innovation. Surgical capacity assessment in combination with an evaluation of the trauma system and services at SRRH are key factors to identifying priorities in care and partnership growth.

**Objectives:** To assess surgical capacity at SRRH and to evaluate the functionality of the Soroti trauma system and services, delineating a trauma-informed approach to capacity evaluation.

**Methods:** The Global Assessment in Pediatric Surgery (GAPS) checklist, a novel capacity assessment tool, was implemented at SRRH, administered via interview with a senior surgical faculty member. To evaluate the trauma system, a 26-item environmental scan was implemented via three structured interviews with a general surgeon, medical officer, and intern, in addition to a focus group with four interns. This project was conducted in July 2019.

**Results:** GAPS highlights strengths in surgical capacity at SRRH including ability to perform surgery 24-hr/day; consistent access to 2 operating rooms with sterile equipment, a blood bank, and oxygen; and availability of a surgical and anesthesia team with experience in pediatric care. Over 50% of health care practitioners involved in pediatric care attend 1-2 CME sessions annually. Areas for growth in capacity include improving timely access to surgical care (currently, <50% of patients reach definitive care in <2 hrs), formalized tracking of patient outcomes, access to pediatric-sized OR equipment, and the establishment of surgical and anesthesia residency training programs at SRRH. Key identifications of the environmental scan include the need for establishment of EMS in the community, and significant trainee interest (consensus amongst 2/2 interviewees at training levels of medical officer and intern, and 4/4 interns in focus group separate to structured interview) in the development of trauma care provider education during internship, such as ATLS and simulation training.

**Conclusions:** This study demonstrates insight into the current scope of surgical capacity and trauma services at SRRH. Potential partnership priorities include a focus on integrated pre-hospital care and educational resources for trainees at the institution.

### 337 Dr. Sally Hye Ji Choi Vascular Surgery

#### **Title: Evaluation of aortic zone 2 landing accuracy during TEVAR following carotid-subclavian revascularization**

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**Background:** The thoracic aorta distal to the left subclavian artery (LSA) is prone to dissection, aneurysmal degeneration and traumatic injury. Therefore, zone 2 landing during thoracic endovascular aortic repair (TEVAR) is commonly required, but can prove to be challenging due to the often tortuous and angulated anatomy of the region.

**Objectives:** Our objective was to determine the landing accuracy of zone 2-targeted endografts following carotid-subclavian revascularization (CSR), which is routinely performed at our institution.

**Methods:** Retrospective review of patients that underwent CSR for zone 2 endograft delivery at our institution between Jan 1st 2007-Oct 1st 2018 was done. Patient demographics, comorbidities, treatment indication, urgency, and intraoperative imaging modality were documented. Accuracy of zone 2 delivery was evaluated by two independent reviewers using postoperative CT scans.

**Results:** TEVAR with CSR was performed in 54 patients for treatment of aneurysms (32%), dissections (48%) or trauma (20%). Mean age was 62 ± 3 years, with 72% males. Urgent treatment (< 24 hrs) was provided in 52% of cases. Nine (17%) cases required immediate rescue procedures: five (9.3%) proximal cuffs due to type 1a endoleak and four (7.4%) immediate left common carotid artery (LCCA) revascularization with retrograde stent. Twenty four (44%) cases of antegrade LSA stump filling were noted on follow-up imaging. Average proximal endograft landing distance from the LCCA was 8 mm. Cases performed using higher resolution built-in fluoroscopy machine compared to mobile C-arm were associated with higher chance of intervention with proximal cuff extension (OR 7.7; 95%CI 1.1-53.7). The need for immediate rescue procedures was not associated with pathology, urgency of surgery or post-operative mortality.

**Conclusion:** Using current endografts and imaging modalities, zone 2-targeted TEVARs have suboptimal technical accuracy with high rates of immediate revision and inadequate seal of the LSA.

### 338 Dr. Jordan Wong Radiation Oncology

#### **Title: Validation of Deep Learning-based Auto-Segmentation for Organs at Risk in Lung Stereotactic Body Radiotherapy Using**

#### **Retrospective Radiotherapy Plans**

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From <sup>1</sup>BC Cancer - Radiation Oncology, <sup>2</sup>BC Cancer - Medical Physics, <sup>3</sup>Saskatchewan Cancer Agency - Radiation Oncology

**Background:** Accurate segmentation of organs at risk (OARs) is particularly important in stereotactic body radiotherapy (SBRT) where high dose per fraction and smaller margins are used. Automatic segmentation can decrease workload and improve treatment consistency, but this requires high quality training data and robust validation before implementation into clinical practice.

**Objectives:** We evaluate the performance of deep learning-based auto-segmentation models trained using a less resource intensive approach of leveraging retrospective manually drawn segmentations.

**Methods:** Auto-segmentation models were trained using a deep convolutional neural network based on a U-net architecture. Training data consisted of 210 structure sets, which included 160 publicly available CT scans, with ground truth segmentations reviewed and edited by a single radiation oncologist, and 50 SBRT planning CT scans from previously treated patients from center A that were not re-reviewed. Deep learning-based auto-segmentations (DS) were then generated for 100 planning CT scans; 50 were additional planning CT scans from center A and 50 were obtained from center B. The original clinical segmentations (CS) were compared with DSs using the Dice Similarity Coefficient (DSC) and 95% Hausdorff distance transform (DT).

**Results:** Comparing DSs to CSs for all 100 validation planning CT scans, the mean DSC and 95% DT were 0.93 and 2.85mm for aorta (n=81), 0.81 and 3.32mm for esophagus (n=99), 0.95 and 5.15mm for heart (n=100), 0.98 and 3.09mm for lung (n=188), 0.55 and 6.59mm for brachial plexus (n=101), 0.82 and 4.23mm for proximal bronchial tree (n=100), 0.90 and 1.58mm for spinal cord (n=87), and 0.91 and 2.27mm for trachea (n=100). The mean DSC and 95% DT were similar for center A and center B for all structures.

**Conclusions:** Lung SBRT DSs trained using un-reviewed retrospective clinical data closely approximated manual segmentations from two centers, with comparable results to other auto-segmentation studies. Previous radiotherapy courses used for treatment represent a valuable data source for DS training and validation. An approach leveraging this data can more quickly lead to the implementation of useful auto-segmentation into clinical workflow.

### 339 Dr. Sumaiya Muathen Otolaryngology

#### **Title: Subcutaneous Nucala Injection: An adjunctive Treatment for Recalcitrant Allergic Fungal Rhinosinusitis**

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**Background:** Recalcitrant Allergic Fungal Rhinosinusitis (AFRS), a complex subtype of Chronic Rhinosinusitis, is a non-invasive fungal sinus disease that results from chronic allergic inflammation of the sinonasal mucosa. Failure to respond to mainstay therapies and sinus surgery leaves AFRS patients with limited alternatives and a decreased quality of life. Mepolizumab (Nucala) is an anti-IL5 medication currently designed to treat patients with severe eosinophilic asthma. This study aimed to identify the efficacy of mepolizumab on improving Modified Lund-Kennedy (MLK) endoscopic scores in recalcitrant AFRS patients.

**Objective:** The primary objective was to determine if the addition of mepolizumab lead to improvement in Modified Lund-Kennedy (MLK) sinonasal endoscopic scores in recalcitrant AFRS patients. Additionally, we examined the rate of patients requiring a prednisone rescue compared to a retrospective control arm.

**Methods:** Retrospective chart review of 27 recalcitrant AFRS patients who added one Nucala injection per month to their treatment between December 2016 and June 2019. Patients were evaluated endoscopically at baseline and at each subsequent follow-up every 6-8 weeks. A retrospective control arm was randomly generated to compare the rate of patients requiring a prednisone rescue to patients receiving mepolizumab. Sinonasal Outcome Test 22 (SNOT-22) score and median eosinophil count were collected when retrospective data was available.

**Results:** No significant differences were found in the total MLK score change between mepolizumab initiation at baseline and up to 6 follow-up visits thereafter (Friedman test p-value = 0.86), nor to the MLK edema and polyposis sub scores combined (Friedman test p-value = 0.95). Mepolizumab patients had a higher rate of prednisone rescues per 1000 person days compared to controls. No significant differences were found in the total SNOT-22 score changes or it's quality of life sub score between baseline and 2 follow-up visits (Friedman test p-value = 0.92). Median Eosinophil count significantly decreased by  $0.40 \times 10^9/L$  (95%CI:1.3, 0.2;  $p < 0.01$ ) between baseline and a median of 167 days of Nucala use.

**Conclusion:** Mepolizumab injections administered once monthly, as an adjunctive treatment for recalcitrant AFRS, is associated with a non-significant improvement in endoscopic scores, a higher rate of requiring prednisone, a non-significant worsening of total SNOT-22 score and with an associated notable improvement in eosinophil levels. Further larger scale prospective studies are required to confirm these findings.

#### 340 Dr. Hannah Piper Pediatric Surgery

##### **Title: The Impact of Daily Probiotics on the Incidence and Severity of Necrotizing Enterocolitis in Very Low Birth Weight Infants**

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**Background:** Necrotizing enterocolitis (NEC) remains a leading cause of morbidity and mortality in premature infants, particularly those who are very low birth weight (VLBW) (<1500g). Several randomized controlled trials suggest probiotics are effective at reducing the incidence of NEC. However, whether these results can be practically achieved is unclear. At BC Women's Neonatal Intensive Care Unit (BCWNICU), probiotics have been routinely given to VLBW infants for the past 3 years. The purpose of this study was to evaluate the potential risks and benefits of probiotics, and the impact on the incidence and severity of NEC at this center.

**Methods:** A retrospective review of VLBW infants cared for at BCWNICU two years prior to (2014-2016) and two years following (2016-2018) the introduction of probiotics (Bifidobacterium and Lactobacillus) was conducted. Babies received probiotics daily until 35 weeks corrected gestational age. Those with known gastrointestinal pathology were excluded. Baseline characteristics, antibiotic use, episodes of suspected and confirmed NEC as well as infectious and nutritional outcomes were compared between groups. Welch's t-test and chi square test were performed to compare variables with p-values <0.05.

**Results:** 665 VLBW infants were reviewed (310 who received probiotics and 355 who did not). The two groups did not differ significantly with regard to gestational age, birth weight, sex, comorbidities, type of enteral feed, time to full enteral nutrition or length of stay. The overall incidence of NEC (including suspected cases) was similar between groups (23.7% vs. 24.2%,  $p=0.87$ ) as was the incidence of NEC > stage 2 (3.9% vs. 5.8%,  $p=0.36$ ). Infants receiving probiotics had significantly fewer overall infections (26.8% vs. 31.3%,  $p=0.046$ ) with respiratory, bloodstream and urinary tract being the most common. Additionally, significantly fewer babies receiving probiotics required treatment with antibiotics during their admission (33.1% vs. 24.6%,  $p=0.019$ ).

**Conclusions:** The routine use of Bifidobacterium and Lactobacillus probiotics in VLBW infants did not significantly impact the incidence or severity of NEC. However, it may result in fewer overall infections and less antibiotic use.

#### 341 Dr. Yunyuan Li Plastic Surgery

##### **Title: Targeting M-CSF-mediated myeloid cells as treatment option for skin autoimmune disease (alopecia areata)**

Shamim Hortamani, Arveen Shokravi, Emily Mason, Ruhangiz T. Kilani, Yunyuan Li, Aziz Ghahary  
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**Introduction:** Alopecia Areata (AA) is an autoimmune disease with the clinical features of hair loss and skin inflammation. The mechanism by which inflammation persists in AA affected skin is not known. Currently, there is no satisfactory treatment for AA. Recent works from our research group have identified macrophage colony-stimulating factor (M-CSF)-mediated myeloid cells to be involved in initiation and progression of this disease in an AA mouse model. Furthermore, our previous finding has also demonstrated that undifferentiation of keratinocytes in hair follicles is involved in the hair loss mechanism in AA.

**Objectives:** The aim of this study is to find new treatment options for AA by targeting M-CSF-mediated myeloid cells via local depletion of this cell population, inhibition of M-CSF receptor signalling pathway or increasing the differentiation of hair follicle epithelial cells.

**Methods:** AA mouse model was induced by dermal injection of skin mixture cells, isolated from AA affected skin. In vivo depletion of macrophages in AA affected skin was obtained by using clodronate liposome, a medication previously used as anti-osteoporotic drug. Several in vitro experiments were conducted to test the effects of kynurenine, an IDO induced tryptophan metabolites, on M-CSF-mediated myeloid cells, skin cell proliferation and keratinocyte differentiation. Hair regrowth were evaluated by photography.

**Results:** Our pilot study showed that local depletion of myeloid cells in AA-affected skin by dermal injection of clodronate liposome effectively restore the hair growth in AA mice (3 of 5 mice). Kynurenine at concentration of 5-50  $\mu\text{g/ml}$  significantly reduced M-CSF-mediated myeloid cell proliferation and skin mixture cell proliferation. RT-PCR result revealed that kynurenine down-regulated M-CSF receptor expression in mouse splenocytes. Finally, our result demonstrated that kynurenine induced undifferentiated hair follicles epithelial cells to undergo differentiation, a condition to improve hair growth. These findings collectively suggest that the use of either clodronate, kynurenine or combination can be an alternative treatment for this inflammatory disease.

**Conclusions:** The current findings indicate that targeting M-CSF activated immune cells could potentially treat AA initially in Rodents and then in human patients.

#### 342 Dr. Yunyuan Li Plastic Surgery

##### **Title: De novo sweat gland-like structures generated at dorsal skin of Balb/C mice upon dermal injury**

Yunyuan Li, Ruhangiz T. Kilani, Aziz Ghahary

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**Introduction:** Sweat glands are coiled tubular structures in human skin for secretion of sweat, excretion of waste and regulation of body temperature. They usually have an outer basal layer consisting of keratin 5, keratin 14 and smooth muscle actin -expressing myoepithelial cells, and an inner suprabasal layer of keratin 8, 18 and 19-expressing luminal cells. Although the epidermis and dermis can be restored in patients with large-skin damages such as burn, there is no report on regeneration of functional sweat glands within the wounded areas in mammals. For this reason, patients suffered from large burn injury cannot tolerate warm environment.

**Objectives:** The aim of this study is to investigate whether sweat glands can be regenerated after skin injury in animal models.

**Methods:** Several stains of mice were used for this study. Skin wounds were created in the midline of dorsal skin of mice. Each mouse was created two wounds with a diameter around 8 mm by punch biopsy. To confirm the presence of sweat glands within the wounded areas, H & E and immunofluorescent staining were conducted using antibodies for K14, K19,  $\alpha$ -smooth muscle actin and Na-K-ATPases. Mouse palm skin was used as positive control.

**Results:** Normally, sweat glands are only distributed in palm skin of mice. Here, we found that sweat gland-like structures were presented in wounded dorsal skin of Balb/C mice. Similar with sweat glands from palm skin of mice, sweat glands in wounded skin of Balb/C contain an outer layer consisting of myoepithelial cells (K14 and  $\alpha$ -smooth muscle actin double positive) and an inner layer consisting of luminal cells (K19 positive). Different with normal palm skin, Na-K-ATPase stain was negative in sweat gland-like structures from wounded skin, indicating these new-formed sweat glands are immature. Finally, we showed that the regeneration capacity of sweat glands induced by skin injury could only find in Balb/C mice but not in other stains of mice (C57/BL, CD-1 and NOD).

**Conclusions:** Sweat glands can be regenerated in Balb/C mice and this regeneration is induced by skin injury. Understanding the cellular source and mechanism of sweat gland regeneration in Balb/C might teach us to find a new strategy in generating sweat gland in patients with large skin damage.

**343 Dr. Najah Adreak Cardiac Surgery**

**Title: Short- and long-term survival rate of mini-sternotomy vs full sternotomy in aortic valve replacement: The St. Paul's Hospital experience**

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**Background:** Advantages of mini-sternotomy aortic valve replacement (MSAVR) include improved cosmetics, reduction in postoperative pain, blood loss, and length of stay (LOS), and better wound healing. However, MSAVR is not widely adopted by surgeons, and the clinical outcomes of MSAVR have not been reported in Canada. We studied the outcomes of MSAVR in our institutions in British Columbia comparing such to the full sternotomy aortic valve replacement (FSAVR).

**Methods:** We conducted retrospective analysis of the Cardiac Service BC database of all isolated aortic valve replacements (AVR) performed in our institution from Jan 2007 to Dec 2016. Nine hundred ten patients were identified (776 conventional AVR and 134 MSAVR) with a median follow-up period of 6.2 yrs. (95% CL: 3.8 to 8.5). Descriptive statistical analysis was carried out.

**Results:** Baseline variables between the two surgery groups were similar with a mean age of 70.7 ± 11.8 yrs in MSAVR vs 69.7 ± 12.2 in the FSAVR group (p=0.38). 40% were females. Those who had MSAVR group had higher NYHA III/IV Class 76.8% vs 49.3% (p=0.001) and had a trend towards greater incidence of renal failure (12.7% vs 8.8%, p=0.15). Bioprosthetic valves were implanted in 93.3% (MSAVR) and 93.8% (FSAVR). The mean cardiopulmonary bypass (CPB) and aortic cross-clamp (XC) times were shorter in MSAVR group with 74 vs 80 min (p=0.014) and 56 vs 62min (p=0.08), respectively. There were no significant differences in the incidence of atrial fibrillation (p=0.89) or renal dysfunction (p=0.49) between the two groups. There was no significant difference in 30-day mortality (p=0.79) and long-term mortality between groups (p=0.70). LOS was shorter in the MSAVR group (mean 7.8 ± 6.3 vs 8.6 ± 7.2 days, p=0.006).

**Conclusion:** MSAVR can be performed safely with similar short and long-term survival rates. CPB and XC times and LOS were shorter in MSAVR. MSAVR should be performed when feasible.

**344 Dr. Jessica Luc Cardiac Surgery**

**Title: Valvectomy Versus Replacement for the Surgical Treatment of Infective Tricuspid Valve Endocarditis: A Systematic Review and Meta-Analysis**

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**Background:** Optimal surgical treatment of infective tricuspid valve endocarditis in patients with intravenous drug use (IVDU) remains controversial. Tricuspid valvectomy has been proposed for infective tricuspid valve endocarditis in this patient population given the inherent social concerns.

**Objective:** The aim of this systematic review and meta-analysis was to compare outcomes of valvectomy versus replacement for the surgical treatment of isolated infective tricuspid valve endocarditis.

**Methods:** An electronic search was performed to identify all relevant studies published.

After assessment for inclusion and exclusion criteria, 16 original studies were pooled for systematic review and meta-analysis.

**Results:** There were a total of 752 patients with infective tricuspid valve endocarditis, of which 14% underwent valvectomy and 86% underwent replacement (mean follow-up 4.2 years). There were no differences in rates of stroke [valvectomy 4% vs. replacement 3%, p=0.85] but a higher likelihood of prolonged ventilation in those who underwent valvectomy [valvectomy 40% vs. replacement 26%, p<0.01]. There were no differences in 30-day post-operative mortality [valvectomy 13% vs. replacement 7%, p=0.21], post-operative right heart failure [valvectomy 27% vs. replacement 11%, p=0.17] and recurrent endocarditis [valvectomy 7% vs. replacement 19%, p=0.81]. Valvectomy had higher rate of reoperation for tricuspid valve replacement [valvectomy 56% vs. replacement 14, p=0.06].

**Conclusions:** Tricuspid valvectomy is an acceptable initial therapy for infective tricuspid valve endocarditis in patients with IVDU as a bridge to identify those who will self-select themselves as candidates for staged valve replacement.

**345 Dr. Jessica Luc Cardiac Surgery**

**Title: Effect of Operating Room Personnel Generation on Perceptions and Responses to Surgeon Behavior**

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**Background:** Little is known regarding the impact of operating room (OR) personnel generation on their perceptions to various surgeon behaviors.

**Objective:** We aimed to characterize generational differences by evaluating OR personnel responses to five realistic intraoperative scenarios.

**Methods:** OR personnel were asked to assess surgeon behavior across a standardized set of five scenarios. For each scenario, respondents were asked to identify the behavior as either acceptable, unacceptable but would ignore, unacceptable and would confront the surgeon, or unacceptable and would report to management. Chi-squared analyses were used to compare responses to surgeon behavior with respondent generation.

**Results:** There were 3101 respondents, of which 41% were baby boomers (n=1280), 31% were Generation (Gen) X (n=955) and 28% were Gen Y (n=866). Overall, when compared to Gen X or Gen Y, baby boomers were significantly more likely to find surgeon behaviors of impatience (p<0.001), being late for a case (p<0.001), swearing in the OR (p<0.001), and shouting with a bleeding patient (p=0.001) to be inappropriate and would talk to the surgeon. Alternatively, Gen Y respondents were more likely to find fault with surgeon behaviors that deviate from rules and regulations, such as forgetting a timeout (p=0.001), when compared to baby boomers and Gen X respondents.

**Conclusions:** Results of our study demonstrate that OR personnel generation affects their perceptions and response to surgeon behavior. By shedding light on generational differences, we hope that we can work towards improved awareness and development of leadership strategies to optimize surgical workplace morale and productivity.

**346 Dr. Jessica Luc Cardiac Surgery**

**Title: Social Media Improves Cardiothoracic Surgery Literature Dissemination: Results of a Randomized Trial**

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**Background:** The Thoracic Surgery Social Media Network (TSSMN) represents a collaborative effort of leading journals in cardiothoracic surgery to highlight publications via social media, specifically Twitter.

**Objective:** We conducted a prospective randomized trial to determine the effect of scheduled tweeting on non-traditional bibliometrics of dissemination.

**Methods:** A total of 112 representative original articles (2017-2018) were selected and randomized 1:1 to an intervention group to be tweeted via TSSMN or a control (non-tweeted) group. Four articles per day were tweeted by TSSMN delegates for 14 days. Primary endpoints included change in Altmetric score pre and post-tweet compared to controls. Secondary endpoints included change in Twitter analytics day one post-tweet and day seven post-tweet for each article compared to baseline.

**Results:** Tweeting via TSSMN significantly improved article Altmetric scores (Pre-tweet 1 vs. Post-tweet 8,  $p<0.001$ ), Mendeley reads (Pre-tweet 1 vs. Post-tweet 3,  $p<0.001$ ), and Twitter impressions (Day 1 post-tweet 1599 vs. Day 7 post-tweet 2296,  $p<0.001$ ). Subgroup analysis demonstrates that incorporating photos into the tweets trended towards increased link clicks to the full-text article ( $p=0.08$ ) whereas tweeting at 1pmEST and 9pmEST generated the highest and lowest audience reach ( $p=0.022$ ), respectively. Articles published in adult cardiac surgery achieved the highest change in Altmetric score ( $p=0.028$ ), Mendeley reads ( $p=0.028$ ) and were more likely to be retweeted ( $p=0.042$ ) than those published on education, general thoracic surgery, and congenital surgery.

**Conclusions:** Social media highlights of scholarly literature via TSSMN Twitter activity improves article Altmetric scores, Mendeley reads, and Twitter analytics, with dissemination to a greater audience.

#### 347 Dr. Matthew Boroditsky Plastic Surgery

##### Title: "How good is the Mustarde Otoplasty?"

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**Background:** The Mustarde otoplasty is a commonly used procedure for the correction of prominent ear. Complication rates following Mustarde otoplasty, related to suture extrusion and long-term outcomes, are variable in the literature.

**Objectives:** Examine the efficacy and safety of the Mustarde otoplasty

**Methods:** Retrospective data was collected on patients under 18 years-old who underwent primary otoplasty by the senior author between May 2009 – August 2018. Patient demographics, clinical presentation, intraoperative details, complications, follow-up, and patient/family satisfaction scores were collected and analyzed. Mustarde efficacy was measured via patient and surgeon satisfaction, whereas safety was measured by complication and reoperation rates.

**Results:** There were 119 Mustarde otoplasties performed on 68 patients, with a median follow-up of 72 weeks (range: 24-476 weeks). Fifty-one of the 68 patients underwent bilateral procedures. Of the 119 otoplasties, 110 (92%) were performed for prominent ear and 9 (8%) for cup/constricted ear. The median operative time was 95 minutes (31-133 minutes). A total of 24 complications were reported in 17 patients. Complications included: Suture extrusion ( $n=20$ ), hematoma ( $n=1$ ), suture abscess ( $n=1$ ) and reoperation ( $n=2$ ). The study had a revision rate of 1.7% ( $n=2$ ). No additional procedures were documented at other hospitals in the province. The majority (97%) of reported ear outcomes demonstrated both patient and surgeon satisfaction.

**Conclusions:** The Mustarde otoplasty demonstrated a high efficacy in the correction of prominent ear, with low reoperation rates and high patient and surgeon satisfaction. Suture extrusion, the most frequent complication, was managed successfully by suture removal one year post-operatively.

#### 348 Dr. Daniel Ben Lustig General Surgery

##### Title: Preoperative Calcium and Parathyroid Hormone Levels Affect Dual Energy Computed Tomography (DECT) and Conventional Preoperative Localization Studies in Patients with Primary Hyperparathyroidism

Daniel Ben. Lustig, MD, MSc, Michael Y. Guo, BSc, Jake Hiebert, MD, Elizaveta Vasilyeva, MD, Jennifer Li, MD and Sam Michael. Wiseman, MD FACS.

**Introduction:** Primary hyperparathyroidism (PHP) can be treated with a focused neck dissection when the location of the tumour has been correctly identified with preoperative imaging. Several factors influence the accuracy of these tests but have not been studied in newer imaging techniques. The objective of this study was to determine whether preoperative calcium and PTH levels affect the sensitivity and accuracy of dual energy computed tomography (DECT), sestamibi single positron emission computed tomography (CT-MIBI) and ultrasound (US).

**Methods:** A retrospective study was conducted at a tertiary endocrine referral center examining all patients with PHP who underwent DECT, CT-MIBI, US, and parathyroidectomy at our center between 2012 and 2019. Preoperative calcium and parathyroid hormone (PTH) levels were used to stratify patients into three cohorts: normal calcium high PTH, high calcium normal PTH and high calcium high PTH for which sensitivity and accuracy of the imaging tests were calculated.

**Results:** A total of 237 patients were included in our study population. The sensitivity and accuracy for DECT, CT-MIBI and US are summarized in table 1 for the different patient cohorts. Furthermore, DECT was able to correctly identify the parathyroid tumour in 55% (22 of 38) of patients whose preoperative US and CT-MIBI localization failed.

**Conclusion:** Preoperative calcium and PTH levels influences the sensitivity and accuracy of preoperative localization in PHP for all imaging studies evaluated. DECT should be considered first-line for preoperative localization and can also be used to identify parathyroid tumours that are not successfully localized by combined US and CT-MIBI.

#### 349 Dr. Dorsa Mousa-Doust General Surgery

##### Title: Excision of breast Fibroepithelial lesions: when is it still necessary?

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**Background:** Fibroepithelial lesions (FEL) range from the benign fibroadenoma (FA) to malignant phyllodes tumor (PT). While FAs do not require routine excision, PTs require excision with negative margins. It has been recommended for many years that FA over 3 cm in size be excised to avoid missing PT. However, we have been unable to find literature to support that recommendation.

**Objective:** To assess whether the policy to excise FA 3cm in size or greater is justified, and identify a low risk group that can be spared surgery.

**Methods:** Patients having surgery with FEL on CNB at Mt St Joseph hospital from 2009-2018 were identified from a prospective database. The association of clinical, radiology, and pathological features with upstage to PT was evaluated. Univariable and multivariable logistic regression analysis of variables was conducted to identify the risk factors of upstage to PT and trend analysis was performed to assess tumor size cut offs.

**Results:** Of the 627 patients included in this study, 405 were identified as having FA on CNB and 222 were identified as having FEL where PT could not be ruled out. A total of 113 cases of PT were identified upon surgical excision, 27 had CNB of FA (6.7%) while 82 were upstaged from FEL (36.9%). For FEL the NPV for tumor size of 10-100mm ranged from 57% to 65%, highlighting the need for surgical excision of these lesions. However, the NPV among FA cases was consistently high, 88% to 99%, for all tumor sizes and for tumors < 37mm it is 95.6%. Using the size cut off of 37mm, 86.2% of FA patients in our study could have avoided surgical excision of these lesions. All cases of PT with CNB of FA were noted to be enlarging. Upstage to PT among FA cases was not associated with age while it was associated with older age among FEL cases ( $p<0.001$ ) as the likelihood of upstage increased by 1.1% per year. Family history was not associated with upstage to PT for both FA and FEL groups.

**Conclusion:** Patients with FEL on CNB should continue to have excision to rule out PT. We now recommend that patients identified with FA lesions that are 37mm or less in size can be considered for non-operative management.

**350 Dr. Anna McGuire** Thoracic Surgery

**Title: Impact of Carbohydrate Loading Enhanced Recovery After Surgery Protocol On Adverse Cardiopulmonary Events In A Thoracic Surgery Population**

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**Background:** Enhanced recovery after surgery (ERAS) protocols, including carbohydrate loading pre-operatively, is associated with improved postoperative outcomes in colorectal surgery. These results have been extrapolated to thoracic patient populations, despite notable differences in underlying patient factors, & procedure related complications.

**Objective:** To describe the impact of an ERAS carbohydrate loading pathway implemented on adverse cardiopulmonary events in a thoracic surgery population.

**Methods:** A retrospective cohort study was conducted to identify patients undergoing elective thoracic surgery prior & following the implementation of a standardized carbohydrate loading pre-operative pathway. Primary diagnosis, type of surgery, complications, & patient comorbidities were evaluated. Univariable and multivariable analyses were conducted with appropriate statistical tests of comparison.

**Results:** There were 1774 cases included: 852 had carbohydrate loading, & 924 did not. Overall there were 883 (49.7%) female participants. The median age was 65 years (range 20-85). Overall, & on stratification by operation. There was no significant difference in frequency of pneumonia & atrial arrhythmia between groups. For all pulmonary, mediastinal, & chest wall surgery, there was also no significant difference in frequency of pneumonia & atrial arrhythmia between groups. The median length of stay was significantly shorter in lobectomy patients with carbohydrate loading group (5 vs. 6 days; p=0.03). There was also significantly more Thoracoscopic lobectomy conducted in the carbohydrate loading group (p<0.001).

**Conclusion:** Implementation of a preoperative carbohydrate loading pathway was not associated with increased cardiopulmonary complications in thoracic patients. The magnitude of thoracic procedure, including minimally invasive approaches & post-operative care pathways, are likely more important determinants of clinical outcomes.

**351 Dr. Mira Keyes** Radiation Oncology

**Title: Patterns of prostate cancer recurrence after brachytherapy imaged with PSMA-targeting 18F-DCFPyL PET/CT**

**Introduction:** Brachytherapy is a highly effective treatment in localized prostate cancer. A previous study from our institution indicated a low rate of local failure after prostate brachytherapy (Lo, IJROBP 2015). However the study was limited by the absence of post-implant prostate biopsy and by utilization of conventional imaging to document local, regional and distant recurrence. In this study, we evaluate patterns of recurrence after brachytherapy utilizing positron emission tomography (PET) tracers that target the prostate specific membrane antigen (PSMA).

**Methods:** The study included patients enrolled in our ongoing institutional prospective trial, "PSMA PET/CT for Assessment of Recurrent Prostate Cancer" (NCT02899312). Patients with recurrent prostate cancer were eligible if they were candidates for salvage local therapy and there was no recurrent disease visualized on conventional cross-sectional imaging and bone scans. Biochemical and PSMA PET/CT recurrence were defined according to PHOENIX (Roach, IJROBP 2006) and PROMISE (Eiber, JNM 2018) criteria respectively.

**Results:** Between July 20, 1998 and August, 2018, 6380 patients have been treated with brachytherapy at our institution. Between March 2017 and August 2018, 208 patients were enrolled in the PSMA PET/CT trial, open for 13 months during this time. During the same time period, 1349 brachytherapy patients had follow up PSA recorded and 81 (1.6%) experienced biochemical recurrence. In these patients with biochemical recurrence, median follow-up was approximately 7 years and median time to biochemical recurrence was 50 months. 35 out of 208 study patients were identified as receiving brachytherapy as part of initial curative treatment. In these brachytherapy patients, 68.6% had local recurrence in the prostate, 37.1% had seminal vesicle involvement, 34.3% had nodal recurrence and 28.6% had distant metastases. The basal segments of prostate were involved in 80.0% of local recurrences, which was significantly different than involvement of the mid (31.4%) and apical (11.4%) segments; p < 0.001.

**Conclusion:** Contrary to previous evidence, our study showed that local failure is a common pattern of recurrence in patients who experience biochemical relapse after prostate brachytherapy. Further study is underway to correlate implant dosimetry with the location of intra-prostatic recurrence.

**352 Dr. Kevin Zhao** Otolaryngology

**Title: Factors Associated with Failure of Botulinum Toxin Injection in Adductor Spasmodic Dysphonia**

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**Background:** Spasmodic dysphonia (SD) is a neurological voice disorder where the laryngeal intrinsic muscles involuntarily contract.

Electromyography (EMG) Guided botulinum toxin (BTX) injection is considered first-line treatment for adductor SD. Failure rate can range between 6-30%.

**Objective:** Study objective was to determine which factors were associated with failure of botulinum toxin injection in adductor SD.

**Methods:** This was a retrospective review conducted at a tertiary, academic center. Adductor SD patients presenting for BTX injections from August 2017 to October 2018 were eligible. Age, gender, Voice Handicap Index (VHI-10), Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V), number of injections, disease duration, unilateral/bilateral injection, right/left injection, dose quantity, body mass index (BMI), professional voice user, employment, psychiatric comorbidity, breathiness, and dysphagia were investigated. Outcomes included failure as defined by the patient and dosage change. Univariate and multivariate statistical analysis was conducted.

**Results:** Sixty seven out of 564 injections (11.88%) were categorized as failure by 131 patients. In multivariate analysis, dosage change was associated with shorter duration of good effect (p=0.00), BTX dose (p=0.02), breathiness (p=0.00), bilateral injection (p=0.02), dysphagia (p=0.01) and professional voice user (p=0.02). Failure was associated with first injection with a new physician (p=0.00), professional voice user (p=0.00) and lack of breathiness (p=0.00). Failure rate was not associated with age, gender, VHI-10, CAPE-V, disease duration, left/right injection, dose quantity, BMI, psychiatric comorbidity, and dysphagia.

**Conclusion:** Failure rate was 11.88% and associated with patients' first injection with a physician, professional voice user, and lack of breathiness.

Dosage change occurred in 29.08% of injections and was associated with injection side effects, bilateral injections, BTX dose, professional voice user, and shorter duration of good effect.

**353 Dr. Navneet Singh** Otolaryngology

**Title: The Efficacy of Topical 0.3% Hydrogen Peroxide Solution Rinse in the Management of Biofilm-Associated Chronic Rhinosinusitis**

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**Introduction:** Chronic Rhinosinusitis (CRS) is an inflammatory condition of the paranasal sinuses. Biofilm has been implicated in CRS recalcitrant to both medical and surgical sinus therapy. The presence of biofilm results in patients having worse postoperative symptoms, recurrent infections, and persistent inflammation. Hydrogen peroxide (H2O2) is known for its antiseptic, antibacterial, antiviral and antifungal effects. It is also thought to have the ability to dissolve, destroy and release adherent biofilm from the underlying mucosal membrane. The efficacy of H2O2 sinus irrigation in patients with CRS has never been studied.

**Objectives:** To study the efficacy and safety of a 0.3% H2O2 solution compared to saline irrigation in recalcitrant CRS associated with biofilm.

**Methods:** Thirty patients were enrolled in a prospective, randomized controlled trial at St. Paul's Sinus Centre in Vancouver, B.C. Patients were included if they were diagnosed with recalcitrant CRS and present with biofilm. Participants were blinded and randomized to irrigate with either a 0.3% Hydrogen Peroxide solution or saline (control) every other day in conjunction with the standard-of-care budesonide rinse. Following six weeks of treatment, participants were asked to continue with standard of care for an additional 6 weeks and return for follow up on week 12. The primary endpoint was the Modified Lund Kennedy endoscopic grading system and SNOT-22 quality of life questionnaire. Safety was monitored by evaluating UPSIT olfactory test and mucosal biopsies.

**Results:** Nine patients have completed their 6 week follow up thus far, six in the experimental arm, and three in the control arm. 83% of the experimental group, exhibited a clinically significant improvement of minimum 1 point in total MLK score between baseline and 6 weeks compared to 33% in the control group (experimental group: baseline median=20, mean=19, n=6; 6 week median= 13, mean=15, n=6). Of those that completed SNOT-22, scores clinically improved with a minimum of 9 points was noted in 3/9 subjects, remained the same in 2/9 subjects and worsened in 1/9 subjects. 1/9 patients experienced a clinically significant decrease in UPSIT scores. No serious adverse events were reported by any participants including no changes to mucociliary time or mucosal changes (biopsy). Recruitment is ongoing for this study.

**Conclusion:** Preliminary results suggest Hydrogen Peroxide may potentially provide efficacious and tolerable treatment for recalcitrant CRS.

**354 Dr. Sita Oza Ollek** General Surgery

**Title: Location of the Primary Tumor within the Breast: A Unique Predictor for Local Recurrence After Skin Sparing Mastectomy with Immediate Reconstruction**

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**Background:** Skin sparing mastectomy (SSM) with immediate reconstruction for breast cancer is safe and provides superior cosmetic outcomes. However, there is a risk for local recurrence which may be influenced by various pathologic, technical and treatment factors.

**Objective:** To identify predictive factors for local recurrence after SSM and to specifically examine the relationship of the location of the primary tumor within the breast on local recurrence.

**Methods:** We retrospectively identified patients who underwent SSM for breast cancer from September 1997 – December 2010. A logistic regression analysis was performed to identify predictive factors for local recurrence.

**Results:** 697 patients were included. The median age at diagnosis was 46 [41-52] years. Tumors were grade III, T3/T4 and node positive in 37%, 13% and 40% of cases respectively. With a median follow up of 9.4 [5.3-13.9] years, local recurrence was the first relapse event in 14.7% of patients. Patients with a primary tumor in the medial breast were at increased risk of local recurrence (OR 2.42, 95% CI 1.34-4.37, p=0.003). Those who required radiotherapy were also at increased risk for local recurrence (OR 1.93, 95% CI 1.11-3.41, p=0.021) while those who received chemotherapy had a lower risk of local recurrence (OR 0.53, 95% CI 0.30-0.94, p=0.029). Biomarker profile, LVI, margins, T stage and nodal status were not significantly associated with local recurrence.

**Conclusion:** With long term follow up, patients remain at risk for local recurrence after SSM. Location of the primary tumor within the breast may represent a unique predictor for local recurrence.

**355 Dr. Gautamn Sarwal** Vascular Surgery

**Title: The physical toll of working in operating rooms: A survey of the Canadian Society of Vascular Surgery**

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**Background:** Occupational injuries and disability is increasingly being recognized as a source of surgeon burnout. The purpose of this study was to assess the physical toll of working in operating rooms.

**Objective:** To assess work-place musculoskeletal (MSK) complaints and challenges faced by Canadian vascular surgeons and trainees and its implications on surgical practice and occupational longevity.

**Methods:** We designed and distributed an online survey to members of the Canadian Society of Vascular Surgery including residents, fellows and staff vascular surgeons. The survey collected data on surgeon demographics, operative volume, technical preferences and work-related MSK symptoms.

**Results:** An online survey was distributed to 188 surgeons and trainees. After three e-mailings, 112 surveys were returned for a 60% response rate. Of the responders, 87% were male, 50% were 45 years or older, and 55% had been in practice for ten or more years. Work-place MSK symptoms was reported by 83% of the responders; the most common symptom locations were pain in the low back (78%), neck (74%) and shoulder (31%). 80% of the responders believed that these symptoms were directly related to their operative environment. 48% sought medical care for this including physiotherapy (22%), massage therapy (30%) and surgery (7%). As a result of these MSK symptoms, 25% experience chronic pain with 8% requiring analgesics and 8% reporting time off work as a consequence. Another 11% reported an impact on their operative performance with 14% considering early retirement. A lack of operating room system changes in order to prevent workplace injury and disability was noted by 85% of the responders although only 3% reported their disability to their department.

**Conclusion:** Occupational MSK symptoms and disability is higher amongst Canadian vascular surgeons than other surgical specialties. Aside from raising awareness, further research is needed to design and validate a dedicated ergonomics program aimed to preventing these disorders in order to promote surgeon longevity and quality-of-life.

**356 Dr. Kadhim Taqi** General Surgery

**Title: Trends for acute surgical consultations for oncology patients in British Columbia.**

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**Introduction:** Cancer is the leading cause of death in Canada with significant number of patients presenting to the emergency department with acute symptoms. Limited data is available about short and long term outcomes of this specific population.

**Objective:** The aim of this study was to identify modifiable factors that could help improve prognosis of acute cancer patients.

**Methods:** Retrospective review of prospectively collected data of all patients referred to the Acute Care Surgery services (ACS) at Vancouver General Hospital (VGH) for the management of oncology related surgical problems from July 2017 till August 2018.

**Results:** A total of 191 patients were identified of which (55%) were females. The mean age was 65.8 ± 14.5 years. The most common cancers were Gastrointestinal, Breast and Sarcomas. The most common presentations were Small Bowel obstruction and post-operative complications. Cancer was newly diagnosed in 37 patients, and 96 patients presented with Stage IV disease. The mean length of stay was 12.8 ± 15.6 days. A total of 90 patients required surgery of which 31% was for palliative reasons. Disposition to home was the most common discharge planning (81.2%).

**Conclusion:** The diversity of cancer types and their care requires multidisciplinary team involvement. This would require special attention to their inpatient care and disposition planning, which would effect their short and long term outcomes.

357 **Dr. Zach Sagorin** General Surgery

**Title: Gender-based compensation disparity among general surgeons in British Columbia**

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**Background:** The surgical workforce gender composition is shifting. Nearly half of new general surgeons in British Columbia (BC) are now women. Despite equivalent surgical outcomes, women in surgery may earn less than their male colleagues.

**Objective:** Identify and analyze gender differences in BC general surgeon Medical Services Plan (MSP) compensation.

**Methods:** MSP payments to practitioners were collected for all BC general surgeons from 2010/11 to 2017/18 fiscal years. Surgery and consult volumes were obtained from General Surgeons of BC. Surgeon data was gathered from public databases. Subspecialist surgeons and years general surgeons billed <\$200,000 were excluded. Data was analyzed by T-tests for continuous variables and  $\chi^2$  tests for categorical variables. Multivariable regression was performed to adjust for confounding variables.

**Results:** Of 223 general surgeons, women (N=51) billed \$119,332 lower mean MSP compensation than men (N=172) (\$388,984 vs. \$508,316,  $p<.001$ ). Compensation was similar for men and women general surgeons with <5 years in practice. After  $\geq 5$  years in practice compensation of women surgeons (\$402,815) was less than men (\$519,137,  $p<.001$ ). Compensation differences persisted at large (\$372,242 vs. \$486,345,  $p<.001$ ) and medium population centers (\$403,175 vs. \$508,371,  $p=.008$ ). After adjusting for years in practice, surgeries performed, and consult volumes, men surgeons earned \$61,877 more than women surgeons (\$496,698 vs. \$434,821,  $p<.001$ ).

**Conclusion:** Women general surgeons earned less than men. The gender difference in compensation is not wholly accounted for by differences in the number of surgeries and consultations performed. Improved understanding of labour division and expert discussion on contributing factors will be necessary to reduce compensation discrepancy and improve equity among general surgeons in BC.

358 **Dr. Hannah Kapur** General Surgery

**Title: Calculating quality indicators for mastectomy at Mount Saint Joseph Hospital**

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**Background:** There is current concern for the overtreatment of breast cancer. Breast conserving surgery (BCS) is recommended for early breast cancer and may represent an opportunity to de-escalate surgical treatment. Quality indicators (QIs) have been published by European and American Breast Cancer Societies. One recommended QI is the BCS rate, for which there are no published Canadian standards. Review of our practice at Mount Saint Joseph Hospital in 2012 showed a higher than expected mastectomy rate.

**Objectives:** Our primary purpose was to calculate QIs for BCS rate and determine compliancy with American and European standards. Our secondary purpose was to examine reasons for mastectomy and identify opportunities to de-escalate surgery. We hypothesized that mastectomy rates will be higher at our institution than European standards due to a high number of medically necessary mastectomies.

**Methods:** All patients who received a breast cancer surgery between 2013 to 2017 were identified using our institution's database. QIs for BCS rates were calculated and compared to American and European standards. Patients with unifocal first diagnosis of breast cancer were included and patients with multifocal disease, neoadjuvant therapy, contraindication to radiotherapy, and BRCA1/2 predispositions were excluded. The reasons for mastectomy were prospectively collected and verified by chart review. Statistical analyses were done using R.

**Results:** Between 2013 to 2017, 3076 patients underwent breast cancer surgery and 2311 met inclusion criteria. Our BCS rate for invasive cancer <3cm was 77.1%, invasive cancer <2cm was 84.1%, and in situ cancer (DCIS) <2cm was 84.9%. The single-operation rate for invasive cancer was 88.8% and 80.3% for DCIS. Despite an awareness of the mastectomy rate in 2012, there was no statistically significant change in BCS rates over the 5-year period, but there was a significant reduction in contralateral prophylactic mastectomy (CPM) rate from 31.6% to 17.3% ( $p<0.001$ ). The highest BCS rate was among patients aged 40 to 74 with invasive cancer ( $p<0.001$ ). For those patients having initial mastectomy, 72% were medically necessary and 28% by patient choice. Trend analysis looking at tumor size and medical need for mastectomy indicated that 80% of patients at our centre would be eligible for BCS with tumor cut off of 2.5cm inclusively.

**Conclusion:** Our institution met American but not European QI standards for BCS rates. We identified a high number of medically necessary mastectomies, potentially indicating a difference in patient demographics compared to Europe. Our results support the understanding that BCS rates are influenced by multiple factors and are challenging to compare across jurisdictions. CPM rates may offer a more actionable opportunity to de-escalate surgery for breast cancer than BCS rates.

359 **Dr. Zach Sagorin** General Surgery

**Title: Quarter Century Evaluation of General Surgery Residency at the University of British Columbia**

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Department of Surgery, University of British Columbia

**Background:** Over the last quarter century, the demographics, recruitment, and training of incoming residents in general surgery programs have changed. Leadership is an important CanMEDS competency and valued as a surgeon. It will be meaningful to evaluate both the immediate and long-term indicators of surgical, academic, and administrative leadership of residency training alumni.

**Objectives:** Evaluate attrition and completion of advanced degrees and fellowship training for the University of British Columbia (UBC) general surgery residency program. Analyze alumni leadership appointment attainment and satisfaction.

**Methods:** UBC general surgery residency trainees and alumni from 1988 to 2013 were studied using routinely collected residency data and data gathered from public databases. Alumni were sent surveys evaluating leadership positions and satisfaction. Comparisons were made across gender and between 1988-2002 and 2003-2013 cohorts. Statistics were performed using JMP V14.1.0.

**Results:** Over the quarter century, 147 of 177 incoming residents completed training (83.5%) with no difference by entering cohort (83.8% 1988-2002 compared to 83.3% 2003-2013,  $p=0.9409$ ) or gender (82.7% of women compared to 84.2% of men,  $p=0.7919$ ). Women general surgery alumni completed fellowships more often than men general surgery alumni (49 of 62 women (79%) compared to 50 of 85 men (58.8%),  $p=0.0099$ ). The gender composition of general surgery trainee cohorts from 1988-2002 (25% women) and 2003-2013 (57.3% women) were different ( $p<0.0001$ ). Alumni from 1988-2002 completed fewer fellowships than 2003-2013 alumni (53.7% compared to 78.8%, respectively,  $p=0.0013$ ). Similar number of years to complete residency was identified for men ( $5.7\pm 0.6$ ) and women ( $5.9\pm 0.8$ ) ( $p=0.0688$ ). Of 30 alumni survey respondents, 21 (70.0%) obtained leadership appointments. Surgeons were somewhat or extremely satisfied in 82.9% of leadership appointments identified.

**Conclusion:** General surgery trainees at this institution complete residency at high rates and there is no difference in residency completion by cohort or gender. Alumni fellowship completion frequency has risen and women compose over half of recent general surgery residency alumni. Many alumni obtain leadership positions after graduation with high rates of satisfaction.

360 **Dr. Ameen Amanian** Otolaryngology

**Title: Assessing Post-Operative Patient-Centred Care Education Administration in Head and Neck Cancer Patients – A Pilot Study**

Ameen Amanian MD, Edward Wang BASc, Himanshu Chotwani BSc(c), Eitan Prisman MD, FRCSC

**Background:** Head and neck cancer is a disease that has a particular propensity for treatment-related morbidity. Patient-centred care has been a rapidly growing field of interest in healthcare during recent decades. Patients who are more involved in their care in hospital and who are actively provided with more treatment-related information during the post-operative period may experience improvements in their overall satisfaction.

**Objectives:** To determine whether patients' self-involvement and patient-centred education delivered via electronic tablet modules has an impact on overall satisfaction and perceived quality of medical care.

**Methods:** Patients undergoing reconstructive head and neck surgeries for a confirmed oral or oropharyngeal cancer diagnosis were recruited. They were randomized to receive scheduled education through electronic surveys during their post-operative admission as opposed to no education. A survey collected on discharge day was used to assess patient-centred outcomes.

**Results:** 21 patients were recruited into the study (N = 13 Education; N = 9 Non-Education). In the education group, 92% of patients found the educational platforms extremely useful or quite useful. 85% of this cohort would recommend the educational platform for patients undergoing similar procedures. Perceived satisfaction with the surgeon and medical team was 92% in the education group vs. 78% in the non-education group. 44% of patients in the non-education group would have liked additional education during their post-operative admission.

**Conclusions:** Head and neck cancer patients perceived satisfaction may enhance with the utilization of patient-centred post-operative educational platform. Further prospective studies are warranted to assess the significance of this.

**361 Dr. Emily Deane** Otolaryngology

**Title: Voice Outcomes following Secondary Tracheoesophageal Puncture in Gastric Pull-up Reconstruction following Total Laryngopharyngectomy**

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**Background:** Gastric pull-up (GPU) is a reconstructive option for circumferential defects after resection of advanced laryngopharyngeal malignancies. Unfortunately, functional debilitation of the voice is an expected outcome of this procedure. To date, there has been little research into the voice outcomes of tracheoesophageal prosthesis (TEP) placement in GPU patients for voice rehabilitation.

**Objectives:** To analyse the voice outcomes of secondary TEP in GPU patients.

**Methods:** Prospective cohort study of patients with advanced laryngopharyngeal malignancies who have undergone GPU and TEP by a single surgeon between 2008 and 2017 at UBC. Objective acoustic measures of fundamental frequency, vocal range, and vocal intensity, were performed using dedicated software. Voice recordings of the "Rainbow Passage" were made and were randomly presented in a blinded fashion to four trained clinicians for perceptual analysis using the previously validated GBRAS scale. Intelligibility was assessed in a blinded fashion by non-otolaryngology clinicians using a previously validated 7-point scale. The previously validated, self-reported, quality of life scale, Voice Handicap Index-10, was also administered to patients.

**Results:** Ten patients (70% male) had abnormal fundamental frequency and limited vocal range and intensity. A moderate degree of vocal impairment was judged on GRBAS perceptual analysis [grade 2.4 (0.5), roughness 2.1 (0.9), breathiness 2.2 (0.8), asthenia 1.7 (0.6), strain 1.7 (0.3)] and moderate unintelligibility [4.7 (1.4)]. Patients reported moderate voice handicap [25.3 (8.7)].

**Conclusions:** Although voice outcomes are suboptimal, TEP placement in GPU patients is feasible and provides a means of giving useable verbal communication back to these patients.

**362 Dr. Peter Skarsgard** Cardiac Surgery

**Title: Percutaneous Mitral Valve Repair: Proof of concept for a novel medical device**

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**Background:** Mitral regurgitation (MR) is the most common heart valve disease. Surgical mitral valve repair is the gold standard treatment for severe degenerative MR, but more than half of all patients in need of surgery are inoperable due to comorbidity and operative risk. Percutaneous treatment of MR, due to a favourable safety profile, is an attractive strategy to address this unmet need. Here we report proof of concept for a novel implantable medical device to repair degenerative MR using an engineered advancement of traditional surgical ePTFE neochordae implantation.

**Hypothesis:** A medical device consisting of a net of ePTFE suture, attached proximally to the mitral annulus, and distally to the ventricular myocardium, can correct mitral valve prolapse and MR.

**Methods:** Adult sheep were anaesthetized and placed on cardiopulmonary bypass. Under cardioplegic arrest, the mitral valve was exposed through a left atriotomy. A model of degenerative MR was created by division of marginal chordae tendinae supporting the anterior leaflet. After separation from bypass, anterior leaflet prolapse and posteriorly directed severe MR was confirmed by epicardial doppler echocardiography. During a second cardioplegic arrest, a medical device was surgically implanted on the mitral valve, to evaluate correction of prolapse and MR, as well as the device adjustment mechanism.

**Results:** The model of prolapse and MR was confirmed. The device corrected prolapse and MR, and the adjustment mechanism permitted stepwise correction of prolapse and MR on the beating heart.

**Conclusions:** Proof of concept is confirmed. A medical device consisting of a net of ePTFE suture, attached proximally to the mitral annulus, and distally to the ventricular myocardium, can correct mitral valve prolapse and MR.

**364 Dr. Saeideh Maleki** Otolaryngology

**Title: Epigenetic silencing of *SMPD3* in oral cancer alters cell migration, invasion, and drug response**

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**Background:** Oral squamous cell carcinoma (OSCC) displays a dismal 5-year survival rate of ~50% due primarily to a lack of early intervention and high rates of recurrence. To improve survival, we must better understand the molecular events driving the disease. We performed genome-wide DNA methylation and expression profiling of patient-derived normal, pre-malignant, and tumor tissue and identified the *SMPD3* promoter as a site of frequent hypermethylation in pre-malignant and tumor tissues. The protein encoded by *SMPD3*, neutral sphingomyelinase 2 (nSMase2), catalyzes the hydrolysis of sphingomyelin to ceramide. Ceramide has been linked to numerous cell processes, including proliferation, apoptosis, and stress response.

**Objectives:** This study aims to determine the role of *SMPD3* in cell proliferation, migration, invasion, and stress response of oral dysplasia and OSCC cells.

**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). *SMPD3* methylation and expression status were assessed in commonly used oral dysplasia (DOK, POE9-nTERT) and OSCC (Cal27, SCC-4, SCC-9, SCC-25) cell lines using methylation-specific PCR and qPCR, respectively. To determine the effect of *SMPD3* overexpression, we generated stable, doxycycline-inducible dysplasia (DOK) and OSCC (SCC-25) cell lines via lentiviral transduction. The effect of overexpression on cell proliferation was tested via manual counting (Trypan blue exclusion). Transwell assays without Matrigel were used to assess migration, whereas addition of 200 µg/ml Matrigel was used to test invasion. Finally, clonogenic assays were used to determine the effect of *SMPD3* on response to various stressors, including radiation and EGFR inhibition via the chemotherapy drug Erlotinib.

**Results:** *SMPD3* promoter hypermethylation and gene silencing was observed in 4/6 pre-malignant and 6/10 CIS/OSCC samples. In agreement, analysis of TCGA data revealed a statistically significant increase in methylation and decrease in expression of *SMPD3* in tumors compared to normal tissues. Furthermore, *SMPD3* was methylated and silenced in all oral dysplasia and OSCC cell lines analyzed, with the exception of SCC-4. *SMPD3* overexpressing

DOK and SCC-25 cells showed a significant decrease in migration and invasion compared to controls, whereas proliferation was unchanged. Furthermore, *SMPD3*-overexpressing cells showed improved clonogenic survival following treatment with the EGFR inhibitor Erlotinib.

**Conclusions:** Our results suggest that hypermethylation and silencing of *SMPD3* are early and common events in OSCC progression. *SMPD3* appears to play an important role in migration and invasion of dysplastic and malignant oral cells, and overexpression improves clonogenic survival following treatment with Erlotinib.

### 365 Dr. Victor Mocanu Otolaryngology

#### Title: "Pilot Study for Development of a Descriptive and Clinically Relevant Endoscopic Sinus Scoring System"

Victor Mocanu, Saad Alsaleh, Rami Al-Salman, Sumaiya Muathen, Rishi Bhatta, Amin Javer

University of British Columbia, Department of Surgery, Division of Otolaryngology (V.M., S.M., R.B., A.J.); Clemenceau Medical Group, Abdali Medical Center, ENT Department (R.A.); King Saud University, Head and Neck Surgery Department (S.A.)

**Background:** Chronic rhinosinusitis (CRS) is a condition in which the nasal passages and surrounding sinuses become inflamed for 12 weeks or longer. Numerous endoscopic scoring systems exist to assess disease severity in CRS. The Modified Lund-Kennedy (MLK) scoring system is one commonly used instrument which yields a 0-6 score based on edema, polyposis and discharge in nasal passages. A more descriptive Alsaleh-Javer Endoscopic Sinus Score (AJESS) system is currently being validated for CRS endoscopic scoring. The AJESS assesses all sinuses, olfactory clefts, and middle turbinates for numerical scores of edema/polyposis and letter scores for CRS features: crusting, synechia, purulence, mucus, recirculating mucus, and ostial narrowness.

**Objectives:** A pilot study was conducted to determine the test-retest and inter-rater reliability of the AJESS system.

**Methods:** CRS patients visiting the St. Paul's Sinus Centre for routine clinic follow-up were enrolled. Anonymized photos of all sinuses and olfactory clefts were collected and presented to five reviewers (three rhinology fellows and two practicing surgeons). The reviewers scored photos according to the AJESS rubric twice, two weeks apart. Statistical analysis was performed using IBM SPSS 24.

**Results:** Nine CRS patients were enrolled and ninety photos were scored. The AJESS system showed good test-retest reliability (Cohen  $\kappa = 0.68$ ; 95% CI = 0.61 - 0.75) and moderate inter-rater reliability (Fleiss  $\kappa = 0.41$ ; 95% CI = 0.39 - 0.43).

**Conclusions:** The descriptive AJESS system appears to be reliable and reproducible. An upscaled head-to-head study of the AJESS and MLK systems is examining reliability, relevance to validated patient-reported outcome measures, and correlation with olfactory ability on formal testing. Pending validation and head-to-head analysis, the AJESS system may be a more reliable and valid endoscopic scoring system for clinical practice and outcomes research in CRS.

### 366 Dr. Laura Samson, Otolaryngology

#### Title: Vitamin D Supplementation and Reduction of Severity and Frequency of Epistaxis in Hereditary Hemorrhagic Telangiectasia

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**Introduction:** Hereditary haemorrhagic telangiectasia (HHT) also known as Osler-Weber-Rendu disease, is a rare systemic autosomal dominantly inherited disorder of the fibrovascular tissue with a wide variety of clinical manifestations. The supplementation of Vitamin D in order to reach normal levels has been suggested as a therapy for those with cardiovascular disease due to its impact on arterial stiffness. As well, observational retrospective studies have found an association between Vitamin D levels and epistaxis bleeding time and severity in HHT patients. Despite evidence of the positive effect Vitamin D has on HHT patients and epistaxis, no prospective study has been performed.

**Objectives:** The primary objective of this study is to determine if Vitamin D supplementation of 1000 or 4000 IU daily will reduce the frequency and severity of epistaxis among HHT patients. Additionally, we aim to determine the adequate dosage of Vitamin D supplementation to reduce the frequency and severity of epistaxis in HHT patients.

**Methods:** This is a prospective randomized control trial study of 60 patients diagnosed with HHT. Patients diagnosed with HHT who are not taking Vitamin D supplementation at the time of recruitment are randomized into one of three groups: 1) receiving 1000 IU vitamin D; 2) receiving 4000 IU and 3) the control group receiving a placebo. Patients are instructed to take daily supplementation for the 6-month duration of the study. Endpoints include Epistaxis Severity Score (ESS) questionnaire, count of nasal arteriovenous malformations (AVMs) and Serum Vitamin D levels. This data is collected at baseline, 3 and 6 months follow up visits.

**Results:** There was no significant change in mean ESS between baseline and 3 months in either the placebo (n=4, baseline=4.82, 3-month=4.86, p=0.95), or 1000IU treatment group (n=10, baseline=5.57, 3-month=5.05, p=0.61) and a non-significant decrease in the 4000 IU treatment group (n=9, baseline=5.10, 3-month=4.73, p=0.5). Additionally, a decrease was noted in placebo (n=5, baseline=5.49, 6-month=4.18, p=0.20) and 4000 IU (n=10, baseline=5.10, 6-month=4.65 p=0.40) but not in 1000IU (n=11, baseline=5.89, 6-month=5.84 p=0.95), between baseline and six months however, none of these differences were found to be statistically significant. There was no statistically significant difference in ESS scores at baseline, 3 months, and 6 months based on receiving a different dosage of Vitamin D supplementation (F = 0.945, p = 0.982; Wilk's  $\Lambda = 0.173$ ).

**Conclusion:** There was a non-significant decrease in ESS over a 6-month period for HHT patients on either dosage of 1000IU or 4000IU Vitamin D. However, these preliminary results suggest a trend in reduced Epistaxis Severity Score for patients on the highest dosage, 4000IU, of Vitamin D supplementation. After the completion of 60 patients, there will be a large enough sample size to determine if there is a significant decrease in ESS when patients are on 4000IU Vitamin D supplementation for 6 months.

### 367 Dr. Daegan Sit Radiation Oncology

#### Title: Treatment and Outcomes in pT4 Well-Differentiated Thyroid Carcinoma

Daegan Sit<sup>ab</sup>, Wanxian Koh<sup>a</sup>, Aria Shokohi<sup>ab</sup>, Eric Tran<sup>ab</sup>, Eric Berthelet<sup>ab</sup>, Jonn Wu<sup>ab</sup>, Robert Olson<sup>ab</sup>, Sarah Hamilton<sup>ab</sup>

**Background:** Locally advanced, pT4 well differentiated thyroid carcinoma is a relatively rare entity and the benefit of external beam radiotherapy is unclear.

**Hypothesis:** The purpose of this study is to evaluate locoregional control (LRC) and cancer specific survival (CSS) of patients with pT4 well differentiated thyroid carcinoma in the largest, single-institution retrospective cohort to date.

**Methods:** Electronic records of patients with pT4 well-differentiated thyroid carcinoma treated at our institution from 2001 to 2013 were reviewed. Log-rank test and multivariable Cox regression were used to establish factors impacting locoregional control and cancer specific survival.

**Results:** A total of 232 patients were treated during this time period. The most common histologies were papillary carcinoma (n=192) and follicular carcinoma (n=11). The median age was 58, 61% were female and 39% were male. Median follow up time was 11 years. The median tumour size was 3.1cm (interquartile range: 2.0-5.0cm), 60% had multifocal disease, 33% lymphovascular invasion, 9% perineural invasion and 64% had node positive disease. Local invasion into the strap muscles was seen in 51%, trachea 33%, larynx 4%, pharynx 3%, and recurrent laryngeal nerve 1%. 22% patients had an R0 resection, 56% R1 and 23% R2. 90% patients received adjuvant radioactive iodine therapy. A total of 88 patients received external beam radiotherapy with a median dose of 60Gy. There were 7 acute grade 3 toxicities (3 dysphagia, 2 nausea, and 2 pain); there were 7 late grade 3 toxicities in the cohort (2 dysphagia, 3 esophageal stricture, 1 pain, 1 laryngeal stenosis). There were no grade 4 toxicities observed.

Ten year LRC was 65%, CSS was 85% and OS was 75%. On multivariate analysis, older age (p=0.02, HR 1.02, 95% CI 1.0-1.04), larynx invasion (p=0.05, HR 3.32, 95% CI 1.0-11.0) and larger tumour size (p=0.01, HR 1.17, 95% CI 1.04-1.32) were associated with worse LRC. Older age (p<0.001, HR 1.10, 95% CI 1.06-1.15), lymphovascular invasion (p=0.002, HR 3.3, 95% CI 1.5-7.2), perineural invasion (p=0.02, HR 2.9, 95% CI 1.19-7.48), and tracheal invasion (p=0.009, HR 2.7, 95% CI 1.3-5.5) were associated with worse CSS. Adjuvant RT was not associated with improved LRC and CSS when the entire cohort

was assessed. However, for patients with microscopic or macroscopic residual disease (R1 and R2 resection), adjuvant radiotherapy was associated with improved LRC on multivariable analysis ( $p=0.02$ , HR 0.45, 95% CI 0.23-0.90).

**Conclusion:** Despite locally advanced disease; 10 year CSS was 85% in this cohort of patients with pT4 DTC. Adjuvant radiotherapy improved LRC for patients with R1 and R2 resections and was associated with a low rate of toxicity.

### 368 Amanian, Ameen Otolaryngology

#### **Bone Mineral Density in Recalcitrant Chronic Rhinosinusitis Patients on Long-Term Intranasal Budesonide via Mucosal Atomization Device: A Cross-Sectional Study**

Jamil Manji, Gurkaran Singh, Luis Macias-Valle, Andres Finkelstein, Christopher Okpaleke, Anali Dadgostar, Fahad Al-Asousi, Ameen Amanian and Amin Javer.

**Background:** Chronic rhinosinusitis (CRS) is a common condition affecting millions of North Americans. Due to concerns with absorption of systemic steroids, such as decreased bone density, otolaryngologists frequently prescribe intranasal corticosteroids (INCS). It is important to identify the risks of INCS on bone density given the public health impact of osteoporosis on the general population.

**Hypothesis:** To determine if the long-term use of topical nasal budesonide delivered via the mucosal atomization device (MAD) has an impact on bone density (BMD).

**Methods:** In a cross-sectional study of CRS patients ( $N=173$ , 89 females, average age= 55.7 years, SD 12.4) who had previous sinus surgery and were receiving intranasal budesonide via MAD ( $\geq 12$  months, average duration=17.5 months, SD 4.3), BMD was measured. The WHO classification of T-scores for osteopenia and osteoporosis and Pearson correlation analysis ( $\alpha=0.05$ ) were performed.

**Results:** No significant correlation was found between BMD and concomitant treatment. T-scores of the femur, spine and hip were significantly correlated with age and body mass index. Prevalence of osteoporosis among women (11%) and men (9.5%) aged  $\geq 50$  years was comparable to the national prevalence.

**Conclusion:** The prevalence of osteoporosis among recalcitrant CRS patients using long-term intranasal budesonide via MAD was comparable to that of the general population.

### 369 Dr. Printha Wijesinghe Otolaryngology

#### **Title: Role of oxidative stress-related miRNAs in idiopathic sudden sensorineural hearing loss (SSNHL) etiopathogenesis**

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**Background:** MicroRNAs (miRNAs) regulate gene expression. There is little known about the impact of oxidative stress on the expression of miRNAs and their targeted mRNAs in auditory cells. Ischemia one of the main proposed pathogenetic mechanisms for idiopathic sudden sensorineural hearing loss (SSNHL) may exert its effect through oxidative stress.

**Objective:** To compare the miRNA expression profiles of, hypoxic versus normoxic House Ear Institute -Organ of Corti 1 (HEI-OC1) cells cultured under permissive conditions; SSNHL patients (treated and untreated) versus age-matched normal hearing controls (NHCs) serum samples; and to compare the differentially expressed miRNAs (DEMs) observed in hypoxic HEI-OC1 cells with that in SSNHL patients' serum.

**Materials and Methods:** We induced oxidative stress by treating HEI-OC1 cells with 5mM H<sub>2</sub>O<sub>2</sub> for 1hr exposure under permissive culture conditions. miRNAs extracted from hypoxic and control cell lysates were compared using a TaqMan Low Density Array (TLDA) (Rodent MicroRNA A+B Cards Set v3.0) PCR system. Prospective SSNHL patients presenting within 28 days of onset of hearing loss were recruited as were age-matched controls. Pooled sera of untreated ( $n=04$ , mean age =57.1 years), treated (32, 52.6) SSNHL patients and age-matched NHCs ( $n=09$ , 51.2 and  $n=03$ , 50.0) were used for miRNAs investigations using TLDA (Human MicroRNA A+B Cards Set v3.0).

**Results:** There were 8 DEMs miR-133a-3p/ -141-3p/ -146b-5p/ -190b-5p/ -200b-3p/ -200c-3p/ -223-3p and -375-3p identified in common when comparing the hypoxic with normoxic HEI-OC1 cells findings and the untreated SSNHL patients' with NHCs sera findings. 4 of these 8 DEMs (miR-146-5p/ -190b-5p/ -200c-3p and -375-3p) were similarly found in common when comparing hypoxic with normoxic HEI-OC1 cells and treated SSNHL with NHCs sera. The putative target mRNAs of the DEMs were enriched predominantly in signaling pathways phosphatidylinositol 3 kinase / protein Kinase B (PI3K/Akt) followed by mitogen-activated protein kinase (MAPK) in untreated patients/hypoxic cells; whereas Rap1 and MAPK were the corresponding signaling pathways predominantly enriched in treated patients/hypoxic cells.

**Conclusions:** The PI3K/Akt signaling pathway is involved in response to oxidative stress in HEI-OC1 cells and in untreated SSNHL patients, whereas Rap1 signaling which is suggested to regulate vascular morphogenesis or suppress reactive oxygen species is enriched in treated SSNHL patients. These findings support oxidative stress as a pathogenetic mechanism in SSNHL.

### 370 Dr. Nawaf Al Muqaimi Plastic Surgery

#### **Title: Hospital Length of Stay after Cleft Palate Surgery: An Analysis of 200 Consecutive Cases.**

Nawaf Al Muqaimi, Erika Henkelman

**Background:** There is a growing trend towards decreased post-operative in hospital length of stay. This is driven by the desire to decrease hospital costs, increase patient capacity, and improve the patient/family experience. While studies have shown that patients can safely have cleft lip repair as a day or short stay surgery; optimal length of stay after palatoplasty is less clear. Patients undergoing cleft palate repair are at risk for airway complications and postoperative bleeding within 48-hours following surgery. Keeping patients in the hospital longer may provide faster response times to postoperative complications. Longer postoperative hospital stays for patients undergoing palatoplasty has previously been shown to be associated with: structural airway anomalies, longer operative and anesthesia duration, older age, female gender, and the presence of a syndrome.

**Objectives:** This study aims to (1) quantify the postoperative length of stay for patients undergoing palatoplasty at BC Children's Hospital, and (2) analyze variables such as extent of the cleft, surgical technique, surgical time, geographical home, patient's demographics, presence of a relevant comorbidity, ASA status and Pierre Robin Sequence (PRS) diagnosis.

**Methods:** A retrospective chart review was conducted on 200 consecutive patients undergoing primary repair of a cleft palate from June 2011 - May 2018. Demographic, perioperative data were collected from the BC Children's Hospital Database and analyzed.

**Results:** The study cohort consisted of 108 males and 92 females who underwent palatoplasty at a median age of 11.0 months (IQR 9.5 - 12.4). Specific cleft diagnoses were: cleft lip and palate (91), cleft palate (101), and submucous cleft palate (8). 29 patients had a syndrome, 18 patients had a relevant comorbidity and 29 patients had Pierre Robin Sequence (PRS). The most common surgical technique was two-flap palatoplasty (70), followed by Wardill palatoplasty (49), Furlow palatoplasty (48), von Langenbeck (27), and hybrid palatoplasty (3). 179 patients had myringotomy tubes inserted at the time of cleft palate repair. Median surgical time was 2.1 hrs. (IQR 1.7 - 2.5 hours).

Median length of stay from exiting the operating room to discharge was 43.1 hrs (IQR 26.1 - 50.1) with 90 patients staying 1 night, 78 patients staying 2 nights and 32 patients staying more than 2 nights. Length of stay (# of nights) did not depend on surgical technique ( $p=0.438$ ), cleft type ( $p=0.267$ ), presence of a relevant comorbidity ( $p=0.08$ ), age at surgery ( $p= 0.136$ ), myringotomy tubes insertion ( $p=0.147$ ), or geographical home ( $p=0.451$ ). Patient factors associated with a significantly longer length of stay included PRS ( $p<0.001$ ) and an ASA status of 3 or 4 ( $p=0.009$ ). A longer surgical time was also associated with a longer length of stay ( $p=0.016$ ).

**Conclusion:** Patients with PRS, an ASA status of 3 or 4, and those who have longer operations are more likely to stay for more nights post-operatively. Surgical technique and cleft type are not associated with a longer length of stay.

### 371 Dr. Mostafa Fatehi Neurosurgery

#### **Title: Early and Delayed Functional Outcomes after the Treatment of Posterior Inferior Cerebellar Aneurysms**

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**Objective:** Aneurysms of the posterior inferior cerebellar artery (PICA) are a rare cause of subarachnoid hemorrhage. Treatment for this type of aneurysm may be microsurgical clipping or endovascular (coil embolization, flow diverting stent, and proximal occlusion). This decision is based on patient characteristics, aneurysm location and dimensions, along with surgeon and institutional experience. Understanding how patient outcomes are affected by the different treatments of PICA aneurysms would help physicians and patients in their decision regarding treatment options.

**Methods:** Retrospectively, we reviewed the charts of 52 patients who were admitted to Vancouver General Hospital for ruptured or symptomatic PICA aneurysms between 2005 and 2015. Modified Rankin Scores were assigned at the time of discharge and at two subsequent follow-up time points. The mean short-term follow-up period post-operatively was 11.1 months and the mean long-term follow-up period was 19.3 months. Clinical and radiological characteristics were also collected.

**Results:** Of the 52 patients, 2 died prior to obtaining treatment. Of the 50 patients who were treated for their PICA aneurysm, 39 (78%) presented with subarachnoid hemorrhage while 11 (22%) had symptomatic unruptured PICA aneurysms. Overall, 11 (22%) patients had endovascular treatment (coil embolization) while 39 (78%) patients underwent microsurgical clipping/trapping of the aneurysm. At the time of hospital discharge, patients in the microsurgical group had a better mean score on the modified Rankin Scale (2.3) compared to the endovascular group (3.0). This disparity decreased as the mean long-term score in the endovascular group (1.6) was comparable to the microsurgical group (1.9).

**Conclusion:** While the early outcomes in patients treated endovascularly are better, there is no statistically significant outcome difference between the microsurgical and endovascular patient groups in long-term follow-up.

### 372 Dr. Temitope Grace Joshua

#### **Title: A systematic review on treatments outcomes of patients with sudden sensorineural hearing loss.**

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**Background:** Sudden sensorineural hearing loss (SSNHL) is a rapid usually idiopathic hearing decline greater than 30dB over at least three contiguous audiometric frequencies occurring within a 72-hr period. Treatment of SSNHL remains somewhat controversial. Corticosteroids are the mainstay of treatment, and high-dose oral corticosteroids are considered as the first line treatment though intra-tympanic (IT) steroid injections are also widely administered. Hyperbaric Oxygen therapy (HBOT) is mostly considered an adjuvant therapy for SSNHL.

**Objective:** The purpose of this study is to evaluate the current literature on the effectiveness of oral steroids, IT steroids and HBOT based treatments on hearing outcomes in patients with SSNHL.

**Methods:** A systematic review of primary studies published in the English language between January 2000 to June 2018 identified by searching Medline, PubMed, Web of Science, and Embase databases was performed. Inclusion criteria were SSNHL demonstrable on a pure-tone audiogram, no other neurological signs, and commencement of treatment within 14 days of the onset of the hearing loss. Patients with all other types of hearing loss were excluded. The quality of included studies was assessed using the National Institute of Health Assessment tool. The type of investigations, study methods, interventions, and outcomes were recorded on a standardized data collection form. The primary outcome measure was hearing recovery defined as hearing improvement >15dB post treatment. Additional outcome measures of interest included objective measures, such as the change in averaged pure-tone audiometric (PTA) scores, speech discrimination scores and subjective measures, such as patient reports of tinnitus, vertigo, and perceived hearing improvement.

**Results:** 223 articles were identified of which 24 articles meet the study inclusion criteria. The quality of evidence was good in 20 articles, and poor in the remaining 4 articles. Overall, 90% of 1857 patients in the 20 studies who received oral and IT steroids (combination therapy) demonstrated hearing recovery compared to a 75% recovery rate in 776 patients who received oral steroids alone. Combination therapy had statistically significant hearing improvement compared with oral steroids alone (Chi squared,  $p < 0.05$ ). The results of studies that included patients who received triple therapy with HBOT were inconsistent.

**Conclusions:** There was a significant greater hearing improvement (>15db) noticed in patients who received combination therapy ( $p < 0.05$ ) compared to oral steroids alone or HBOT.

### 373 Dr. York Hsiang

#### **Title: The Development of a Smart Stent to Detect In-Stent Restenosis**

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**Background:** In order to prevent in-stent restenosis, stent research has focussed on stent coatings. The purpose of this study was to use microelectronics to develop a smart stent capable of providing continuous monitoring of restenosis through the implanted stent.

**Objectives:** To develop an integrated stent coupled to a pressure transducer to provide intra-stent pressure information wirelessly.

**Methods:** An electrically active stent which served as its own antenna was constructed and tested in vitro and in vivo over a range of pressure measurements.

**Results:** Prototype stents were developed to withstand crimping forces >100N and balloon expansion pressures up to 16 atm. Using in vitro models of tubes with flowing saline, the prototypes had a wireless sensing resolution of 12mmHg. Using a swine model, the prototypes were implanted in PTFE vascular grafts anastomosed to the femoral artery. Using intraluminal clot as a model of in-stent restenosis, the prototype provided real-time tracking of blood pressure changes over a range of 108 mmHg.

**Conclusion:** We developed a prototype smart stent that could withstand the crimping forces similar to the production of balloon angioplasty catheters. These stents provided wireless information over a range of 100mmHg suggesting that they would be able to transmit clinically relevant information about the development of in-stent restenosis.

### 374 Dr. Alice Liu

#### **Title: The effectiveness of motivational interviewing on hearing aid use**

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**Background:** Motivational interviewing (MI) is a method of interacting with patients to enhance behavioral change; the technique works on the principle that behavior change is largely patient dependent. It is well known that many individuals with hearing loss are ambivalent in regards to seeking assistance for hearing loss and using hearing aids. To our knowledge, a systematic analysis of current literature has not been done to determine the efficacy of MI in increasing hearing aid use.

**Objectives:** To determine the impact of MI on hearing aid use compared to standard care. Secondary outcomes include determining if there are associated adverse effects with MI, analyzing the barriers to implementing MI, and to provide clinical recommendations on how MI can be best used.

**Methods:** A systematic review of the Cochrane ENT, Central, Medline, Web of Science, ICTRP, and ClinicalTrials.gov databases was performed following PRISMA statement guidelines. Inclusion criteria were randomized controlled trials (RCT) published between 1988 and 2018 that compared MI to standard care. Abstracts were reviewed and data extracted by two independent reviewers. RevMan 5.3 and a random effect model were used for analysis.

**Results:** In total, 626 articles were identified across the databases mentioned above. Three articles and one clinical trial, examining 176 patients, were included in the final data extraction. Two articles showed a statistically significant increase in hours of hearing aid use in MI treated patients compared to standard care in immediate follow-up; one RCT showed an increase that was not significant and another did not report on hearing aid use. There were no reported associated adverse effects.

**Conclusions:** Motivational interviewing appears to achieve an immediate increase hearing aid use compared to standard care. This technique needs to be further evaluated to determine if the immediate improvements in hearing aid use are maintained over time.

### 375 Dr. Aishwarya Roshan

#### **Title: Back (Door) to the Future: Dorsal Lumbotomy for Pediatric Upper Pole Hemi-Nephrectomy**

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**Introduction:** The dorsal lumbotomy approach to renal surgery has become a lost art. Upper pole heminephrectomy (UHN) is performed for two main indications: ectopic ureterocele and duplication anomalies with upper pole ectopy. Current popular techniques for conducting UHN include open flank, laparoscopic, and robotic.

**Objectives:** This study evaluates outcomes following dorsal lumbotomy (DL), an open approach used historically for pyeloplasty and pyelolithotomy, and in which no clinical trials or exclusive case-series have been conducted for UHN in children.

**Methods:** A retrospective review of 50 UHN performed in pediatric patients using the DL approach by a single surgeon at BC Children's Hospital between 2000–19. Clinical variables and indicators included age, sex, weight, skin to skin time, total operative time, duration of hospital stay, post-operative complications, analgesic requirements, and 3-month post-operative ultrasound results.

**Results:** Mean age at surgery was 24.5 months. Mean length of follow-up was 22.5 months. Mean (range) for time between skin incision and closure was 90 (62 – 140) minutes, and the mean (range) total operating room time was 140 (70 – 180) minutes. There were neither intraoperative complications nor transfusions. The mean (range) post-operative opioid delivered was 0.74 (0.00 – 2.00) mg/kg/day. Mean (range) post-operative ibuprofen delivered was 4.73 (0.00 – 25.00) mg/kg/day. Median length of hospital stay was 2 days. No patients received postoperative prescriptions for narcotics at discharge. Two patients experienced minor wound complications. One patient had secondary atrophy of the lower pole. Secondary lower tract surgery, unrelated to surgical approach, was performed in six patients. Fifteen patients experienced a urinary tract infection at some point after surgery.

**Conclusions:** DL is an historical approach for UHN that should not be forgotten. It is safe, feasible, and produces operative outcomes and times comparable or superior to that of conventional open flank incision, laparoscopic, and robotic techniques. These findings as well as cost considerations should be considered when promoting robotic approaches to UHN.

### 376 Dr. Annie Lalonde General Surgery

#### **Title: Standardizing peri-operative VTE prophylaxis in orthopedic trauma patients at VGH – is there room for improvement?**

Annie Lalonde<sup>1</sup>, John Steyn<sup>1</sup>, Emilie Joos<sup>2</sup>, Philip Dawe<sup>2</sup>, Morad Hameed<sup>2</sup>, David Evans<sup>2</sup>, Pierre Guy<sup>3</sup>, Naisan Garraway<sup>2</sup>.

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**Background:** Venous thromboembolic events (VTE) are a significant cause of morbidity and mortality in trauma patients, who have an inherent higher VTE risk than the general hospitalized patients. VTE rates were anecdotally found to be higher than expected in patients with long bone orthopedic trauma at Vancouver General Hospital (VGH), increasing from 2012 to 2016 to a maximum of 4.6% (1.3% (DVT) and 1.8% (PE) for general trauma patient population). The current practice guidelines from multiple societies, including the American Association of Orthopedic Surgeons and CHEST, address VTE prophylaxis (VTEp) mostly in the context of elective reconstructive procedures, with minimal recommendations for trauma patients, leading to equipoise and variability in practices. Variations in local peri-operative VTE prophylaxis (VTEp) administration were suspected to contribute to our increasing VTE rates.

**Objectives:** Determining orthopedic surgeon-lead local practices for peri-operative administration of VTEp in orthopedic trauma patients.

**Methods:** A survey was created in collaboration with orthopedic surgeons at VGH, with questions addressing demographics of the surgeons, long bone and pelvis fracture-specific peri-operative VTEp administration practices and barriers to optimal VTEp prescription. It was distributed to practicing orthopedic trauma surgeons at Vancouver General Hospital and Royal Columbian Hospital. Responses were recorded on an online platform.

**Results:** 11 of 12 surveyed surgeons responded. Pre-operative VTEp administration and holding practices were highly variable for most fracture types (operative pelvis and acetabular fractures, femur fractures, hip fractures for patients over 65 years old, tibial plateau fractures), with the exception of tibial shaft fractures and upper extremity fractures. 81% of respondents recommended VTEp upon discharge following surgery for pelvis, acetabular and femur fractures, though cost was raised as a common prohibitive factor. Case cancellation by anesthesiologists due to concerns over optimal and safe timing with neuraxial anesthesia was found to be one of the barriers to pre-operative VTEp administration.

**Conclusions:** Practices for peri-operative VTEp management were significantly variable, with key actionable issues identified. Future directions include surveying orthopedic trauma surgeons in level 1 trauma centers in Canada and the USA, surveying our local anesthesiologists in regards to optimal timing of VTEp for safe neuraxial anesthesia and clarifying current outpatient VTEp prescription patterns at VGH.

### 377 Dr. Dhatt Saroop Pediatric Surgery

#### **Title: Improving the Diagnostic Accuracy of Pediatric Appendicitis using a Multidisciplinary Pathway**

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**Background/Purpose:** Improvement opportunities exist in the accuracy and timeliness of the diagnosis of childhood appendicitis. The purpose of our study was to conduct a post-implementation audit of a diagnostic pathway for children with suspected appendicitis presenting to our pediatric emergency department.

**Methods:** We adopted a diagnostic pathway that utilized a validated risk of appendicitis stratification tool (Alvarado score) with protocolized use of abdominal ultrasound for moderate risk patients. We conducted a 10% convenience sample audit of pathway patients treated over the subsequent 18-month period. Outcome measures included false negative and positive rates, sensitivity, specificity and overall pathway accuracy.

**Results:** 134 pathway patients, of which 22 (16.4%) had appendicitis confirmed pathologically, were evaluated. The risk group distribution of patients was: low risk (29%), moderate risk (60%) and high risk (11%). The negative appendectomy rate was 4.4% (reduced from 14% pre-pathway) and the false negative (missed appendicitis) rate was 3.0%. No patients received CT scans. Pathway sensitivity was 81.8% (95% CI 59.7% to 94.8%), specificity-92.9% (95% CI 86.4%-96.9%), and overall accuracy-91.0% (95% CI 84.9%-95.3%).

**Conclusion:** Implementation of a diagnostic pathway achieved a high level of accuracy and reduced our institutional negative appendectomy rate by 67%. The audit identified additional pathway improvement opportunities.

**378 Dr. Annie Lalande** General Surgery**Title: Reflecting on 5 years of Primary Trauma Care course experiences in Gondar, Ethiopia.**

Annie Lalande<sup>1</sup>, Kristin DeGirolamo<sup>1</sup>, Mery Berhan<sup>2</sup>, Dessie Yirdaw<sup>2</sup>, Shahrzad Joharifard<sup>1</sup>, Vito Zou<sup>1</sup>, Richard Simons<sup>3</sup>, Miklol Mengistu<sup>2</sup>, Mensur Yassin<sup>2</sup>, Naisan Garraway<sup>3</sup>.

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**Background:** Trauma is a leading cause of morbidity and mortality around the world, with low- and middle-income countries (LMICs) bearing the majority of its burden. Through an ongoing partnership for over 5 years, the Branch for International Surgical Care, in collaboration with the Trauma Services at VGH, has been involved in expanding surgical capacity in Gondar, Ethiopia, featuring training as one of the main strategies. The Primary Trauma Care (PTC) course is an internationally-recognized course that has been developed to target low-resource countries as an alternative to less adapted courses and has been used in all of the team's previous deployments.

**Objectives:** Evaluating the three iterations of the PTC course in Gondar, Ethiopia.

**Methods:** The PTC course was taught on three separate occasions during three deployments between 2015 and 2019. Initially offered to senior staff in the context of a training-the-trainer session, as well as to senior residents and rural staff, it was then provided to the senior general surgery residents and, based on feedback, taught to junior residents the following year. The course ran over two days, consisting of didactic sessions, practical skills sessions and group scenarios. A pre-course test was administered to evaluate baseline knowledge and re-administered after the course to evaluate short-term knowledge retention. Surveys included in the PTC course as well as one designed by UBC were provided to the participants after the course.

**Results:** The PTC course has now become independently run by local leadership with minimal support from the Canadian team. 8 junior general surgery residents and 6 anesthetists participated in the 2019 iteration, encouraging more interdisciplinary exchange than in the previous years. All students improved between the pre-course test and the post-course test, on average by 12.5%. 79% of the trainees felt definitely more confident in their management of trauma patients, while all the others felt somewhat more confident. For all iterations, the trainees have emphasized that these sessions were useful, practical, provided them with a systematic approach to the trauma patient and introduced or supported the vision of trauma as a team effort.

**Conclusions:** The PTC course is adapted to the local environment to provide essential knowledge for the care of the injured patient. It has served as a platform to engage residents in addressing local issues of access to care. The course has been offered to progressively younger trainees, though some further teaching for interns and first year residents is needed given their primary role in the initial resuscitation. Future directions include supporting the provision of the course to more rural general practitioners, as well as conducting an evaluation of long-term knowledge and skills retention 6-12 months after the course.

**379 Dr. Martha L Talbot** General Surgery**Title: Population-based treatment, regional recurrence patterns and survival in Merkel cell carcinoma: a 15-year review**

Martha Talbot, Heather Stuart, Trevor Hamilton

UBC General Surgery

**Background:** Merkel cell carcinoma (MCC) is a rare, neuroendocrine tumor of the skin that commonly metastasizes to lymph nodes. Current guidelines recommend sentinel lymph node biopsy (SLNB) for node negative patients.

**Methods:** A retrospective review of all Provincial Cancer Agency cases of MCC from 2000 to 2015. Demographics and therapeutic interventions were assessed focusing on SLNB in node negative patients. Kaplan-Meier curve estimates and log-rank testing were used to compare survival and regional recurrence rates. Cox proportional hazard modeling was used for multivariate analysis.

**Results:** 285 cases of MCC were identified, 200 (70.2%) were node negative at diagnosis. Of the node negative cohort 55.5% were male with median age of 77 years [IQR 69-83]. Sixteen different treatment pathways were identified within this cohort, and 17.4% had a SLNB. On univariate analysis median overall survival was significantly longer for node negative patients who had a SLNB compared to those who did not (106.2 months vs 50.9 months, p=0.028). The 5-year regional recurrence was 23.4% in the entire cohort. In the node negative cohort, the regional recurrence rate was 22.8% in those with SLNB and 26.5% for those without a SLNB (p=0.52). On multivariate analysis only age and wide local excision were found to significantly reduce regional recurrence rate.

**Conclusions:** Despite current recommendations, the routine SLNB in node negative patients with MCC is lacking. Further study of the impact of SLNB on survival and regional recurrence is required with a larger cohort.

**380 Dr. Paige Knight** Plastic Surgery**Title: Pre-operative tranexamic acid reduces peri-operative blood loss: A meta-analysis**

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**Purpose:** Tranexamic acid (TXA) is a synthetic anti-fibrinolytic which has been used in various surgical disciplines to reduce blood loss. However, its utility in plastic surgery has not been well characterized. This study evaluates the current evidence for the efficacy and safety of TXA on surgical blood loss in all surgical disciplines.

**Methods:** Cochrane Central and Embase were searched in November 2018, and search terms included "Tranexamic Acid" AND "Intravenous", with studies limited to Randomized controlled trials (RCTs) in humans. Two independent reviewers and an arbitrator assessed articles for inclusion. Criteria included a single pre-operative bolus dose of intravenous TXA, surgical patients, and intra-operative blood loss measurement.

**Results:** A total of 1098 articles were screened, 57 met inclusion criteria. RCT's were performed across a wide variety of surgical subspecialties: orthopedic surgery (27), obstetrics and gynecology (16), oral maxillofacial surgery/ Otolaryngology (10), cardiac surgery (3), and plastic surgery (1). Sample sizes of the included trials ranged from 6 -374, and mean age of participants ranged from 22.8-79.3 years. There were a total of 5698 patients included in the analysis.

**Conclusion:** A single pre-operative dose of intravenous TXA reduces peri-operative blood loss compared to placebo (-153.33cc (95% CI = -187.79cc to -118.87cc) in a variety of surgical disciplines without increasing the risk of thromboembolic events (OR1.00). Therefore, a single pre-operative dose of TXA should be considered, particularly for elective day surgery procedures to minimize risks of peri-operative blood loss.

**381 Dr. Annie Lalande** General Surgery**Title: Stewardship of laboratory investigations and rational resource utilization in acute care surgery.**

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**Background:** Ancillary tests in hospitalized patients should be performed to support clinical judgment and identify actionable issues for ongoing care. Excessive laboratory investigations can lead to iatrogenic anemia, prolonged recovery and increased blood transfusion requirements. Currently, limited research exists characterizing the full impact of unnecessary phlebotomy, including factors such as hospital costs and environmental consequences.

**Objectives:** Characterizing unnecessary laboratory investigations ordering patten at Vancouver General Hospital (VGH) on the Acute Care Surgery (ACS) service.

**Methods:** A retrospective chart review was performed for patients admitted to the ACS service at VGH between January 1 and December 31, 2018 investigating five disease entities: acute uncomplicated appendicitis, acute uncomplicated cholecystitis, choledocholithiasis, gallstone pancreatitis and adhesive small bowel obstruction treated non-operatively. Up to 20 patients per disease entity with an uncomplicated course were randomly selected for further analysis. Bloodwork ordered during their admission was compared to an ideal pathway for laboratory investigations, established by a consensus amongst General Surgery division members. The associated pure carbon footprint was calculation using the Department for Environment, Food and Rural Affairs (DEFRA) PAS2050 methodology and publicly available raw materials origin data.

**Results:** 304 patients met the admissions criteria, of which 83 were randomly selected and further evaluated. On average, 76% of evaluated patients had excessive bloodwork drawn during their admission. Moreover, 100% of patients undergoing a same admission laparoscopic cholecystectomy for gallstone pancreatitis and choledocholithiasis had excessive bloodwork drawn. This represents an estimated 1201 excessive tests and laboratory costs of 10,158\$ for all the included patients. Carbon footprint calculations are underway.

**Conclusions:** Excessive bloodwork was prevalent in the population studied, suggesting that unnecessary investigations are a significant problem in the hospitalized general surgery patients, with far-reaching impacts. Next steps include calculating the associated carbon footprint on a more granular level, expanding the population studied to include various services and spearheading local policy changes at Vancouver General Hospital and in our Health Authority.

**382 Wiseman, Sam** General Surgery

**Title: LIMITED CLINICAL UTILITY OF INTRAOPERATIVE FROZEN SECTION DURING PARATHYROIDECTOMY FOR TREATMENT OF PRIMARY HYPERPARATHYROIDISM**

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**BACKGROUND & OBJECTIVES:** This study's objective was to evaluate the utility of intraoperative frozen section (IFS) performed during parathyroidectomy for treatment of primary hyperparathyroidism (PHP), and to identify patients for whom it is most helpful.

**METHODS:** A retrospective chart review was carried out for all patients who underwent parathyroidectomy for treatment of PHP between January 2013 and June 2018.

**RESULTS:** 262 patients made up the final study population. Overall, IFS provided information that influenced the operative plan in 46 patients (17.6%). IFS altered the operative plan in 10.2% of cases that were correctly preoperatively localized, and in 41.5% of cases that were either incorrectly or not preoperatively localized.

**CONCLUSIONS:** IFS did not provide information that influenced the operative plan during parathyroidectomy for treatment of PHP for the majority of patients. Patients that present with normal PTH and hypercalcemia, or those who do not localize preoperatively, are most likely to benefit from IFS.

**383 Brar, Shanjot** General Surgery

**Title: Discharge VTE Prophylaxis Prescribing Patterns of VGH Trauma and Orthopedic Surgeons Following Orthopedic Trauma Surgery at Vancouver General Hospital.**

*Shanjot Brar<sup>1</sup>, Annie Lalonde<sup>1</sup>, Philip Dawe<sup>2</sup>, Emilie Joos<sup>2</sup>, Morad Hameed<sup>2</sup>, David Evans<sup>2</sup>, Naisan Garraway<sup>2</sup>.*

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**Introduction.** Patients undergoing orthopedic surgery following trauma have been described to be at a high risk of developing venous thromboembolic events (VTE), due to multiple factors including the trauma itself, the surgical intervention and prolonged subsequent immobility. The ACCP, SIGN, British Orthopaedic Association and NICE guidelines all recommend variable options for the type and length of VTE prophylaxis (VTEp) following orthopedic surgery, though most concern elective reconstruction procedures. A recent survey sent to orthopedic trauma surgeons at Vancouver General Hospital and Royal Columbian Hospital demonstrated that most surgeons would recommend prescribing post-operative VTEp at discharge for patients with pelvic, acetabular or hip fractures (81%) and other long bone fractures. Anecdotally, orthopaedic trauma patients admitted under the trauma service have been noted to receive post-discharge VTEp infrequently. This study aimed to better describe prescribing patterns of physicians at VGH following orthopedic trauma fractures.

**Objectives.** Determining the discharge VTEp prescribing patterns for orthopedic trauma patients at VGH.

**Methods.** A retrospective chart review was conducted for orthopedic trauma patients admitted to Vancouver General Hospital from Nov 1, 2017 to Oct 31, 2018 with an Injury Severity Score of 12 and above. Data was collected from hospital charts as well as from the provincial trauma registry, with parameters evaluated including attending orthopaedic and trauma surgeon, surgery performed, discharging physician and VTE prophylaxis (duration and type) prescribed upon discharge.

**Results.** Data collection is currently underway for the 411 identified orthopedic trauma patients meeting inclusion criteria. Preliminary results demonstrate that on average, 28% (27/97) of patients with an operative long bone fracture were prescribed VTEp upon discharge. 34% (11/32) of patients with pelvic fractures were discharged with VTEp medication, most commonly enoxaparin or dalteparin.

**Conclusions.** Despite most orthopedic trauma surgeons at VGH and RCH recommending prescription of VTEp upon discharge, preliminary results demonstrate rates lower than expected. This suggests a discrepancy between prescribing practices regarding type/length of medication following operative long bone fracture upon discharge, a likely multifactorial issue which will require further characterization.

**384 Lie, Jessica Jin** General Surgery

**Title: Emergency Use of Group A Plasma in Trauma Patients at a Level 1 Trauma Center**

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*1Division of General Surgery*

*2Department of Pathology and Laboratory Medicine*

**Background:** With the increasing use of massive transfusion protocols in damage control resuscitation, Group AB universal plasma is in decreased supply. Studies have suggested the use of Group A plasma as an alternative. However, the outcomes of trauma patients receiving Group A plasma remain to be elucidated. The goal of this study is to evaluate the safety of the use of Group A plasma in trauma patients in a North American level 1 Trauma Center.

**Methods:** The use of group A plasma was initiated in July 2017 at our institution. A prospectively collected database of trauma patients who received emergency release plasma between July 2016 to July 2018 was reviewed to compare outcomes of patients who received A plasma to those who received AB plasma.

**Results:** Of the 55 patients identified, 37 patients received A plasma and 18 patients received AB Plasma. Patient demographics were comparable in terms of age, gender, blood type, injury type, mechanism of injury and Injury Severity Score. Between the A plasma and the AB plasma groups, there was no significant difference in length of stay (24 vs. 33 days), plasma transfused (5.7 vs. 9.4 units), or ICU admission (76% vs. 67%). There were no transfusion-related complications in both groups. Mortality (32% vs 39%) was similar between both groups.

**Conclusion:** This study supports the use of group A plasma in an emergency setting for trauma patients as a safe alternative to AB plasma

**385 Dr. Saman Fouladirad** Neurosurgery

**Title: Challenges Associated with Transitioning from Pediatric to Adult-Care for Youths with Hydrocephalus**

*Saman Fouladirad, Alexander Cheong, Patrick McDonald*

**Introduction:** Hydrocephalus is a chronic neurological condition that affects around 6 in 10,000 live births and is one of the most common indications for pediatric brain surgery. The condition is fatal if left untreated, however surgical procedures such as shunt placements has led to most pediatric patients surviving and transitioning to adulthood. Unlike other chronic conditions such as cystic fibrosis, congenital heart disease, type I diabetes, etc., the transition of adolescents with hydrocephalus from pediatric to adult care is often fragmented and disjointed given the lack of attention and research in establishing appropriate guidelines and models of transfer. This is particularly concerning not only due to the prevalence of hydrocephalus among the pediatric population, but the significant increase in morbidity and mortality associated post-transition with poorly handled transfers.

**Objective:** The purpose of the study was to quantify the various factors that challenge young adults with hydrocephalus as they go through this transitioning period by utilizing both a qualitative and quantitative approach.

**Methods:** The study consisted of two phases that used a series of interview and survey questions to collect qualitative and quantitative data to identify factors that challenge young adults with hydrocephalus who are transitioning/transitioned into adult care.

**Results:** Emerging themes from the data highlighted the difficulty patients and family members have in forgoing familiar relationships, adapting to the new cultural environment in an adult clinic and becoming self-reliant.

**Conclusion:** Understanding the expectations, concerns and overall input of patients is one of the many important steps that must be taken in order to build a foundation for a transition model of care that can carefully attend to the needs of patients with hydrocephalus.

**386 Dr. Janine Michele Roller Plastic Surgery**

**Title: A Clinical and Histological Analysis of Double Capsules and Adherence in Augmentation Mammoplasty with Textured Implants**

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**Background:** Biocell implants are heavily textured breast implants that were removed from the Canadian market in May 2019 for their associated risk of breast implant-associated anaplastic large cell lymphoma (BIA-ALCL). However, many patients still have these implants in-situ and have presented with failed adherence and double capsules and the clinical significance is unknown. There may be a link between these pathological findings and BIA-ALCL. Despite a generic definition, double capsules are lacking a comprehensive definition and classification system.

**Objectives:** This study aims to create a comprehensive definition and classification of double capsules in Biocell textured implants in relation to failed adherence.

**Methods:** This is a prospective cohort study. Patients presenting for explantation of Biocell breast implants to the senior author's (NJC) practice were reviewed. Charts were reviewed for: original surgery and explantation dates, patient and implant characteristics, clinical presentation, and intraoperative findings. Representative cases of different degrees of adherence and double capsule formation were selected for histopathological analysis. Data was analyzed using descriptive statistics.

**Results:** Eleven women presented for explantation of their Biocell implants primarily for capsular contracture, pain, or size change. The average time to explantation was 8 years. Thirty samples were taken from 22 implants. Intra-operatively, three types of adherence was observed: adherent, partially non-adherent, and completely non-adherent. Ten samples taken from three adherent implants did not demonstrate evidence of a double capsule. Of the remaining 19 implants, 15 were partially adherent and four were completely non-adherent. All 20 samples taken from these 19 implants had evidence of a double capsule. Histopathological analysis showed that outer capsules were well developed and thicker. Inner capsules were thinner, had high levels of inflammatory cells, and ranged from areas of fibroplasia with synovial-like metaplasia to islands or areas of well-defined inner capsular layers in a discontinuous fashion. Completely non-adherent implants had a fully circumscribed double capsule.

**Conclusions:** Aggressively textured breast implants can result in a double capsule which exists in all cases of implants that are partial to completely non-adherent. Here, we present the first algorithm to define and classify double capsules. This definition and classification system will help form the basis of clinical and research related discussions regarding the problems associated with Biocell implants.

**387 Dr. Abdalla Butt Vascular Surgery**

**Title: Evaluating the Role of Perioperative Medicine Consult on Clinical Outcomes in Vascular Surgery Patients**

*Abdalla Butt, Simran Parmar, Abhiram Cherukupalli, Yuda Shih, Gary K Yang, York Hsiang, Division of Vascular Surgery, University of British Columbia, Vancouver, BC*

**Objective:** The Internal Medicine Perioperative Consult Team (IMPCT) was introduced at our institution in 2015 with the goal of improving pre-operative optimization to reduce post-operative complications. The objective of this study was to evaluate the effect of IMPCT on clinical outcomes in patients undergoing vascular surgery.

**Methods:** A retrospective review of all vascular patients who received pre-operative IMPCT consults between January 2015 and December 2017 at a tertiary care teaching hospital was undertaken. In addition, a control group (2:1) from the same period who did not receive IMPCT consults were matched to the IMPCT cohort based on age, sex and surgical intervention. Patient demographics, co-morbidities, and post-operative complications including troponin levels were collected. The primary outcomes were delays in surgery, post-operative complications, and length of stay.

**Results:** One hundred and ninety-five patients were identified, 71 IMPCT and 129 control patients. Average age, sex and surgical procedure were no different between the two groups. Average days to surgery was similar between the IMPCT and control groups, 4.93 vs. 4.17 (p=0.63). Medical optimization of patients played the greatest role in increased time to surgery in IMPCT cohort, 56.8% vs. 14.5% of cases (p<0.05). However, in the control cohort, late admission was a significant factor in increased time to surgery, 40% vs. 13.6% cases (p<0.05). Sepsis as a post-operative complication was higher in the control group than the IMPCT group, 9.3% vs. 1.4% of cases (p<0.05). Cardiac and renal complications were the most common in both groups but did not reach significance, 31% vs. 30.2% of cases (p=0.93) and 36.6% vs. 32.6% of cases (p=0.33). Length of stay trended towards higher for IMPCT compared to control patients, 16.9 vs 9.5 days (p=0.58).

**Conclusion:** After three years, there was no difference in delay to surgery, post-operative complication or length of stay in patients who had IMPCT consults, compared with no IMPCT consults

**388 Dr. Nicole Mak General Surgery, Otolaryngology**

**Title: Relationship Between Thyroid Surgical Oncological Quality Indicators**

*Nicole Mak, Kristen Van Esch, Sam M. Wiseman*

**Background and purpose:** Given the central role of adequate oncologic resection, surgical quality indicators can be useful tools in patient management and quality improvement. We aimed to examine the correlation between 3 established surgical quality indicators--serum thyroglobulin (TG), 24-hour radioactive iodine uptake (RAIU), and metastatic lymph node ratio (MLNR)—with each other and with the MACIS prognostic score.

**Methods:** A retrospective review of patients undergoing total thyroidectomy for treatment of differentiated thyroid cancer (DTC) by a single surgeon was conducted. To establish the strength of correlation between pairs of quality indicators and the MACIS score, tests of normality and Spearman's correlation coefficient (rs) were used. A p-value less than 0.05 is considered significant and rs less than 0.2 to be very weakly correlated.

**Results:** A total of 145 patients were included in the study population. The majority of DTC in the sample population was low risk. The mean MACIS score was 5.0 (s.d. 1.50). Only 13 patients had "high risk" DTC according to ATA guidelines for MACIS (score >6.9). Weak correlation was identified between Tg-RAIU (rs 0.27, p = 0.006), and moderate correlation between Tg-MLNR (rs 0.41 p = 0.001). Only a weak correlation between postoperative Tg-MACIS (rs 0.20, p = 0.054) was found.

**Conclusion:** Examination of this sample population revealed correlations between surgical quality indicators. The serum TG level may represent the quality metric of with the most clinical utility since it correlates with both RAIU and MLNR, reflecting the residual volume of benign and malignant thyroid tissue.

**389 Dr. Nicole Mak** General Surgery

**Title: Intraoperative Parathyroid Hormone Measurement During Parathyroidectomy For Treatment of Primary Hyperparathyroidism: When Should You End The Operation?**

*Nicole Mak, Jennifer Li, Elizaveta Vasilyeva, Jake Hiebert, Michael Guo, Daniel Lustig, Dan Holmes, Sam M. Wiseman*

**Introduction:** The study objective was to evaluate the intraoperative 50% decrease in PTH level, with or without PTH normalization, for its ability to predict cure during parathyroidectomy (PTx) for the treatment of primary hyperparathyroidism (PHP).

**Methods:** A retrospective review of patients undergoing PTx was conducted. The timepoints at which the 50% PTH decrease, with or without PTH normalization, was reached were recorded. The accuracy of intraoperative PTH for predicting cure, defined as normocalcemia at 6 months postoperatively, was evaluated.

**Results:** The study population was composed of 248 PHP patients, with 247 patients achieving normocalcemia at 6 months postoperatively. If a 50% PTH decrease was used to indicate operation conclusion, a single case of contralateral parathyroid adenoma would be missed. Persistent PTH elevation at T10 had a PPV of 77%, NPV of 99.5%, sensitivity of 95.2% and specificity of 97.3% for predicting the presence of a contralateral adenoma. For the entire study cohort, 24.5 hours of cumulative operating time (6 minutes/patient) would be saved if the 50% PTH decrease triggered operation conclusion. If PTH normalization was also required, 19.4 hours (4.7 minutes/patient) would be saved and a persistent PTH elevation at T10 would have a PPV of 38.2%, NPV of 100%, sensitivity of 100%, and specificity of 85% for identifying contralateral adenoma.

**Discussion:** A decrease in the higher of the baseline or pre-excision PTH levels by 50% at T5 or T10, regardless of whether PTH level normalizes, reliably predicts cure from PHP and should be used to guide the operation.

**391 Dr. Zach Zhang** Plastic Surgery

**Title: Perioperative predictors of digital replantation success rate - A review of institutional experience**

*Zach Zhang MD1, Peter Credico BSc2, Sean Bristol MD FRSCS1, Sheina Macadam BSc MD FRSCS1*

*1Division of Plastic and Reconstructive Surgery, Department of Surgery, University of British Columbia, Vancouver, Canada*

*2Faculty of Medicine, University of British Columbia, Vancouver, Canada*

**Background:** Digital replant is a challenging procedure with highly variable success rate between institutions. Institutional experience at the UBC Division of Plastics and Reconstructive Surgery is unknown.

**Objectives:** To investigate the success rate of digital replant at the UBC Division of Plastics Surgery and the factors associated with increased replant survival.

**Methods:** This was a retrospective cohort study of all patients who underwent digital replant at the Vancouver General Hospital (January 2000 to September 2018). Digit survival, patient demographics, comorbidities, injury pattern, operative data, and postoperative care were retrospectively reviewed. Univariable and binary logistic regression analysis were conducted to identify factors associated with increased replant success rate.

**Results:** Of the 146 patients, 132 (90.4%) were male, the average age was 41-years-old, and 46 (31.5%) had multi-digit replants. Of the 220 replanted digits, 157 (71.4%) were successful. Binary logistic regression identified significant factors ( $p < 0.05$ ) associated with increased digit survival were sharp or saw mechanism of injury ( $< 0.01$ ), incomplete amputation ( $< 0.01$ ), amputation proximal to zone I flexor level ( $< 0.02$ ), postoperative aspirin use (0.01), absence of leech use (0.05), and absence of re-exploration in OR ( $< 0.01$ ). Digit ischemia time, day vs. night surgery, number of anastomosed vessels, postoperative infusional continuous regional analgesia were not found to be significant factors.

**Conclusions:** The UBC Plastic Surgery Division replant success rate is comparable to another national cohort. Sharper amputations, intact venous drainage, more proximal amputation, aspirin use, and the lack of requirement for leech therapy and exploration are associated with increased digital replant survival.

**392 Dr. Mitchell Allan Webb** General Surgery

**Title: Damage Control in Liver Transplantation: a strategy in managing hemorrhage**

*Authors: Subin Punnen, Mitchell Webb, Michael Bleszynski, Andrzej Buczkowski*

*Division of General Surgery*

**Background:** Damage control surgery (DCS) has gained acceptance in the management of the critically ill surgical patient. However, its use in liver transplantation is not yet well described and indications for its use remain to be elucidated.

**Objectives:** To determine predictors for use of DCS and, alternatively, failure of primary closure after the index liver transplantation (ILT).

**Methods:** A risk-adjusted 10-year review of adults undergoing deceased donor liver transplant at a single tertiary centre between the 2007 and 2017

**Results:** Of 448 index liver transplantations, 123 (27%) underwent DCS with delayed bile duct reconstruction. Intra-operative blood loss (7.0 vs 4.9), Cell-saver return (2.0 vs 1.5) and transfused units of pRBCs (8 vs 5.5) were significantly greater in DCS compared to PC. Intra-op blood loss, intra-op FFP, post-op pRBC and total volume of post-operative transfusions were significantly associated with failure of primary abdominal closure. After risk-adjustment, no difference in secondary outcomes was demonstrated.

**Conclusion:** DCS provides a viable solution to managing massive hemorrhage and coagulopathy during ILT and may obviate the scenario of failed primary closure.

**393 Dr. Justin Oh** Radiation Oncology

**Title: Association between Nutritional Risk Index and Outcomes for Head and Neck Cancer patients receiving Concurrent Chemo-Radiotherapy**

*Author(s): Justin Oh, Alvin Liu, Eric Tran, Eric Berthelet, Jonn Wu, Robert A. Olson, Nicole Chau, Angie Bowman, Sarah Hamilton*

**Background:** Patients undergoing combined chemoradiotherapy (CRT) for Head and Neck Cancer (HNC) are often malnourished before, during, and after treatment. Contributing factors include odynophagia, dysphagia, dysgeusia, and mucositis. Poor nutritional status is associated with poor treatment outcomes and worse complications. A simple validated objective measure of malnutrition is the Nutritional Risk Index (NRI). NRI has been validated in surgical cohort, but it has not been assessed as a malnutrition screening tool for HNC patients undergoing radical radiotherapy.

**Objectives:**

- 1) To assess the difference between pre- and post-treatment nutritional status as measured by NRI
- 2) To evaluate whether NRI score predicts for treatment outcomes and complications.

**Methods:** A population-based review of British Columbia (BC) provincial database of HNC patients treated from 2013 to 2015 with curative intent CRT was performed. The provincial nutritional database prospectively collects basic anthropometric data, including initial weight, height, post-treatment weights and treatment complications. Basic demographic and oncologic staging and treatment information were collected retrospectively. Outcomes included overall survival (OS), early mortality, hospitalization, and G-tube dependence. Univariate (UVA) and multivariate (MVA) analysis were performed as appropriate.

**Results:** 292 patients were identified, 78% were male, and median age was 59. Average pretreatment NRI was 110 compared to post treatment NRI of 99 ( $p < 0.01$ ). In the median follow up of 3.5 years, 67 deaths were recorded. UVA showed worse OS associated with worse pretreatment NRI ( $p = 0.02$ ). On MVA, worse OS was still associated with pre-treatment NRI ( $p = 0.04$ ), as well as increasing age ( $< 0.01$ ), ECOG status ( $p = 0.02$ ), and oral cavity disease

compared to oropharynx ( $p=0.02$ ). 3% of patients passed away in the first 90 days, and higher ECOG score ( $p<0.01$ , Fisher's Exact test) and T-stage ( $p<0.01$ , Fisher's Exact Test) were associated with early mortality. 3% were G-tube dependent at 1 year, and it was associated with increasing age ( $p=0.01$ ) and worse NRI ( $p<0.01$ ). 15% were hospitalized within 90 days, but there was no associated factor with early hospitalization. On MVA, worse NRI ( $p=0.02$ ) and higher T-stage ( $p=0.01$ ) predicted for a complication risk.

**Conclusion:** NRI is a simple tool that can quantify malnutrition. In HNC patients undergoing curative CRT, there is a significant difference between pre- and post-treatment NRI. Pre-treatment NRI predicts worse overall survival and treatment complications. NRI should be considered as one of the prognostic factors for HNC patients undergoing curative CRT.

**394 Dr. Jonathan Lim** Radiation Oncology

**Title:** Late effects assessment in survivors of pediatric brain tumors and rhabdomyosarcoma.

*Jonathan Lim, Jemma Say, Karen Goddard*

**Background:** A "recall program" began at the recently established BC Cancer LEAF (Late Effects, Assessment and Follow-up) Clinic in July 2016. This clinic is specifically designed to address the needs of adult childhood cancer survivors (ACCS) who had been lost to regular follow-up. Patients who have had CNS tumors or rhabdomyosarcomas are at a high risk of experiencing late effects (LEs) or chronic health problems more than five years after their treatment. Their previous therapy generally included surgical resection, high dose radiation therapy (RT) and intensive combination chemotherapy. The majority of patients are still treated this way and it is critical to understand late morbidity associated with this intensive multimodal therapy.

**Objectives:** The objective of our project is to assess the burden of LEs in ACCS treated for CNS tumors and rhabdomyosarcoma and determine if previously unrecognized LEs are detected in these patients by recall assessment.

**Methods:** This study identified all CNS tumors and rhabdomyosarcoma ACCS treated in BC, diagnosed between 1969 to 2002 and not reviewed at any cancer clinic for a minimum of 5 years. 201 patients were identified by the ORS/CAIS database, 66 patients were already being followed, 16 were unable to be contacted, and 9 were deceased, therefore 110 patients were recalled for clinical assessment at the LEAF clinic. A retrospective review of the ORS and CAIS database of patients attending recall assessment, from the start of the recall program is currently being performed. A variety of data is being collected, such as demographics, details of original therapy, any relapse, evidence of late effects or chronic health problems detected prior to and at recall assessment, patients' history of screening programs, and treatments started. Data collection is underway and 71 of the 110 patients have been reviewed.

**Results:** Over half of the eligible patients have been retrospectively reviewed. This process is still underway.

**Conclusions:** Our data shows that ACCS experience a significant number of serious LEs, with some LEs being more prevalent than others. We will present data regarding the burden of LEs in pediatric brain tumor survivors.

**395 Dr. Soroush Rokui** Otolaryngology

**Title:** Adventures in Surgery: preliminary results and insights from interactive, case-based surgical education modules for medical students.

*Soroush Rokui BSc<sup>1</sup>, Geoffrey Blair, MD FRCSC<sup>1</sup>, Arman Abdalkhani MD FRCSC<sup>1,2</sup>*

<sup>1</sup>Department of Surgery, University of British Columbia

<sup>2</sup>Division of Otolaryngology, University of British Columbia

**Background:** The surgical patient is generally underrepresented in medical pre-clerkship curricula, resulting in a relative deficit of knowledge in surgical indications, methods and decision-making amongst third year medical students. This underscores the need for additional exposure to these scenarios in advance of beginning formal clinical training. The advent of interactive modules has shown promise in other fields of medical education; as such, our team has produced a number of case modules for various surgical specialties in an effort to improve medical student fluency with different surgical specialties prior to entering their Surgery and Perioperative Care (SPC) clerkship block.

**Objective:** To assess the utility of a series of interactive surgical case modules for medical students in their surgical clerkship block.

**Methods:** Five surgical specialties were included in this pilot project (general surgery, otolaryngology, plastic surgery, urology, and vascular surgery). From each of these disciplines, a senior resident or staff surgeon was recruited to write several high yield cases corresponding to the MD undergraduate program learning objectives of that surgical discipline. A total of 12 cases were written. Thereafter, cases were transformed into interactive modules using the Prezi presentation platform. Modules for each specialty included relevant anatomy, multiple-choice questions, and radiographic or intraoperative images where applicable. Modules were followed by optional, self-reported surveys. Survey outcomes included length of cases, affinity for the interactive format, difficulty of cases, and overall utility of the module.

**Results:** A focus group of 8 students has completed modules and surveys thus far. After completing the survey, students' self-reported 'confidence in managing surgical patients' increased by 23.2% (3.750 to 5.375 out of 7,  $n=8$ ). 8 students (100%) found the difficulty and length of the modules to be 'just right'. 8 students (100%) believe the modules will 'somewhat' or 'significantly' contribute to their clinical approach. Overall utility of the modules was 5.375 out of 7 ( $n=8$ ). 8 students (100%) were 'likely' (5.25 out of 7) to use another one of the modules in the future. 8 students (100%) prefer this interactive case format for 'at least some of [their] learning'. Feedback for improvement was primarily directed at the software used to deliver the modules.

**Conclusion:** Preliminary results from a cohort of third year medical students shows that students benefit subjectively from the availability of interactive case modules for various surgical specialties and are likely to use these modules before and during their surgical rotations. Possible improvements include using a more sophisticated and intuitive delivery software.

**396 Dr. Mostafa Fatehi** Neurosurgery

**Title:** Low grade gliomas: to operate, or not to operate?

*M. Sadr, MD, PhD, M. Fatehi, MD, MSc, R.Guo, BSc, B. Toyota, MD, MSc, G. Redekop, MD, MSc, C. Haw, MD, MSc*

**Introduction:** Low grade gliomas (LGGs) are neuroepithelial tumors derived from glial cells in the central nervous system. Patients with LGGs may initially present with symptoms such as seizures and headaches, or may be completely asymptomatic. LGGs' natural history is variable, ranging from asymptomatic patients with stable tumour burden to rapidly growing lesions progressing to higher grade gliomas, requiring prompt treatment.

**Rationale:** The current model of management of low grade gliomas is the aggressive treatment of the disease in its early stages with surgery and radiation and chemotherapy. However, the aforementioned treatments are far from benign, and a subset of patients may benefit from conservative management. In the current study, we have tested benefits and drawbacks of a conservative "watch-and-wait" versus opt for early surgery approach for LGGs.

**Design:** We have performed a retrospective study of patients diagnosed with low grade glioma. We have included all patients with imaging findings of LGG, from 1990-2015. Overall survival and progression free survival were the outcomes of interest. These results were analysed "as-treated".

**Results:** A total of 167 patients (median age 38.2 years, 55% male) were included in the present study. The median follow up time was over 7 years. Approximately 1/3 of LGG patients did not require surgery. Of those who underwent surgery, 40 patients proceeded to adjuvant chemo-radiation. Furthermore, the size or the location of the tumour did not predict the necessity of surgical intervention. Symptomatic patients, especially those having seizures, were most likely to undergo surgical resection.

**Conclusion:** Despite the current dogma suggesting that LGG patients undergo aggressive operative interventions, our study demonstrates that a large subset of LGG patients would benefit from conservative management.

**397 Dr. Ru Guo** Neurosurgery

**Title: Next-Generation Sequencing and Functional Studies for Rare, Highly-Penetrant Mutations in Familial Intracranial Aneurysms**

Ru C. Guo,<sup>1</sup> Emma C. Hitchcock,<sup>2,3</sup> Harwood Kwan,<sup>2,3</sup> Steven Jones,<sup>2,4</sup> Patrice Eydux,<sup>2,5</sup> Gary J. Redekop,<sup>1</sup> Charles Haw<sup>1</sup>, Peter Gooderham<sup>1</sup>, William T. Gibson<sup>2,3</sup>

<sup>1</sup> Division of Neurosurgery, Department of Surgery, UBC, <sup>2</sup>Department of Medical Genetics, UBC, <sup>3</sup>BC Children's Hospital Research Institute, <sup>4</sup>BC Cancer Agency Michael Smith Genome Sciences Centre,

<sup>5</sup>Department of Pathology and Laboratory Medicine, UBC, Vancouver, BC Canada

**Background:** Intracranial aneurysms (IA) arise when arterial walls weaken and form sac-like bulges, which can rupture and lead to subarachnoid haemorrhage. Familial intracranial aneurysms are defined as two or more relatives being affected with IA. At this time, one gene, THSD1, has been associated with familial IA.

**Objectives:** Our objective was to use next-generation sequencing to identify rare, non-syndromic variants in multiplex IA families that have Mendelian inheritance patterns.

**Methods:** Informed consent was obtained from all participants. Detailed clinical histories were obtained via interview. Participants were annotated with relevant information (e.g. IA status, age of diagnosis, number of IA, smoking history). Our group conducted whole exome sequencing in members (n=19) of five different families.

**Results:** We found 116 rare variants in 32 genes that were common between at least three out of the five families. To determine the association of these variants with IA formation, the identified subset of genes were filtered down via manual annotation with disease-association and literature-search terms that were known to be relevant to vascular formation and maintenance (e.g. "angiogenesis"). Our preliminary results reveal the candidate genes: ASTN2, HSPG2, and ITGB4.

**Conclusions:** In spite of the potential candidate genes identified herein, a larger participant cohort is desirable in order to identify reproducible disease associations. We have expanded our cohort to an additional 119 individuals, including 32 families with two or more affected first-degree relatives. Confirmation of emerging candidates will require establishment of a causal relationship between rare variants and vascular pathology in animal models.

**398 Dr. Mitchell Allan Webb** General Surgery

**Title: Caval reconstruction in orthotopic liver transplantation: is one technique supreme?**

Mitchell Webb, Subin Punnen, Michael Bleszynski, Andrzej Buczkowski

Division of General Surgery

**Background:** In orthotopic liver transplantation (OLTx), several techniques exist for reconstruction of hepatic outflow. Classically, the recipient IVC is completely cross-clamped and resected. Other techniques, Piggyback (PB) and Side-to-Side (SS), preserve IVC patency and may prove beneficial in reducing hemodynamic instability and subsequent technical complications.

**Methods:** Risk-adjusted 10 year review of deceased donor orthotopic liver transplantations between 2007 and 2017 at a single tertiary centre

**Results:** A total of 448 OLTx were performed: 134 classic, 173 SS, and 155 PG. Mean case duration was shorter with PB technique (classic 392, SS 363, PB 321 min,  $p < 0.005$ ). Other than mean volume of crystalloid (classic: 4077, SS: 3248, PB: 3403,  $p < 0.05$ ), techniques did not differ with respect to intra-operative resuscitation requirements (pRBC, FFP, PLts, Cryoprecipitate). PB, however, required less post-operative pRBCs (2 vs 3 and 3.5 units, Classic and SS), FFP (1.4 vs 2.5 and 2.5 units, Classic and SS), and total 24-hr volume (5.6 vs 6.0 and 6.8 L, classic and SS).

**Conclusion:** Surgeon's choice of caval reconstruction is complex and depends on multiple factors including personal experience, patient anatomy and disease status. The benefit of reduced transfusion requirements and operative duration may indicate that PB is a superior technique under certain circumstances.

**399 Dr. Nicholas Salterio** Neurosurgery

**Title: Short- & Long-Term Gait and Cognitive Outcomes After Primary Endoscopic Third Ventriculostomy in Adult Obstructive Hydrocephalus**

Nicholas Salterio<sup>1,2</sup> and Thomas Zwimpfer MD/PhD<sup>2</sup>

<sup>1</sup>Division of Experimental Medicine, Faculty of Medicine, UBC

<sup>2</sup>Division of Neurosurgery, Vancouver General Hospital

**Introduction:** In addition to symptoms of raised ICP, adults with obstructive hydrocephalus often present with the following understudied symptoms: cognitive dysfunction, gait disturbances, and/or bladder problems.

**Objectives:** Determine short- & long-term gait and cognitive outcomes.

**Methods:** Obstructive hydrocephalus was identified based on tri-ventriculomegaly on CT and/or MRI. This report focuses on gait velocity (10 m timed gait) and cognitive function (Montreal Cognitive Assessment [MoCA]) at three timepoints: pre-ETV, ~3 months post-ETV, and ~12 months post-ETV.

**Results:** 75 adults underwent primary ETV and 43 completed required assessments. Mean age was 57.5 years and 19 (44%) were female. Etiology: 31 (72.1%) congenital and 12 (27.9%) acquired. Short- and long-term post-ETV gait velocity improved by a median change of +0.4m/s (n=36, n=12, respectively;  $p < 0.001$ ). Individual analysis shows all patients' gait improved at long-term follow-up. Short-term post-ETV MoCA improved by a median change of +1 in short-term (n=39;  $p < 0.001$ ) and +2 in long-term follow-up (n=15;  $p < 0.007$ ). Individual analysis shows 23/39 (59%) and 8/15 (53%) have clinical improvement of  $\geq 2$  points in short- & long-term follow-up, respectively. Clinical worsening ( $\geq 2$  points less) was found in 2/39(5%) in short-term and 1/15(7%) in long-term follow-up.

**Conclusions:** Gait velocity is improved at short-term & sustained at long-term follow-up. Long-term clinical improvement and rare clinical worsening in global cognition was seen. Therefore, ETVs are safe and effective at managing gait and cognitive symptoms in obstructive hydrocephalus at long-term follow-up.

**400 Dr. Paul Steinbok** Neurosurgery

**Title: Upper Extremity Performance Changes in Children with Spastic Cerebral Palsy following Lumbo-sacral Selective Dorsal Rhizotomy.**

Paul Steinbok<sup>1</sup> (Presenting author); Nishanth Sadashiva<sup>1</sup>; Patricia Mortenson<sup>2</sup>, Mandeep Tamber<sup>1</sup>.

<sup>1</sup> Division of Neurosurgery, Dept. of Surgery, University of British Columbia and BC Children's Hospital

<sup>2</sup> Dept. of Occupational Science and Occupational Therapy, University of British Columbia and BC Children's Hospital

**Objectives:** In children with spastic cerebral palsy, lumbo-sacral selective dorsal rhizotomy (SDR) is done primarily to improve lower limb spasticity. However, improvement in upper extremity function has also been noted after SDR, at least in short follow up. The goal of this study was to determine if improvements in upper extremity function are sustained in the longer term.

**Methods:** This was a retrospective review of prospectively collected data on children operated with SDR since 1987 at a single centre. Quality of Upper Extremities Skill Test (QUEST) scores were compared at three time points: preoperatively, early post-operatively (<1.5 years) and late post-operatively (>10 years).

**Results:** Out of more than 200 patients with SDR, 53 had a follow-up at 10 years or more. Of these 53 patients, 37 had a QUEST assessment done preoperatively, as the remainder had been operated on before QUEST was done routinely. Pairwise comparison of QUEST showed that scores improved significantly from baseline to early post-operatively, and that this improvement was generally maintained at late post-operative assessment. There was no significant change statistically in scores between early and late post-operative time points. Using repeated measures ANOVA, QUEST improvement was not related to age at surgery, CP severity (GMFCS level) or % of dorsal rootlets cut. About 50% had clinically important improvement in UL function, based on a cut off of > 3% change.

**Conclusion:** This study suggests that following SDR early postoperative improvements in upper extremity function are common and are sustained in the long term.

**401 Dr. Diana Forbes****Title: Practice pattern among Canadian plastic surgeons on the use of hyaluronidase for treating complications related to HA fillers.***Diana Forbes*

**Purpose:** The use of hyaluronic acid (HA) fillers have become a popular treatment to address changes in the aging face. National statistics report a 58% increase in the use of HA fillers since 2014<sup>1</sup>. Second to only botulinum toxin, HA is the next most common non-surgical aesthetic procedure<sup>1</sup>. Acute complications associated with HA fillers are usually short-lived and reversible. They include but are limited to pain, ecchymosis, and edema. Other early onset complications include vascular occlusion, Tyndall effect, and surface irregularities and nodules<sup>2</sup>. Hyaluronidases are enzymes which depolymerise and subsequently degrade HA<sup>3</sup>. There are many described indications for the use hyaluronidases in aesthetics surgery. To better understand the current practice patterns, we surveyed Canadian plastic surgeons on the use of hyaluronidase for managing complications related to HA fillers.

**Methods:** With the approval of the Canadian Society of Plastic Surgeons, an electronic survey was e-mailed to all members. The survey included twelve questions focusing on hyaluronidase usage. A total of 382 surveys were distributed and 98 surveys were completed for a response rate of 28%.

**Results:** Approximately half (48%) of the survey respondents use HA fillers in their practice. Of the respondents who did not perform HA injections, nearly two-thirds were not interested in performing the procedure and over 30% of respondents were not in a private practice setting. Skin testing for hypersensitivity reactions was only performed by less than 10% of HA users. Forty-eight percent of HA providers have used hyaluronidase to treat complications from the use of HA fillers. Nearly all respondents used hyaluronidase for filler over-correction (95.5%) as well as asymmetry (86.4%). Twenty-four percent of the respondents reported using a hyaluronidase formulation prepared by a compounding pharmacy. The vast majority (82.6%) of HA providers reported using hyaluronidase every several months or less than once a year. Over half of the respondents have used hyaluronidase for inflammatory or infectious nodules (59.1%) and the Tyndall effect (59.1%). Other reported applications included resolution of vascular compromise, and one respondent reported using hyaluronidase for haematoma resolution.

**Conclusion:** The use of hyaluronidase to manage hyaluronic acid filler complications is popular among Canadian plastic surgeons. While hyaluronidase is commonly used by plastic surgeons for over-correction and asymmetry, its use in aesthetic practice is rather diverse and heterogenous.

## 2019 Department of Surgery Faculty Achievement Awards



### Hjalmar Johnson New Investigator Award – Dr. Emilie Joos

Dr. Emilie Joos is a rising star in the UBC Department of Surgery. In a few short years, she has re-energized research activities in Trauma and Acute Care Surgery as Fellowship Director, and in the Division of General Surgery, as Research Director. Engagement with research and academic productivity has skyrocketed in the Division because of her energy and enthusiasm as a role model and mentor for our trainees.

This year, Dr. Joos published one of the world's largest multicenter studies on the diagnosis and management of pancreatic trauma. Her work will not only affect the care of thousands of patients worldwide, but also was a proof of concept of the great potential of an emerging national research collective in Trauma and Acute Care Surgery.

As a global citizen, Dr. Joos has played a defining leadership role in the Branch for International Surgical Care, and Médecins Sans Frontières (MSF). Dr. Joos has already made substantial academic contributions at local, national and global levels, and is an inspiring role model for future generations of surgeons.



### Richard J Finley Senior Investigator Award – Dr. Nadine Caron

Dr. Caron was born and raised in Kamloops, BC, and completed her Bachelor of Science in Kinesiology at Simon Fraser University (1993) and her Medical Degree (1997) at the University of British Columbia in Vancouver. During her surgical residency, Nadine completed her Masters of Public Health (2001) from Harvard University and after completion of residency training (2003), moved to San Francisco to complete her Postgraduate Fellowship Training in Endocrine Surgical Oncology at the University of California, San Francisco (2004). But her love for BC brought her home and since January 2005, Nadine has been working as a General and Endocrine Surgeon at the University Hospital of Northern BC. She is an

Assistant Professor–Surgery at UBC's the Northern Medical Program, as well as an Associate Faculty member at Johns Hopkins University's School of Public Health, Adjunct Professor at University of Northern British Columbia, Associate Faculty at UBC's School of Population and Public Health and BCCA Scientist, Genome Sciences Centre.

As the first female First Nations student to graduate from the University of British Columbia's medical school, she won the Hamber Gold Medal as the top graduating student and was named one of Maclean's "One Hundred Canadians to Watch." Nadine's main research focus involves access to equal health status, health care services and the research that leads to these for our marginalized populations – including Aboriginal, northern and rural. She is currently a member of the Michael Smith Foundation for Health Research Board of Directors, the Governing Council of the Canadian Institutes of Health Research, Regional Advisory Committee for the Terry Fox Research Institute (BC Node), the BCCA Surgical Oncology Network and member of the Northern Aboriginal Cancer Care Advisory Committee. As well, Nadine is the interim Director for UBC's Centre for Excellence in Indigenous Health which aims to be a focal point for collaboration involving UBC students/faculty and community in partnerships to optimize health science curriculum, education, student supports and health research through an Indigenous lens. Nadine has also been a part of multiple presentations nationally and internationally on Indigenous health, cancer care in rural and northern populations, and addressing the inequities – both known and suspected – for Canada's marginalized populations.

## A History of the 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. The visiting professor presented original research as part of the day as well as judged the clinical and basic science presentations. The Department is grateful for this wonderful legacy that Madeline and Wally Chung have left for the Department.

- 1995 Lloyd MacLean, Department Head, Surgery, McGill University and President of the American College of Surgeons
- 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  
Health Services. *"Magnetic resonance imaging and robotic surgery."*
- 2016 Dr. Ivar Mendez, Fred H. Wigmore Professor and Unified Head of the Department of Surgery at the University of Saskatchewan – *"Robotic and  
distance tele-mentoring surgery."*
- 2017 Dr. Michael Tymianski, Head of UHN's Division of Neurosurgery and Senior Scientist at the Krembil Research Institute  
Dr. Wendy Lai, President of Médecins Sans Frontières (Doctors Without Borders) Canada
- 2018 Dr. Richard Reznick, Dean, Faculty of Health Sciences Queen's University and CEO, Southeastern Ontario Academic Medical Association  
*"Large scale educational change: difficult, but doable."*