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Baltimore, MD 21201
Two-Day Virtual Event Through Zoom

Abstract Booklet

ABSTRACTS

See [MSRD 2020 Event Webpage](#) for more information about the event

Oral Presentation Abstracts

Presenters are indicated with “*” next to their names.

O.01

PREVENTIVE CARE UTILIZATION AMONG ADULTS WITH HEARING LOSS IN THE UNITED STATES. Nicholas Fioravante*, Jennifer Deal, Amber Willink, Clarice Myers, and Lama Assi, Department of Cochlear Center for Hearing and Public Health, Johns Hopkins University School of Bloomberg School of Public Health, Baltimore, MD.

Hearing loss (HL) can negatively impact patient-provider communication and limit access to health promotion information, which may lead to decreased preventive care utilization. Using data from the 2015 and 2018 National Health Interview Survey, we examined the association between perceived HL with and without hearing aid use with self-reported age-appropriate uptake of breast and colon cancer screening, and influenza and pneumococcal vaccination. In models adjusted for sociodemographic characteristics, access to care, and health status, people with HL had lower odds of receiving breast cancer screening (odds ratio[OR]=0.83, 95% confidence interval[CI]=0.72-0.96) and higher odds of receiving pneumococcal vaccination (OR=1.11, 95%CI=1.00-1.24) relative to those without HL. There were no differences in their colon cancer or influenza vaccination uptake. Compared to those without HL, people with HL who used hearing aids had increased odds of colon cancer screening and influenza and pneumococcal vaccination, while people with HL who did not use hearing aids were less likely report cancer screening. Overall, Americans with untreated HL were less likely to report completing cancer screening. Hearing aid use may modify the association between HL and preventive care uptake. Screening for HL in primary care settings and communication trainings for providers may help reduce cancer screening disparities.

O.02

GENERAL HEALTH STATUS AMONG VETERANS WITH EMBEDDED METAL FRAGMENTS. Jessica Palmer*, Stella Hines¹, Melissa McDiarmid¹, Clayton Brown², Joanna Gaitens¹, ¹Division of Occupational and Environmental Medicine, Department of Medicine and ²Department of Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, MD.

An estimated two-thirds of U.S. wounded personnel from the conflicts in Iraq and Afghanistan may have retained metal fragments, and current medical practice is to observe fragments that are not readily accessible for removal by surgery. However, metal ions released from the fragment over time can enter systemic circulation, threatening target organs far from the site of injury. Previous studies have associated metal exposure with negative effects in the kidneys, brain, and lungs, but the long-term effects of embedded metal fragments have not been fully elucidated. The goal of this study was to determine whether Veterans with self-reported embedded metal fragments have poorer general health compared to those with low risk of metal fragments. In this study, 9,000 Veterans from the VA Toxic Embedded Fragment Registry were randomly selected to receive a questionnaire, which asked Veterans about the nature of their injuries, military exposure history, and chronic health conditions. It also included the Veterans RAND 12 Item Health Survey, which computes general physical and mental health scores. Veterans were categorized into a low or high risk category of having an embedded metal fragment based on their responses. Of the 2,233 respondents in this study who reported blast or bullet injury, 1,688 Veterans were categorized as high risk for embedded metal fragments, 515 as low risk, and 30 had incomplete data. The mean Physical Component Scores

(PCS) and Mental Component Scores (MCS) for the high risk category were 35.54 and 37.24, and for the low risk category 34.92 and 34.35, respectively. Using a logistic regression model the data were adjusted for age, race, smoking status, military branch, and injury severity. There was no statistically significant difference between the PCS for the two groups; however, the MCS was significantly greater in the high risk group compared to the low risk group, indicating better mental health status in Veterans with high risk of metal fragments. This suggests the need for future research on the effects of embedded metals on long-term health, and whether other factors, such as health care services, could further explain these results.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.03

INSURANCE COVERAGE OF VENTRAL HERNIA REPAIR. Annie Yang*, Marissa Klein¹, Ledibabari M. Ngaage², Michael Ha³, and Yvonne M. Rasko³, ²Division of Plastic Surgery, Department of Plastic Surgery, Johns Hopkins School of Medicine, and ³Division of Plastic Surgery, Department of Surgery, ¹University of Maryland School of Medicine, Baltimore, MD.

A ventral hernia, tissue protrusion through the abdominal muscles, can be painful, lead to tissue strangulation, and be a life-threatening emergency. Surgical repair before a strangulated hernia occurs carries a better prognosis and lower cost. Further, surgical adjuncts, such as acellular dermis matrix (ADM) and biological mesh, are highly effective. However, this is often an elective procedure which poses challenges when seeking insurance coverage. Currently, the literature is scarce on the insurance coverage status of ventral hernia repair. Aims: The goal of this study was to assess variability in insurance coverage of ventral hernia repair. Methods: We conducted a cross-sectional analysis of 101 US insurance policies related to ventral hernia repair and use of surgical adjuncts. We also assessed coverage of related surgeries, such as panniculectomy and abdominoplasty. Results: One in ten insurance companies (n=11, 11%) had explicit, accessible policies on ventral hernia repair and offered preauthorized (n=9, 9%) or case-by-case (n=2, 2%) coverage. The remaining 95 (94%) companies did not have any clear policy. One quarter (n=26, 26%) provided preauthorized coverage of panniculectomy in conjunction with hernia repair, 2 (2%) provided coverage on a case-by-case basis, and 10 (10%) denied coverage. Although 4 (4%) companies offered preauthorized coverage of abdominoplasty and 2 (2%) covered on a case-by-case basis, almost half (n=45, 45%) denied coverage. Three (3%) companies had preauthorized coverage of diastasis repair, 1 (1%) covered on a case-by-case basis, while 41 (41%) denied coverage. Two (2%) companies provided preauthorized coverage of biologic mesh, 1 (1%) provided coverage on a case-by-case basis, and 3 (3%) denied coverage. Finally, 4 (4%) companies had policies on ADM, but only 1 (1%) determined coverage on a case-by-case basis, while 4 (4%) denied coverage. Conclusion: There is an alarming lack of access to insurance policies and coverage of ventral hernia repair and related procedures. We hope that these shortcomings in insurance coverage for essential surgical correction of ventral hernias may be acknowledged and addressed.

This research was supported in part by the Stueber Scholars Program and Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.04

ASSOCIATIONS BETWEEN THIRD TRIMESTER ULTRASOUND AND GLUCOSE TESTING. Madalyn Myers*, Sarah Crimmins¹, Lucille Martin², Emad Elsamadicy³, Tabitha Quebedeaux³, and Jerome N. Kopelman³, ¹Division of Maternal and Fetal Medicine, ³Department of Obstetrics, Gynecology and Reproductive Sciences, ²University of Maryland School of Medicine, Baltimore, MD.

Gestational diabetes mellitus (GDM) has been identified as an etiology of polyhydramnios and macrosomia. On ultrasound, polyhydramnios is defined as AFI > 25 or MVP > 8 and markers of fetal macrosomia include an abdominal circumference > 95th percentile (AC) or estimated fetal weight > 90th percentile (EFW). GDM screening employs multiple modalities, including 1) a 1-hour 50-gram glucose screening test (GST) which if elevated is followed by a 3-hour 100-gram glucose tolerance test, or 2) a Hemoglobin A1c (HbA1c). The timing of this screening depends on individuals risk factors. We sought to determine if a relationship existed between GDM screening modalities and ultrasound findings related to both polyhydramnios and/or macrosomia. Our specific aims are to 1) determine whether there is a relationship between an elevated HbA1c in early pregnancy (< 20 weeks) and the presence of polyhydramnios at the third trimester ultrasound, 2) analyze the relationship between early or traditional (after 20 weeks) HbA1c and GST results and the incidence of polyhydramnios, EFW, and AC. We conducted a prospective observational study of all individuals undergoing GDM screening (both GST and HbA1c) at a single practice affiliated with the University of Maryland Faculty practice between 2016-2020. Exclusion criteria includes previous diagnosis of diabetes mellitus (DM), multiple gestation pregnancies, miscarriages, and no delivery information. Glucose screening results were then compared to third trimester ultrasound (28-36 weeks) result. A total of 1388 patients met inclusion criteria. No significant associations were found between any GDM screening evaluation and the presence of polyhydramnios. Elevated early GST and traditionally timed GST and HbA1c are associated with an EFW > 90% (p=0.023, p=0.001, p= 0.006, respectively) and an AC > 95% (p= 0.007, p=0.001, p=0.001, respectively). Additionally, low early GST is associated with an EFW < 10% (p=0.004) and an AC < 5% (p=0.009). No relationship was found between any GDM screening modalities and polyhydramnios. GST in both trimesters and HbA1c in the second trimester may be predictors of macrosomia.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.05

PERFORMANCE OF CT VOLUMETRY FOR TRAUMATIC HEMOTHORAX IS ON PAR WITH EXPERT RADIOLOGIST VOLUME ESTIMATION FOR PREDICTION OF HEMORRHAGE-RELATED OUTCOMES. Bryan Nixon*, Nahye Kim*, Jean Jeudy, Guang Li, and David Dreizin, Department of Diagnostic Radiology and Nuclear Medicine, University of Maryland School of Medicine, Baltimore, MD.

A widespread and clinically relevant method of measuring hemothorax is lacking in acute trauma care. The objective was to evaluate and compare quantitative computed tomography (CT) hemothorax volumetry measurements and qualitative subjective grading as predictors for surgical or endovascular hemostatic intervention (HI), massive transfusion (MT), and in-hospital mortality (IHM) in trauma patients. We retrospectively analyzed 88 consecutive patients ages 18 and older with traumatic hemothorax, with a volume of at least 100mL total or 50mL in a single hemithorax, who underwent chest CT imaging on admission between 2016-2018 at a single institution. Hemothoraces were labeled quantitatively using segmentation software and graded qualitatively by consensus of a chest and trauma radiology attending on a three-point scale (small, moderate, large). The primary endpoints were HI, MT, and IHM not caused by closed-head injury. For each endpoint, hemothorax volumes were compared between patients with positive and negative outcomes using the Mann-Whitney U test, and receiver operating characteristic (ROC) analysis with the DeLong method was used to compare performance of CT volumetry and qualitative grading. Baseline demographics characteristics for all subjects include median age of 51 years (interquartile range, 36-66) with 73% male gender. Among all patients, the number with HI, MT, and IHM was 11 (13%), 11 (13%), and 8 (9%), respectively. Mean hemothorax volume was significantly greater, compared to controls, in patients with HI (365.4 vs 164.5, p=0.00042), MT (525.0 vs 347.4, p=0.010), or IHM (731.0 vs 321.5, p=0.0021). The area under the curve for CT volumetry was statistically no different than subjective grading for predicting HI (0.79 vs. 0.80, p=0.61), MT (0.74

vs. 0.78, $p=0.43$), or IHM (0.82 vs. 0.84, $p=0.68$). Voxelwise CT volumetry measurements of traumatic hemothorax predict outcomes of HI, MT, and IHM with equivalent accuracy to subjective estimation by consensus of two expert radiologists. The results suggest a possible role for objective and visually intuitive automated quantitative visualization methods for personalized outcome prediction in trauma victims.

O.06

VASCULAR AUTOREGULATION AND GLAUCOMA: DEVELOPMENT OF A MACHINE LEARNING ALGORITHM FOR VASOMOTION QUANTIFICATION. Caroline Simon*, Wei Chen Lai*, Jessica Pottenburgh¹, Dongyi Wang², and Osamah Saeedi¹, ¹Department of Ophthalmology and Visual Sciences, University of Maryland School of Medicine, Baltimore, MD and ²University of Maryland, College Park, College Park, MD.

Primary open-angle glaucoma (POAG) is a leading cause of irreversible blindness across the world. Although reduction in intraocular pressures (IOP) remains the primary treatment for POAG, evidence shows the existence of patients with controlled IOPs who are still experiencing irreversible vision loss. Various factors thus play a role in the pathogenesis of POAG, as previous studies suggest that changes in the hemodynamics of retinal capillaries may be linked to glaucoma. Erythrocyte mediated angiography (EMA) is a novel imaging technique that visualizes erythrocyte flow and pausing in vivo. Blood is drawn from the participant and their erythrocytes are tagged with indocyanine green (ICG) dye. The ICG-labelled erythrocytes are then reinjected into the patient's blood and imaged with a scanning laser ophthalmoscope, which allows for clear visualization of the paused cells. Paused erythrocytes play a vital role in understanding the mechanism of glaucoma, since erythrocytes pause in retinal capillaries for nutrient exchange as a normal physiologic phenomenon. Dysfunctional hemodynamics in this pausing process could serve as one cause of glaucoma pathogenesis and its progression. Manual counting of erythrocytes on the EMA images is time consuming, so our lab aimed to develop a machine learning algorithm to detect and count the number of paused cells precisely and accurately. We will use this algorithm to count paused erythrocytes in glaucomatous and control eyes and compare differences. We hypothesized that the erythrocytes in glaucomatous eyes will have less paused cells compared to control eyes. Therefore, quantifying the hemodynamics of erythrocyte pausing using EMA could potentially serve as a glaucoma biomarker that can be used clinically in the future. We anticipate that the results of our study will further optimize EMA as a novel imaging technique and better characterize vascular autoregulation of paused erythrocytes in glaucoma patients.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.07

USE OF ULTRASOUND BIOMICROSCOPY TO ASSESS CORNEAL HYDRATION AND EDEMA. Robert Liu* and Janet Alexander, Division of Pediatrics, Department of Ophthalmology and Visual Sciences, University of Maryland School of Medicine, Baltimore, MD.

Corneal hydration has been associated with both physiologic and pathologic states. Literature suggests that the dysregulation of ocular structure hydration is linked with diseases such as diabetes and glaucoma. Ultrasound Biomicroscopy (UBM) is an ultrasound technique that allows high resolution, noninvasive in vivo imaging of ocular anterior segment (AS) structures and is commonly used when investigating disease course. This study proposes that UBM imaging can be applied to AS structure hydration analysis and holds the potential to provide new insight into disease states and improve patient care and management. We demonstrate the applicability of UBM in hydration analysis through the imaging of porcine corneas in a hydration experiment where the corneas are evaluated before and after injections with Balanced Salt Solution (BSS). Pixel density analysis is conducted to approximate corneal hydration level through the use of ImageJ, as are corneal

thickness measurements. The average corneal thickness before, after the first injection, and after the second injection were determined to be 1.4 ± 0.1 mm, 3.3 ± 0.5 mm, and 3.7 ± 0.5 mm respectively. The average corneal tissue integrated pixel density for the native tissue, after the first injection, and after the second injection was 4.1 ± 0.7 pixels/mm², 8.2 ± 0.9 pixels/mm², and 8.8 ± 1.1 pixels/mm², respectively, for the central cornea. The average corneal tissue integrated pixel density for the native tissue, after the first injection, and after the second injection was 4.0 ± 0.7 pixels/mm², 5.0 ± 0.9 pixels/mm², and 5.7 ± 0.8 pixels/mm², respectively, for the peripheral cornea. The average corneal tissue integrated pixel density after the first injection and after the second injection was 6.5 ± 1.0 pixels/mm² and 7.0 ± 0.9 pixels/mm² respectively, for the interphase between the central and peripheral cornea.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.08

NOVEL ULTRASOUND BIOMICROSCOPY IMAGE ANALYSIS TECHNIQUE OF HUMAN IRIS USING IMAGEJ SOFTWARE: INTRA-OBSERVER REPEATABILITY AND INTER-OBSERVER AGREEMENT. Trisha Miglani*, Michael Chang¹, Moran Levin², and Janet Alexander², ²Department of Ophthalmology and Visual Sciences, ¹University of Maryland School of Medicine, Baltimore, MD.

The iris is a thin diaphragm of muscular and epithelial tissue in the front of the eye that determines eye color and adjusts pupil size to control the amount of light passage. The iris can be involved in various intra-ocular diseases including common diseases like glaucoma, congenital anomalies such as coloboma and rare conditions like sarcoidosis. Thus, the iris is a highly clinically relevant structure, but most literature on iris pathologies is limited to qualitative observations. In this study, we aim to develop novel quantitative assessment tools for evaluation of the iris. We have developed a standardized measurement protocol of iris parameters with reliability analysis using ultrasound biomicroscopy (UBM) and ImageJ software to ultimately establish the rigor and reproducibility of these measurements and provide a quantitative description of the human iris in subjects from infancy to young adulthood. 14 pediatric subjects (25 total eyes) without known pathologies were recruited prospectively and underwent UBM imaging. Two observers measured 19 structural iris parameters on 2 different axial and 2 different longitudinal images per eye using ImageJ. Each image was analyzed by both observers using two settings, once with standard image analysis and once with the Find Edges tool, which uses an edge detector to delineate tissue borders. Reliability analysis comprised of intra-observer repeatability (IOR) and inter-observer agreement (IOA). IOR was determined by calculating the coefficient of variation (CV) and correlation coefficient (r) for each parameter, and IOA was assessed by determining the intra-class correlation coefficient (ICC) for each parameter. Within the axial images, the results demonstrated superior ICC, CV and r values for the majority of parameters with the use of an Edge Finder tool. Within the longitudinal image types, the results demonstrated superior ICC, CV and r values for the majority of parameters using the standard method of image analysis on the raw image. From our results, we concluded that the use of an edge-finder tool increased measurement reliability in axial images, but it did not increase reliability in longitudinal images.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.09

OPIOID OVERDOSE RISK FACTORS IN PWID RECEIVING HCV TREATMENT. Rachel Cermak*, Elana Rosenthal, and Sarah Kattakuzhy, Division of Infectious Disease, Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

Patients with opioid use disorder (OUD) face a myriad of health risks, the most imminent of which is the potential for fatal opioid overdose. Identifying characteristics associated with overdose in individuals with OUD and ongoing injection drug use (IDU) is critical to the development of effective prevention strategies. ANCHOR is a single-center study embedded in an urban harm-reduction program evaluating treatment of HCV in people who inject drugs (PWID) with chronic HCV, OUD, and IDU. Participants received HCV treatment and were offered collocated buprenorphine, naloxone, and PrEP, and were followed for 96 weeks. At each study visit, patients self-reported experienced overdose, witnessed overdose, and whether they administered naloxone since their last visit. Fischer's test was used to determine significant associations between characteristics and overdose during ANCHOR. The 100 enrolled participants were predominantly male (76%), median 57 years, Black (93%) and injected opioids at least daily (58%). At baseline, 64% had ever experienced overdose, 93% had ever witnessed an overdose, and 46% had ever administered naloxone. Nineteen patients (19%) experienced a total of 26 overdoses, including 4 (4%) fatal overdoses. The rate of experienced overdose was 12.7 per 100 person-years. Sixty-nine (69%) witnessed at least one overdose during the study. Experiencing overdose was significantly associated with history of previous overdose ($p=0.0153$), however was not associated with injecting daily or more at baseline, being on medication for OUD at baseline, or incarceration during the study ($p=>0.05$). In conclusion, patients in the ANCHOR cohort had high rates of personal and witnessed overdose during and after HCV treatment. The lack of associations between baseline social and behavioral characteristics and experienced overdose supports the generalized risk across subjects, and indicates the difficulty in predicting those at greatest risk for overdose among individuals with OUD and active IDU. Providers should discuss overdose, prescribe naloxone, and offer treatment for OUD to reduce risk in all patients, in particular those who have a history of overdose.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.10

PERCEIVED RISKS OF PSILOCYBIN AND THE ACCEPTABILITY OF PSILOCYBIN THERAPY IN BLACK/AFRICAN-AMERICAN PATIENTS WITH OPIOID USE DISORDER.
John Clifton*, Alan Davis¹, Annabelle Belcher², Christopher Welsh², and Aaron Greenblatt², ¹Ohio State University School of Social Work, Columbus, OH, and ²Division of Addiction Research and Treatment, Department of Psychiatry, University of Maryland School of Medicine, Baltimore, MD.

Psilocybin is a "classic" psychedelic indolealkylamine being investigated in clinical trials for the treatment of psychiatric disorders including depression, post-traumatic stress disorder (PTSD), and various substance use disorders. Although results from phase-1 and -2 clinical trials are promising, 82.5% of research subjects in psychedelic clinical trials have been non-Hispanic white, which limits the generalizability of results to non-White racial minorities. Because patients from different racial/ethnic backgrounds experience psychiatric disorders at different rates and are confronted with unique barriers to accessing and utilizing treatment it is essential to include more racially/ethnically diverse samples to improve our understanding of psychedelic treatment efficacy in different patient populations. However, nearly no research has examined psychiatric patients' knowledge, perceptions, and attitudes towards psilocybin mushrooms, nor the acceptability of psilocybin-assisted therapy. These are important variables that influence the likelihood that someone will take a drug or accept a treatment intervention. We developed a phone-based survey study that seeks to address these gaps in the literature. The survey will characterize the perceived risks of psilocybin mushrooms and the acceptability of psilocybin-assisted therapy in 50 self-identified Black/African-American patients undergoing outpatient medication treatment for Opioid Use Disorder at the University of Maryland Drug Treatment Center. Analysis will explore correlations between perceived risk and treatment acceptability. Since distrust of the health care system has been hypothesized to contribute to the low participation rates by people of color in psychedelic studies,

health care system distrust levels will also be assessed, and further analyses will explore differences in psilocybin treatment acceptability and perceived risk levels between High vs. Low distrust respondents.

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O.11

RECREATIONAL MARIJUANA USE IS NOT PREDICTIVE OF TWO- YEAR PATIENT REPORTED OUTCOMES IN AN ORTHOPAEDIC COHORT. Fernando Albelo*, Mitchell Baker, Matheus Schneider, Tina Zhang, and Frank Henn, III, Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

Marijuana use and medical marijuana legalization in the United States has risen in recent years, however there is scarce literature on relationships between recreational marijuana and postoperative outcomes. The aim of this study was to investigate the association between the recreational marijuana use and patient- reported outcomes two years after orthopaedic surgery. Patients were retrospectively analyzed from our prospective orthopaedic registry at a single urban institution. A total of 1,103 patients (64.5%) completed questionnaires for demographics and outcomes at baseline and two- year follow up. Patient reported outcome measures included Patient- Reported Outcomes Measurement Information System (PROMIS) in 6 domains (Physical Function, Pain Interference, Social Satisfaction, Fatigue, Anxiety, Depression), Numeric Pain Scales (NPS), Marx Activity Rating Scales (MARS), Musculoskeletal Outcomes Data Evaluation and Management System (MODEMS) for surgical expectations, Surgical Satisfaction Questionnaire- 8 (SSQ-8) and Numeric Surgical Satisfaction (NSS). The cohort was then divided into two groups based on reported recreational marijuana usage and statistical analysis was performed to determine if marijuana use was associated with or predictive of any postoperative outcomes. Marijuana use was reported by 47 (4.3%) patients and those patients were predominantly younger (33 vs. 42.7, $p=0.0002$), male (68.1%, $p=0.019$) and single (78.7%, $p=0.0004$). Significantly worse scores for two- year PROMIS Anxiety (53.2 vs. 49.2, $p=0.005$), PROMIS Depression (51.1 vs 46.5, $p=0.001$), MODEMS Met Expectations (63.1 vs. 74.4, $p=0.024$), SSQ8 (71.7 vs. 80.4, $p=0.005$) and NSS (75.6 vs. 83.1, $p=0.041$) were associated with marijuana use. Marijuana users also had less improvement of NPS at operative site (-1.77 vs. -2.67, $p=0.037$) and greater decrease in MARS activity scores for lower extremities (-12.3 vs. -3.95, $p=0.024$). Marijuana use was associated with worse mental health scores, lower activity level, less pain relief, and worse satisfaction two- years after surgery. However, when controlling for confounding variables, marijuana use was not predictive of any outcome measure.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.12

OPIOID PRESCRIBING PATTERNS IN AN ACADEMIC ORTHOPEDIC SETTING. Francia Fang*, Tristan Weir, Casey Codd, and Joshua Abzug, Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

Over the past two decades, the opioid crisis has increased attention to the prescribing practices of physicians and other healthcare providers (HCP). Orthopedic surgery represents one of the medical specialties with the highest rates of opioid prescriptions. However, there is a lack of mandatory prescriber education for non-physician HCPs, the majority of whom do not receive standardized opioid prescription training. The purpose of this study is to understand the prescribing patterns of orthopedic HCPs and how they may differ between services. A retrospective review was performed over a one-year period for patients who received an opioid prescription from an orthopedic HCP

(attendings, fellows, residents, physician assistants, and nurse practitioners). Data collected included patient demographics, surgical or non-operative intervention, ASA score, prescriber type, and prescription type and dosage. Discharge opioids were converted to milligram morphine equivalents (MME). Simple statistical analysis was performed. 1,500 patients were identified who were treated by the orthopedics service and received an opioid prescription from an orthopedics HCP. 98.2% of patients (N=1,482) received a prescription from a non-attending HCP, and 54.2% of patients (N=814) received a prescription from an advanced care provider such as a physician assistant or nurse practitioner. 44% of patients (N=660) received a prescription from a junior or senior resident. Trauma (24.3%), spine (19%), and hand (15.8%) service patients received 59% of the discharge opioid prescriptions. The average age of the sample population was 50.6 (33.3-62.0) and the average ASA score was 2.2. The majority of orthopedic opioid prescriptions are written by non-attending health care providers. Targeted government regulation for mandatory prescriber education is required to establish standardized prescribing protocols in order to balance pain management and reduce excess opioid prescriptions in orthopedic patients.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.13

A DEEP LEARNING-BASED POSE ESTIMATION APPROACH CAN OBJECTIVELY MEASURE REPETITIVE MOVEMENTS. Hannah Cornman*, Ryan Roemmich¹, and Jan Stenum², ¹Department of Physical Therapy and Rehabilitation Science, Johns Hopkins University School of Medicine and ²Department of Physical Therapy and Rehabilitation Science, Johns Hopkins School of Kinesiology, Baltimore, MD.

There is a need for a rapid, low-cost approach to measurement of repetitive movements in people with Parkinson's Disease (PD) that is accurate, objective, and uses equipment that is accessible in the home or clinic. Here, we evaluated the ability of OpenPose, a deep learning-based pose estimation algorithm, to detect the frequency at which repetitive movement tasks from the MDS-UPDRS (the standard clinical rating scale for motor dysfunction in PD) were performed by healthy volunteers in videos recorded on a smartphone camera. We hypothesized that OpenPose estimates of repetitive movement frequency would match corresponding ground truth manual calculations. Ten healthy volunteers recorded videos of themselves performing repetitive movement tasks (finger tapping, hand open/close, hand pronation/supination, toe tapping, and leg agility) at four target frequencies (1-4 Hz). We estimated movement frequencies using OpenPose and measured by manual frame-by-frame detection for all tasks and target frequencies. The resulting estimates of movement frequencies were compared using a 2x4 condition (OpenPose, manual measurement) x frequency (1, 2, 3, 4 Hz) repeated measures ANOVA. We also performed Pearson's correlations to assess relationships between the movement time stamps identified by OpenPose with those measured manually. Only the hand open/close task showed a significant difference in the movement frequencies estimated by OpenPose and manual measurement; however, this difference was small in magnitude (OpenPose estimated frequencies 0.013 Hz smaller than manual measurements, on average). All other tasks and frequencies showed no significant differences between OpenPose estimates and manual measurements. OpenPose estimates of repetitive movement time stamps were significantly correlated with ground-truth measurements with $r > 0.99$ for all tasks and frequencies. OpenPose showed accurate estimation of repetitive movement frequencies in healthy adults when compared to ground truth manual detection. Our future work will explore the potential of this approach as a low-cost and accessible approach to objective measurement of repetitive movements in people with PD.

This research was supported in part by the American Association of Academic Physiatrists to H.C., as a part of the Rehabilitation Research Experience for Medical Students (RREMS).

O.14

RELIABILITY, VALIDITY AND RESPONSIVENESS OF A NOVEL SUBSCAPULARIS OUTCOME SCORE. Samir Kaveeshwar*, Max Hamaker, Blessing Enobun, Syed Hasan, and Mohit Gilotra, Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

There is no shoulder survey or score designed to specifically test subscapularis function. Available surveys that evaluate shoulder strength and pain often combine rotator cuff muscles making the test unable to differentiate subscapularis tears from other pathology. For example, in larger outcome scores such as the ASES, it is difficult to distinguish subscapularis failure after shoulder arthroplasty. The purpose of this study is to validate a subscapularis specific survey as a viable clinical outcome assessment via established psychometric properties. The survey comprising 5 items was given to a study population of 390 patients, 136 with full thickness rotator cuff tears with a minimum score of 5 (better) and a maximum score of 25 (worse). Surveys were given during the first consultation, prior to surgery and during postoperative visits until one year after surgery. Content validity, construct validity, test-retest reliability, internal consistency and MCID using diagnosis based anchors were determined for our subscapularis function survey. There was a high correlation on test-retest reliability (intraclass correlation coefficient = 0.89). There was acceptable internal consistency for all patients surveyed (Cronbach alpha = 0.91). Floor and ceiling effects for patients with rotator cuff pathology were minimized (0% for both). Patients with an isolated subscapularis tear scored worse than supraspinatus/infraspinatus tear. Patients with an isolated subscapularis tear exhibited similar dysfunction as patients with a supraspinatus/infraspinatus/subscapularis tear. There was acceptable construct validity with all 4 hypothesis demonstrating significance ($p < 0.05$). The MCID using diagnosis as an anchor was 4.17 when differentiating subscapularis tears from other rotator cuff pathology. Amongst patients with rotator cuff tears in this population, a score of 22 or higher predicts a subscapularis tear 75% of the time, in spite of its low overall prevalence. The subscapularis shoulder score demonstrated acceptable psychometric performance for outcomes assessment in patients with rotator cuff disease. This survey can be used as an effective clinical tool to assess subscapularis function.

O.15

PRESS GANEY SCORES DO NOT CORRELATE WITH SURGICAL SATISFACTION AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION. Justin Kung*, Tina Zhang¹, and R. Frank Henn, III², ²Division of Sports Medicine, ¹Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

Patient satisfaction metrics are commonly used to assess the quality of healthcare and affect reimbursement. The purpose of this study was to determine if Press Ganey (PG) Ambulatory Surgery Survey (PGAS) scores correlate with validated measures of surgical satisfaction and patient-reported outcomes (PROs) at two weeks postoperatively in patients undergoing anterior cruciate ligament reconstruction (ACLR). A retrospective review of patients who underwent ACLR from 2015-2019 at a single institution was performed. Patients who completed the PGAS and PROs at two-weeks postoperatively were included in the study. Surgical satisfaction was measured with the Surgical Satisfaction Questionnaire-8 (SSQ-8) and PROs included six Patient-Reported Outcomes Measurement Information System (PROMIS) domains. Thirty-nine patients were analyzed. Total PGAS score and Top Box scores showed no significant correlations with the SSQ-8. There were no significant correlations between SSQ-8 and PGAS domain scores except for a negative correlation with Facility domain scores ($p=0.04$), meaning that patient with higher surgical satisfaction had lower PGAS Facility scores. Total PGAS score, Top Box scores, and PGAS domain scores showed no significant correlation with any of the other PROs. PGAS scores show no concordance with surgical satisfaction, function, pain, mental health, activity, and met expectations of surgery in patients undergoing ACLR. Instead, PGAS scores seem to emphasize delivery of care, such as

quality of communication, ease of registration, or interactions with various staff or health care providers. Therefore, PGAS should not be used as a measure of surgical satisfaction or outcome assessment.

This work was supported by a grant from The James Lawrence Kernan Hospital Endowment Fund, Incorporated.

O.16

IS A LOW-COST DRILL COVER SYSTEM NON-INFERIOR TO CONVENTIONAL SURGICAL DRILLS FOR SKELETAL TRACTION PIN PLACEMENT? Samantha Selhorst*, Robert O'Toole¹, Gerard Slobogean¹, and Nathan O'Hara², ¹Division of Orthopaedic Trauma, ²Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

The Drill Cover system was developed as a low-cost alternative to conventional surgical drills with specific applicability to low- and middle-income countries. However, the system may also be useful for the sterile placement of traction pins in the emergency department of high-income country hospitals. We aimed to determine if the Drill Cover system was non-inferior to conventional surgical drills in terms of infections at the traction pin site. One year ago, a US academic trauma center began using the Drill Cover system to apply skeletal traction pins in patients with femoral shaft fractures. We performed a retrospective interrupted time series study to compare the outcomes of patients treated with conventional surgical drills (pre-intervention group, 20 months) to patients treated with the Drill Cover system (post-intervention group, 9 months). The study included adult patients with femoral shaft fractures initially placed in skeletal traction. The primary outcome was infection that required surgery or antibiotics at the site of skeletal traction pin placement. To compare infection outcomes, we used a non-inferiority test with a one-sided alpha of 0.05 and a non-inferiority margin of 3%. We included 155 patients in the pre-intervention group and 55 patients in the post-intervention group. No infections at the site of skeletal traction pin placement were found in either the pre-intervention or the post-intervention group (difference 0%, 95% CI: -1.4%to 1.4%, non-inferiority p-value<0.01). The results suggest that the Drill Cover system was non-inferior to conventional surgical drills regarding infections at the site of skeletal traction pins. The Drill Cover system may be a safe alternative to the more expensive surgical drills for skeletal traction pin placement in the emergency room environment.

This research was supported by the University of Maryland School of Medicine Summer Orthopaedics Research Program.

O.17

INVESTIGATING THE ROLE OF HEPATITIS B SURFACE ANTIGEN LEVEL IN HUMORAL IMMUNITY IN PATIENTS WITH CHRONIC HEPATITIS B TO FIND SEROCONVERSION BIOMARKERS. Natalia Sampaio Moura*, Alip Ghosh¹, Lydia Tang², Bhawna Poonia², and Shyam Kottili³, ¹Division of Basic Science and Vaccine Research, Institute of Human Virology, University of Maryland School of Social Work and ²Division of Basic Science and Vaccine Research and ³Division of IHV Clinical Research Unit, Institute of Human Virology, University of Maryland School of Medicine, Baltimore, MD.

Chronic hepatitis B infection (CHB) continues to have a large global health impact and high mortality. It has led to over 200 million infections globally, and to fatal diseases such as cirrhosis and hepatocellular carcinoma. Unfortunately, there is no effective cure for CHB. Loss of hepatitis B virus surface antigen (HBsAg) and appearance of anti-hepatitis B surface antibodies (anti-HBs) signify immune control and functional cure of CHB infection. Presence of persistent high HBsAg levels along with dysfunctional immunity of patients with CHB infection has raised the possibility that HBsAg itself is immunoregulatory in CHB infection. Therefore, this study will investigate HBV-specific immune dysfunction, specifically the dysfunction in generating protective anti-HBs response, associated with HBsAg levels. T follicular helper cells (Tfh) have a specialized role to aid the

development of B cells into antibody producing cells. Thus, we aimed to investigate functional differences in the Tfh population in PBMC samples from 17 patients with CHB infection stratified by low (<1500 IU/ml) and high (>9500 IU/ml) HBsAg levels. We utilized flow cytometry to analyze antigen- specific T cell activation markers and Tfh markers upon stimulation. There was no significant difference in Tfh response in patients who had higher vs. lower levels of HBsAg. Further studies analyzing secondary lymphoid organs and a bigger sample size will further elucidate whether Tfh cell quantity and function are affected by the immunoregulatory role of HBsAg in chronic HBV infection.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.18

THE EFFECT OF BLUNT HEPATIC TRAUMA MANAGEMENT ON PATIENT OUTCOMES. Alexandria Riedel* and Margaret Lauerman, Division of Trauma, Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

First line management of hepatic trauma is well defined and consists of manual compression with the initiation of a massive transfusion protocol. Such measures have the ability to control bleeding in most circumstances; however, in about 13.7% of cases, further intervention is necessary. The next line of treatment generally consists of either embolization, a nonoperative approach, or definitive operative management. Typically, hemodynamic stability dictates the next course of treatment. Hemodynamically stable patients are able to be imaged via CT and treated with angioembolization. Conversely, hemodynamically unstable patients tend to need emergency laparotomy. It has been observed that complications arise in 40% of patients who undergo angioembolization. An increase in failure of nonoperative management has also been associated with angioembolization. In turn, it is not clear which method should be employed when treating hepatic trauma patients. We hypothesize that there will be no difference in outcomes between those treated with embolization and those treated with definitive operative management. To test the proposed hypothesis, we have collected retrospective data from a 5-year cohort of hepatic trauma patients at the R. Adams Cowley Shock Trauma Center. Upon data analysis, we see more hepatic necrosis and hepatic abscess in patients who have undergone embolization as opposed to those managed operatively. We also observe higher mortality within the population of individuals treated operatively as opposed to nonoperatively; yet, this discrepancy may be due to the nature of the cohort requiring operative management. Data is not yet sufficient to definitely support superiority in the use of embolization; however, it is currently suggestive of such. We must next work to remove confounding variables associated with surgery from analysis as well as investigate the potential circumstantial benefit each treatment modality may possess. It is undeniable that surgical intervention is necessary in specific presentations; however, it is our next objective to investigate more precisely where surgery is indicated as opposed to where there may be benefit to embolization.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.19

VIRTUAL GRAND ROUNDS AS A NOVEL MEANS FOR APPLICANTS AND PROGRAMS TO CONNECT IN THE ERA OF COVID-19. Juhye Kang*, Linhan Xu¹, David Ambinder¹, and Rena Malik², ²Division of Urology, Department of Surgery, ¹University of Maryland School of Medicine, Baltimore, MD.

COVID-19 has disrupted the 2020-2021 residency application cycle with the cancellation of away rotations and in-person interviews. This study seeks to investigate the feasibility and utility of video conferencing technology (VCT) as an opportunity for applicants to interact with faculty from outside programs. 18 prospective urology applicants were randomized to 6 urology programs to give

a virtual grand rounds (VGR) talk. Presentations were recorded and analyzed by two independent graders to determine audience engagement. Students were surveyed regarding the perceived utility of VGR, and faculty were surveyed to determine the system usability of VCT and their ability to evaluate the applicants. 17 students completed the survey, reporting a 100% satisfaction rate with VGR, and a majority of students felt this was a useful way to learn about outside programs. 85 physicians completed the faculty survey, with nearly half feeling confident in their ability to evaluate the applicant, and 70% were able to decide whether they likely would or would not invite the candidate for an interview. Video transcription data shows sessions were interactive with questions and feedback and had minimal distractions. We conclude that VGR can be a useful means for medical students to express interest in programs as well as function as an additional marker for faculty to evaluate applicants.

O.21

INTERROGATING THE NATURAL HISTORY OF OBSTRUCTIVE SLEEP APNEA DURING THE PANDEMIC. Emily Hamburger* and Amal Isaiah, Division of Pediatrics, Department of Otorhinolaryngology - Head and Neck Surgery, University of Maryland School of Medicine, Baltimore, MD.

Children with obstructive sleep apnea (OSA) demonstrate deficits in cognition, behavior, and quality of life. The surgical removal of tonsils and adenoids, also called adenotonsillectomy (AT), is associated with improvement in behavior in children with OSA. However, there is a paucity of data concerning the long-term effects of untreated pediatric OSA on these subjective outcome measures. Due to the COVID-19 pandemic and disruption in surgical scheduling, a unique opportunity exists for investigating the natural history of pediatric OSA and the related morbidity. This research project will investigate the effects of untreated pediatric OSA on the subjective measurements of behavior and quality of life, while also examining the impact of patient-level demographic factors. The pandemic-related delays facilitate the exploration of how uncontrolled differences in the timing of surgery may affect behavioral outcomes in children with OSA. To investigate this, we will obtain four surveys from parents including the pediatric sleep questionnaire (PSQ), Epworth Sleepiness Scale for Children and Adolescents, OSA-18 Quality of Life Survey, and Behavior Rating Inventory of Executive Function (BRIEF). These will be completed at three timepoints: baseline before surgery, 1-3 months post-surgery, and one year after the baseline. Using multilevel modeling, we will illuminate the trajectory of changes in behavior over time in children grouped by the baseline severity of OSA while highlighting the impact of demographic factors on these changes over time.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.22

FACTORS AFFECTING SPONTANEOUS *CHLAMYDIA TRACHOMATIS* CLEARANCE. Carson Klasner*, Susan Tuddenham¹, and Rebecca Brotman², ¹Division of Infectious Diseases, Department of Medicine, Johns Hopkins University School of Medicine and ²Department of Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, MD.

Chlamydia trachomatis (CT) is the most commonly reported STD in the United States, with many cases remaining asymptomatic and untreated. The natural history of CT infection in humans, including spontaneous resolution of infection without antibiotic treatment, is not completely understood. We conducted a literature review to examine the epidemiology of and factors affecting spontaneous CT clearance in women. Such factors included host immunology, chlamydia serovar, and the vaginal microbiome. This review specifically focuses on the role of the vaginal microbiota in CT clearance. In a healthy state, *Lactobacillus* species dominate the vaginal microbiome, producing lactic acid to inactivate CT organisms and reduce infectivity. Conversely, dysbiotic states are characterized by the presence of *Prevotella* species that produce indole, which may allow for

tryptophan-starved CT organisms to survive. Overall, research on specific correlates of CT clearance is sparse. Understanding the natural history of CT infection is vital for infection prevention and the development of a chlamydia vaccine.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.23

IDENTIFYING PATIENT-CENTERED RESEARCH PRIORITIES IN OVERACTIVE BLADDER BY CROWDSOURCING. Aidan Kennedy*, Riley Kennedy¹, Olga Goloubeva², Philippe Zimmern³, and Rena Malik⁴, ¹George Washington University, San Francisco, CA, ³Division of Urology, Department of Surgery, UT Southwestern Medical Center, Dallas, TX, and ²Department of Oncology and ⁴Division of Urology, Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

Patient's perception of treatment outcomes in conditions with significant impact on quality of life, such as overactive bladder (OAB), are critical to achieving success. Patient centered outcomes research aims to engage patients in research to better reflect their values and needs. Our aim is to identify research topics prioritized by patients with OAB. An advertisement was placed on Amazon MTurk, a crowdsourcing platform, inviting users to complete a survey on OAB Research. The Overactive Bladder Awareness Tool – 3 item (OAB-V3) was used to screen participants. Those that scored 4 or greater took a research prioritization survey. The survey included a choice 10 research topics in categories including: patient-provider communication, diagnosis, treatment and work/disability. The participants ranked their top 5 research priorities from most important to least important. In addition, basic demographic data, OAB-q SF validated questionnaire, fluid intake, diuretic use, duration and both of OAB symptoms were collected. Of 100 MTurk users that took the OAB-V3 screening questionnaire, 45 were eligible and 38 were included in analysis. Participants had a mean age of 34±10 years old, were 66% female and 81% had at least a college degree. Half of participants were white, 26% were Asian and 8% were Black. Participants reported having symptoms for at least six months (58%) that occur on at least half of the days of the year (47%). Additionally, 61% of participants have sought treatment for their OAB. Participants had a mean OAB-q severity score of 51.0 and a mean health related quality of life score of 43.4. Research categories of highest importance were etiology (15%), treatment (14%) and implementing new findings (13%). Amazon MTurk offers a potentially valuable population to crowdsource research priorities in OAB. Our pilot data suggests that research on etiology and treatment of OAB may be of a higher priority to patients and offers a focus for further patient centered outcomes research.

This research was supported by the Department of Urology Grant.

O.24

PSEUDOMONAS AERUGINOSA BACTEREMIA AND THE NEED FOR FOLLOW-UP BLOOD CULTURES. Alexis Green*, Lyndsay O'Hara, Lisa Pineles, Scott Sorongon, Anthony Harris⁴, and Jonathan Baghdadi, Division of Genomic Epidemiology and Clinical Outcomes, Department of Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, MD.

The utility of follow-up blood cultures in the management of Gram-negative bacteremia is controversial, and their role in the management of bacteremia due to *Pseudomonas aeruginosa* has not been extensively studied. We sought to understand why providers obtain follow-up blood cultures in the setting of *P. aeruginosa* bacteremia and whether follow-up blood cultures in this setting are associated with clinical outcomes. A retrospective cohort study of adult inpatients with *P. aeruginosa* bacteremia at the University of Maryland Medical Center between 2015 – 2020 was conducted. Propensity-weighted Cox regression was used to evaluate for an association between follow-up blood cultures and in-hospital mortality. Competing risks analysis was used to evaluate for an association with length of stay. Electronic medical records were reviewed to identify provider

justifications for follow-up blood cultures. Of the 162 patients in the cohort, 130 (80%) had follow-up blood cultures, including 10 (8%) that were positive for *P. aeruginosa* and 11 (8%) that were positive for other organisms. Follow-up blood cultures were associated with lower risk of in-hospital mortality (hazard ratio 0.31; 95% confidence interval, 0.15 to 0.62) and shorter length of stay (hazard ratio 2.10 indicating higher likelihood of early discharge; 95% confidence interval 1.38 to 3.20). The most common reasons for follow-up blood cultures were “to ensure clearance” and “to guide antibiotic therapy”. Follow-up blood cultures are commonly collected for patients with *P. aeruginosa* bacteremia and frequently identify pathogens. In this retrospective observational study from a single center, follow-up blood cultures were associated with decreased in-hospital mortality and shorter length of stay.

This research was supported in part by the Infectious Diseases Society of America Foundation's Grants for Emerging Researchers and Clinicians Program.

O.24A

CHARACTERIZATION OF NERVE GROWTH FACTOR RECEPTOR (NGFR) EXPRESSING SKIN-DERIVED PRECURSOR CELLS (SKPs). Milena Aksentijevich*, Bishal Tandukar¹, Sandeep Joshi¹, and Thomas Hornyak², ¹Department of Biochemistry and Molecular Biology, and ²Department of Dermatology, University of Maryland School of Medicine, Baltimore, MD.

Previous studies in mice have identified two distinct subsets of melanocyte stem cells (McSCs), differentiated by CD34 expression. Whereas CD34⁻ McSCs localize to the secondary hair germ (SHG) of the hair follicle (HF) and demonstrate melanocyte differentiation potential, CD34⁺ McSCs are found in the bulge region and exhibit a wider range of neural crest-derived cell differentiation, including myelin-generating glia. RNA sequencing of McSCs identified p75^{NTR}, a neurotrophin involved in neuronal development, as another marker on McSCs selectively expressed by CD34⁺ McSCs in the bulge region. These findings highlight the potential application of myelin-generating CD34⁺ McSCs to be used therapeutically for demyelinating diseases, and identify p75^{NTR} as a marker that may help translate this research to human models. In this study, we characterized p75^{NTR} expression on skin progenitor cells (SKPs) to identify potential cells within this population that have neural regenerative abilities. SKPs are a multipotent population of stem cells derived directly from dermal tissue and represent an abundant reservoir of easily accessible stem cells in humans. We sorted p75^{NTR}⁺ and CD34⁺ McSCs from murine dermal tissue and analyzed their expression of p75, CD34, Kit, Nestin, and Dct by qPCR. The p75^{NTR}^{+/−} McSCs were initially cultured in order to select for SKPs. Next, we isolated SKPs directly from murine dermal tissue, and analyzed the distinct cell populations by qPCR and immunofluorescence. We were specifically interested in comparing the expression of markers for glial, neuronal, and other neural crest including melanocytic differentiation among these cells. The experimental results demonstrate that p75^{NTR}⁺ cells are mostly differentiated cells, localized outside of the HF bulge region. Additionally, murine SKPs are heterogeneous, comprising P75^{NTR}⁺ cells as well as other cells from multiple neural crest lineages. Future experiments will aim to sort p75^{NTR}⁺ cells directly from SKPs to attain an adequate population of cells for further evaluation of their differentiation potential.

This research was supported by the Veterans Affairs Medical Center.

O.25

RGC-32 CONTRIBUTES TO MS PATHOGENESIS BY MAINTAINING A MATURE ASTROCYTE PHENOTYPE. Austin Beltrand*, Horea Rus¹, Alexandru Tatomir², ¹Division of Neuroimmunology, Department of Neurology, University of Maryland School of Medicine, Baltimore, MD, and ²Division of Neuroimmunology, Department of Neurology, University of Maryland School of Medicine, Baltimore, MD.

Astrocytes are increasingly recognized as critical contributors to multiple sclerosis pathogenesis. We have previously shown that lack of Response Gene to Complement 32 (RGC-32) alters astrocyte morphology in the spinal cord at the peak of experimental autoimmune encephalomyelitis (EAE), suggesting a role for RGC-32 in astrocyte differentiation. In this study, we analyzed the expression and distribution of astrocytes and astrocyte progenitors by immunohistochemistry in spinal cords of wild-type (WT) and RGC-32-knockout (KO) mice with EAE and of normal adult mice. Our analysis showed that during acute EAE, WT astrocytes had a reactive morphology and increased GFAP expression, whereas RGC-32 KO astrocytes had a morphology similar to that of radial glia and an increased expression of progenitor markers such as vimentin and fatty acid binding protein 7 (FABP7). In control mice, GFAP expression and astrocyte density were also higher in the WT group, whereas the number of vimentin and FABP7-positive radial glia was higher in the RGC-32 KO group. In vitro studies on cultured neonatal astrocytes from WT and RGC-32 KO mice showed that RGC-32 regulates a complex array of molecular networks pertaining to signal transduction, growth factor expression and secretion, and extracellular matrix (ECM) remodeling. Among the most differentially expressed factors were insulin-like growth factor 1 (IGF1), insulin-like growth factor binding proteins (IGFBPs), and connective tissue growth factor (CTGF); their expression was downregulated in RGC-32-depleted astrocytes. The nuclear translocation of STAT3, a transcription factor critical for astroglialogenesis and driving glial scar formation, was also impaired after RGC-32 silencing. Taken together, these data suggest that RGC-32 is an important regulator of astrocyte differentiation during EAE and that in the absence of RGC-32, astrocytes are unable to fully mature and become reactive astrocytes.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research, as well as by the National Consortium of MS Grant.

O.26

MR-GUIDED FOCUSED ULTRASOUND (MRGFUS)-MEDIATED BLOOD-BRAIN BARRIER DISRUPTION OF MALIGNANT GLIOMAS IN RAT MODELS. Yamini Vyas*, Pavlos Anastasiadis¹, Jeffrey Winkles², and Graeme Woodworth¹, ¹Department of Neurosurgery, and ²Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

Malignant gliomas are a heterogeneous group of brain tumors characterized by rapid progression and molecular complexity, with limited effective treatments available. Liquid biopsy as a diagnostic tool allows for the non-invasive detection, molecular characterization, and monitoring of the growth of brain tumors. However, deposition of tumor components (e.g., tumor DNA) into the bloodstream is impeded by the blood-brain barrier (BBB). Numerous studies have demonstrated how MR-guided focused ultrasound (MRgFUS) in conjunction with microbubbles (MBs) is a powerful method capable of disrupting the BBB safely and reversibly. We hypothesized that FUS-mediated BBB disruption (BBBD) would facilitate the extravasation of tumor-specific DNA into the systemic circulation at detectable levels. MRgFUS treatments were performed using Sprague-Dawley rats (6-10 weeks old). After co-registration during treatment planning, MBs were administered intravenously in a single bolus injection at 10 μ L/kg (Definity®, Lantheus Medical Imaging) followed immediately by FUS. BBBD was assessed with baseline T1-weighted (T1w) and T1 contrast-enhanced (T1c) MR imaging. Harmonic dosing (HD) was continuously monitored during FUS treatments using an integrated passive cavitation (PCD) system (Image Guided Therapy). T1c MR imaging confirmed that FUS-mediated BBBD was consistently attained at discrete locations in the thalamus and striatum. T2*-weighted MR imaging, followed by post-mortem H&E staining, confirmed the absence of significant microhemorrhages. Contrast-enhancement was quantified at the locations of treatment and correlated with HD. Our results validate that FUS, in combination with MBs, can disrupt the BBB consistently in a rat model. More importantly, MRgFUS guided by HD is an efficient treatment option capable of safe, reliable, and reversible BBBD. HD-driven BBBD,

paired with the level of circulating tumor DNA measurable in the systemic circulation, has the potential for MRgFUS-enabled, non-invasive biopsy of malignant gliomas. Having such a diagnostic tool at our disposal could significantly advance the diagnosis and monitoring of human brain cancers in clinically meaningful ways.

This project is currently funded by the Alpha Omega Alpha Carolyn L. Kuckein Student Research Fellowship.

O.27

REDUCING INSTITUTIONAL IMAGING COSTS AND PROCEDURES BY USING OUTSIDE MAGNETIC RESONANCE IMAGING FOR STEREOTACTIC BRAIN BIOPSY. Francia Fang*, I. Pomeraniec, Panos Mastorakos, and John Heiss, Department of Neurosurgery, National Institute of Neurological Disorders and Stroke, National Institutes of Health, Bethesda, MD.

Imaging workup preceding stereotactic brain biopsy differs among institutions. Practices vary from obtaining additional magnetic resonance imaging (MRI) scans at the surgical institution close to the time of surgery to neuronavigation based on scans from outside institutions. The relevant costs and value to the health system of multiple MRI scans during this workup remain poorly defined. In this review, a generalized total cost equation was formulated and used to analyze differential cost drivers across different patient scenarios from diagnosis to surgery. The value of additional MRI scans was assessed from the perspective of the patient, neurosurgeon, and insurance payer. Each additional MRI scan performed between diagnostic MRI and stereotactic brain biopsy contributes \$306 for Medicare patients versus \$870-\$990 for patients with private insurance. The range of total costs is \$306-\$946 and \$990-\$2,879 for Medicare and private insurance, respectively. There is little to no clinical value to perform additional MRI scans if outside institution MRI scans are high-quality and can be sourced to the intraoperative neuronavigation system. The main driver for imaging costs before stereotactic brain biopsy is the number of MRI scans performed between diagnosis and surgery. Imaging costs vary significantly among insurance types. Cost and waste reduction is achieved through reducing the number of MRI scans by using high-quality outside institution MRI scans, minimizing the interval between scanning and surgery, avoiding dedicated MRI scan with skin fiducials for neuronavigation, and not requiring another diagnostic MRI scan from within the treating institution.

O.28

PD-L1 EXPRESSION AS A PROGNOSTIC MARKER FOR LOCAL CONTROL FOLLOWING IMMUNE CHECKPOINT INHIBITION AND STEREOTACTIC RADIATION IN BRAIN METASTASES. Lars Berg*, Gregory Alexander, and Mark Mishra, Department of Radiation Oncology, University of Maryland School of Medicine, Baltimore, MD.

Stereotactic radiation therapy (SRT) and immune checkpoint inhibitors (ICI) may act synergistically to improve brain metastases treatment outcomes but the effectiveness may depend on 1) a patient's degree of programmed death-1 ligand (PD-L1) expression and 2) whether they received GammaKnife or Linac-based SRT. The objective of this study is to compare outcomes for patients undergoing SRT with and without concurrent ICI, depending on the listed two variables. Patients treated for brain metastases with single or multi-fraction SRT are being retrospectively reviewed through electronic medical records. Effectiveness of treatment is based on local control (LC), radiation necrosis (RN) risk and distant brain failure (DBF), as estimated by the Kaplan-Meier method and compared between groups using the log-rank test. We are collecting data from 271 patients treated with SRS for 590 brain lesions at the University of Maryland Medical System (UMMS). When assessed earlier in the data collection process at 385 lesions, results showed lesions treated with SRT-ICI had significantly improved 1 year local control compared to SRT alone at 98% and 89.5%, respectively ($p=0.0078$). One year DBF (41% vs. 53%; $p=0.21$) and RN incidence (7%

vs. 4%; $p=0.25$) were similar for SRT alone versus SRT-ICI respectively. These results suggest SRT-ICI may improve local control of brain metastases with no statistically significant difference in risk of radiation necrosis or DBF. We aim to reassess this cohort, and to incorporate 1) a patient's degree of PD-L1 expression and 2) whether they received GammaKnife or Linac-based SRT. We will analyze differences in LC, NS, and DBF and assess if PD-L1 is a prognostic factor.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.29

PYRUVATE DEHYDROGENASE IN CEREBRAL ISCHEMIA. Mehnaz Ali*, Apurva Borcar, and Gary Fiskum, Department of Anesthesiology, University of Maryland School of Medicine, Baltimore, MD.

Cerebral ischemia and reperfusion are characterized by an initial increase in PDHC activity, followed by a sharp decline that persists for several hours afterward. This effect is more pronounced the longer the duration of ischemia. This decrease in PDHC activity may result from the generation of numerous oxygen free radicals which occurs with reperfusion. The mitochondria are a site of profuse reactive oxygen species (ROS) generation, and as a mitochondrial enzyme complex, PDHC is particularly susceptible to damage by them. When incubated in an oxygen free radical generating system, the activity of PDHC was found to be inhibited in a linearly-dependent manner on the amount of free radical present. In vitro exposure to ROS-inducers resulted in early decrease of PDHC activity, and eventual neuronal death. This idea is further supported by the exacerbation of PDHC deactivation observed when resuscitating animals under hyperoxic versus normoxic conditions, a circumstance which would lead to greater than usual generation of ROS. Several possible treatments for PDHC inactivation due to ischemia have been investigated, including those that address ROS generation, and those which attempt to increase the activity of PDHC. Pretreating rats with dichloroacetate (DCA), an inhibitor of PDHC kinase (PDK), improved the activity of PDHC following ischemia and reperfusion. Administration of exogenous pyruvate to post-ischemia and resuscitation rat astrocytes prevented cell death and improved PDHC activity. Acetyl-L-carnitine (ALCAR), which increases mitochondrial metabolic rate and may be an alternate fuel source for the TCA cycle, was administered in a canine model of global ischemia and reperfusion, subjects demonstrated improved neurological scores and increased activity of PDHC following up to 24 hours of reperfusion. Treatment with hypothermia and ethanol under normobaric conditions resulted in improvement in neurological deficit scores, as well as improvement in PDHC activity and decreased expression of PDK, and declines in ROS generation. The results of such studies provide encouraging evidence that targeting PDHC and ROS following cerebral ischemia may improve outcomes.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research to M.A. and supported by NIH 1 R01 NS091099-01A1 to G.F.

O.30

PROTON RADIATION PACKAGE TIME AND OUTCOMES IN PATIENTS UNDERGOING CURATIVE TREATMENT FOR HEAD AND NECK CANCERS: A SINGLE INSTITUTION EXPERIENCE. Danielle Arons*, Gregory Alexander, and Matthew Witek, Department of Radiation Oncology, University of Maryland School of Medicine, Baltimore, MD.

Radiotherapy (RT) for cancers of the Head and Neck is often delivered with curative intent as a single modality, concurrently with systemic therapy, or in the adjuvant setting following surgery. Patients receiving RT are at risk for developing significant toxicities in the short and long-term setting. Proton therapy is distinct from photon therapy in its dose distribution enabling decreased dose to organs at risk potentially reducing side-effects. National cancer registry data suggests that

proton therapy increases time to treatment initiation negatively impacting oncologic outcomes. These findings are constrained by the limited granularity of national registry data. We have performed a detailed single institution analysis of proton therapy planning time. Initial patient characteristics have been gathered on 282 patients. We have sorted these patients into groups based on cancer location and histology. With this data, we aim to determine and compare the average time from initial planning to start of radiation treatment between the different groups and identify factors responsible for delays or mechanisms enabling timely treatment with this data.

This research was supported in part by the Radiation Oncology Summer Fellowship.

O.31

PATTERNS OF CARE AND OUTCOMES OF PATIENTS RECEIVING RADIATION THERAPY FOR LOCALLY-ADVANCED LARYNGEAL CANCER: THE UNIVERSITY OF MARYLAND EXPERIENCE. Pragnya Dontu*, Antony Koroulakis, Matthew Witek, and Jason Molitoris, Department of Radiation Oncology, University of Maryland School of Medicine, Baltimore, MD.

Locally advanced laryngeal cancer affects a high-risk subgroup of patients and standard of care is well-established, involving at least two major oncologic treatment modalities. We report our modern institutional disease outcomes and toxicities. All patients with a laryngeal cancer diagnosis treated within the University of Maryland Medical System between 2015-2019 were analyzed. Toxicities were scored according to CTCAE 4.0. Descriptive statistics were used for patient, disease, and treatment characteristics. The Kaplan-Meier (KM) method was used for locoregional control (LRC), progression-free survival (PFS), and overall survival (OS). Between 2015-2019, 65 patients underwent radiation therapy for locally-advanced laryngeal cancer. Forty-nine received definitive chemoradiation, and sixteen received post-operative RT (ten with concurrent chemotherapy). Median follow-up was 12.6 months (range 1.5 – 61.2 months), median age 60 years (41-79). Median RT dose was 69.96 Gy (41.4-70.2 Gy). Grade 3 acute toxicities were reported in 9 (13.8%), with no acute Grade 4 or 5 toxicities. Gastrostomy tubes were placed in 26 (40.0%), with six (9.2%) placed during treatment and the remainder prophylactically. Three-year LC, PFS, and OS were 83.5% (+/- 5.1%), 63.2% (+/- 6.6%), and 68.6 % (+/- 7.7%), respectively. Institutional outcomes are consistent with well-established historical data. Further maturation and collection of data will clarify late toxicity profiles and outcomes within small subgroups of patients.

This research was supported in part by the Radiation Oncology Summer Fellowship.

O.32

TARGETING BRAF MUTANT MELANOMA WITH NOVEL HSP90, BRAF, AND MEK INHIBITOR COMBINATION THERAPY. Jacqueline Hwang*, Emmanuel Unni¹, Sandeep Joshi¹, and Thomas Hornyak², ¹Department of Biochemistry and Molecular Biology and ²Department of Dermatology, University of Maryland School of Medicine, Baltimore, MD.

Over the last 30 years, the incidence of melanoma has risen rapidly by 1.5% each year, with 100,350 new cases estimated in 2020. As melanoma continues to be the leading cause of skin cancer-related deaths, therapeutic advances are needed to improve patient survival. Approximately 40-60% of melanoma cases are caused by a V600E mutation in the BRAF proto-oncogene, leading to overactivation of the RAF-MEK-ERK pathway and uncontrolled cell growth. Many tumors continue to express cell type-specific proteins such as TYRP1 and DCT, which function enzymatically to synthesize melanin. A new class of targeted drug therapies that selectively inhibit either BRAF, MEK, or HSP90, a key chaperone oncoprotein, has been shown to be promising in the treatment of melanoma. However, the limitations to single-agent therapy include acquired drug resistance, suggesting combination therapy is a better approach. This project aims to test the effects of a novel combination of BRAF, MEK, and HSP90 inhibitors (i) in human BRAF mutant melanoma strains. Cells were treated for 48 hours with either DMSO, Onalespib (2nd generation

HSP90i), Vemurafenib (BRAFi), Binimetinib (MEKi), or a combination of Onalespib/Vemurafenib or Onalespib/Binimetinib. Drug efficacy was evaluated through changes in the phosphorylation of MEK and ERK and the expression of TYRP1, DCT, and other proteins visualized by Western blotting. Results showed that combination therapy provided a more significant and direct inhibition of RAF-MEK-ERK pathway-mediated cell proliferation compared to single therapy. Future studies with animal models will further the understanding of this therapy for melanoma.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.32A (Added presentation in place of O.33)

THE USEFULNESS OF DEAMIDATED GLIADIN PROTEIN ANTIBODIES IN DIAGNOSING CELIAC DISEASE IN CHILDREN YOUNGER THAN 3-YEARS-OLD. Madison Hill*, Runa Watkins¹, Elaine Leonard-Puppa¹, Jaylyn Waddell², Samra Blanchard¹, and Howard Kader¹, ¹Division of Gastroenterology and Nutrition, ²Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD.

While the tissue transglutaminase (tTG) antibody is the most established serological test when screening for Celiac disease, in certain populations the tTG lacks sensitivity. Many Celiac experts recommend the additional use of deamidated gliadin peptide (DGP) antibodies in conjunction with the tTG in children younger than 3 years-old. The goal of this study was to evaluate the utility of DGP-IgA and DGP-IgG along with tTG in biopsy proven Celiac disease for screening this cohort of children in order to identify which serological tests lead to an accurate diagnosis for this condition. This was a retrospective chart review of children younger than 3-years-old treated at our Celiac Center who were not IgA deficient and had tTG and DGP serologies obtained along with an EGD and duodenal biopsies. We then determined each tests sensitivity, specificity, PPV and NPV. Both the positive and negative serologies were compared to the results of the EGD biopsy in order to determine the significance of including the DGP-IgG and DGP-IgA test in the Celiac screening serology in this age group. Review of 478 pediatric patients identified 52 patients who were younger than 3-years old and 43 met the inclusion criteria. The positive predictive value, negative predictive value, sensitivity and specificity of deamidated gliadin IgA (91.7%, 45.5%, 64.7%, 83.3%) and deamidated gliadin IgG (77.8%, 37.5%, 58.3%, 60%) were determined. These tests were then assessed in conjunction as DGP-IgA+tTG-IgA (90.9%, 66.7%, 83.3%, 80%) and DGP-IgG+tTG-IgA (87.5%, 60%, 77.8%, 75%). We also determined the positive predictive value, negative predictive value, sensitivity and specificity for the tTG-IgG serology (85.7%, 71.4%, 75% and 83.3%) and for tTG-IgA serology (88.6%, 66.7%, 85.2% and 72.7%). In isolation, DGP-IgA provides a high PPV for Celiac disease in children younger than 3, whereas DGP-IgG has less value. When used alone or in conjunction with tTG-IgA, the DGP-IgA test results in a high PPV of 91.7% and 90.9%, respectively. Based on these results, we recommend that either the DGP-IgA or the tTG-IgA serology be obtained when screening infants younger than 3 years-old for Celiac disease.

O.33 (This Presentation has been withdrawn)

IMPACT OF ARREST OF LABOR ON MATERNAL OUTCOMES OF CESAREAN SECTION. Andrea Theodoru*, Tabitha Quebedeaux¹, and Natalia Perez², and Sarah Crimmins³, ¹Tuoro, LCMC Health, New Orleans, LA and ³Division of Maternal Fetal Medicine, Department of Obstetrics, Gynecology and Reproductive Sciences, ²University of Maryland School of Medicine, Baltimore, MD.

O.34

A NATIONAL REVIEW OF INSURANCE COVERAGE OF NONCANCEROUS BREAST RECONSTRUCTION. Marissa Klein*, Annie Yang¹, Ledibabari M Ngaage², Michael Ha³, and Yvonne Rasko³, ²Division of Plastic Surgery, Department of Surgery, Johns Hopkins School of Medicine and ³Division of Plastic Surgery, Department of Surgery, ¹University of Maryland School of Medicine, Baltimore, MD.

Breast reconstruction can be performed for a multitude of noncancerous indications, such as correction of congenital deformities or trauma. However, despite increased patient well-being after reconstruction and malignancy risks associated with congenital breast syndromes, breast reconstruction is often considered cosmetic by third party payers. In addition, breast reconstruction for noncancerous indications is often not explicitly mentioned in insurance policies. This poses a challenge when seeking health insurance coverage. The goal of this study was to assess variability in insurance coverage of breast reconstruction for noncancerous indications. In June 2020, the authors conducted a cross-sectional analysis of 100 US insurance companies for coverage of breast reconstruction for noncancerous indications. Insurance companies were selected based on their state enrollment data and market share. A Web-based search and individual telephone interviews were conducted to identify the policy. Medical necessity criteria were abstracted from publicly available policies. Of the 100 insurers surveyed, half (50%, $n=50$) had a policy for Poland syndrome, 53% ($n=53$) for trauma, one in ten (14%, $n=14$) for fibrocystic breast disease. Of the companies with policies, 20% ($n=10$) did not cover Poland syndrome in any circumstance whereas 40% ($n=20$) stated that they would cover reconstruction in all cases, as they considered breast reconstruction to be medically necessary. One third of policies on fibrocystic disease had medical necessity criteria for breast reconstruction. Eighteen percent ($n=7$) of policies covering Poland syndrome and 4% ($n=2$) of policies covering trauma include coverage of the contralateral breast. There is a paucity of information on insurance coverage of breast reconstruction for noncancerous indications. Furthermore, there is no consensus among top US insurance companies on what constitutes medical necessity for surgical correction of these noncancerous conditions.

This research was supported in part by the Stueber Scholars Program.

O.35

CARDIAC MAGNETIC RESONANCE IMAGING AS A MODALITY FOR CARDIOVASCULAR DISEASE RISK EVALUATION IN PATIENTS WITH HEPATITIS C: DATA FROM THE CHROME STUDY. Aaron D'Amore*, Arlene Sirajuddin¹, Shyam Kottili², and Poonam Mathur², ¹National Institutes of Health, Bethesda, MD and ²Division of Infectious Disease, Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

Hepatitis C virus (HCV) infection is estimated to infect 71.1 million individuals globally and significantly increases the risk of cirrhosis and hepatocellular carcinoma (HCC). Historically, HCV treatment was initiated to prevent development of cirrhosis and/or progression to HCC. However, HCV is now known to be associated with extrahepatic manifestations, regardless of liver fibrosis stage. Increased risk of cardiovascular disease (CVD) is one such manifestation which may influence timing of treatment initiation, even in patients without advanced liver disease. However, there is limited data assessing CVD risk in patients before and after HCV cure. Our study, CHROME, is an ongoing, single-center, prospective study evaluating CVD risk in patients with HIV and HCV before and after HCV eradication. In a sub-study of CHROME, we sought to assess CVD risk utilizing cardiac magnetic resonance (CMR) and calculating extracellular volume (ECV). ECV is calculated using the longitudinal relaxation time constant (T1) of the myocardium (T1-mapping). Increase in ECV indicates the presence of myocardial inflammation, edema, and/or fibrosis and is a surrogate marker of CVD. CMR was performed for 11 subjects with chronic HCV infection, who were predominantly male (73%), of Black race (91%), middle-aged (mean 55 years), current or past smokers (100%), hypertensive (64%), and without advanced liver disease (F0-F2, determined by

transient elastography or noninvasive blood test measurement) (73%). CMR-ECV was derived for each subject demonstrating elevated ECV for 8 patients (73%). There was no statistical significance between elevated ECV and history of hypertension ($p > 0.05$), indicating that hypertension is not a confounding variable in our sample. The results suggest that in patients without advanced liver disease, HCV itself may contribute to increased CVD risk, and HCV treatment may reduce this risk.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.36

MINIMALLY ISCHEMIC CARDIAC PRESERVATION TECHNIQUES IMPROVE OUTCOMES IN LIFE-SUPPORTING CARDIAC XENOTRANSPLANTATION. Shreya Singireddy* and Muhammad Mohiuddin, Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

The supply of allogeneic donor organs for cardiac transplantation falls short of the clinical demand, resulting in the consideration of porcine cardiac xenotransplantation as an alternative. Similar to human allotransplantation, cardiac xenotransplantation results in organ ischemia. However, it has been observed that pig hearts undergo an increased incidence of primary graft dysfunction, termed “perioperative cardiac xenograft dysfunction” or PCXD. Thus, the standard procedure for static heart preservation using cold cardioplegic solution followed by storage on ice results in poor xenograft survival; this is theorized to be from an increased risk of ischemia-reperfusion injury. The Steen system of non-ischemic continuous perfusion of the heart has shown some promise in reducing PCXD but has not yet been approved for human use and is quite complex and expensive. The primary aim of this study is to determine whether or not a minimally ischemic cardiac preservation technique is equivalent to the non-ischemic method in reducing PCXD during pig-to-baboon xenotransplantation. We hypothesize that minimally ischemic preservation, which involves the perfusion of cold cardioplegic solution in addition to fresh blood prior to storage on ice, will provide a sufficient, cost-effective alternative to the non-ischemic Steen system. A retrospective analysis showed prolonged average survival in baboons with donor hearts that underwent minimally ischemic (275 hours or 11.45 days) and non-ischemic (360.6 hours or 15.03 days) preservation compared to those that underwent traditional ischemic preservation (17 hours). Further, hearts that underwent traditional ischemic preservation required slightly more inotropic support and demonstrated higher lactate and base excess levels on average than the other methods. pH levels for traditional ischemic and minimally ischemic preservation were similar, while those of non-ischemic preservation were slightly higher. These findings suggest that the minimally ischemic method is comparable to the non-ischemic Steen system in improving xenograft survival and may serve as a suitable alternative.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.37

NON-O BLOOD GROUP AND RISK OF EARLY-ONSET ISCHEMIC STROKE IN ORAL CONTRACEPTIVE USERS. Laura Chen*, Thomas Jaworek¹, Kathleen Ryan², Brady Gaynor², Allen Liu³, and Steven Kittner⁴, ²Division of Division of Endocrinology, Diabetes and Nutrition, ¹Department of Medicine and ⁴Division of Stroke and Cerebrovascular Diseases, Department of Neurology, ³University of Maryland School of Medicine, Baltimore, MD.

While oral contraceptive (OC) use is generally safe, women at higher risk for vascular disease are advised to use alternative forms of contraception. Smoking, a prothrombotic factor, is a contraindication for OC use in women over age 35. ABO blood group, specifically the non-O blood types, has also been associated with thrombosis risk. We therefore hypothesized that the effects of smoking and OC use on stroke risk would be accentuated in women with non-O blood groups.

Using data from the Genetics of Early Onset Stroke Study, we used 3 polymorphisms within the ABO locus to classify blood group type in women under age 50, including 347 cases and 383 controls. Logistic regression was used to assess the stroke risk of current OC use, defined as use within 30 days, adjusted for other risk factors, and stratified by O and non-O blood group type. Of the 347 women with early-onset stroke, 45% had African ancestry, 51% had European ancestry, and 4% had other ancestry. The median age was 42 years. After adjusting for race, age, hypertension, diabetes, migraines and aura, and smoking status, the odds ratio (OR) for stroke for smoking alone and OC use alone were 3.0 (95% CI 2.1-4.2) and 3.7 (95% CI 1.7-8.4), respectively in this population. Blood group (O vs non-O) did not appreciably alter the magnitude of these associations. However, the joint risk of smoking and OC use was substantially higher in women with blood group non-O (OR = 9.5, 95% CI 3.2-34.9) vs in women with blood group O (OR=4.9, 95% CI 0.4-110.2). Our findings are consistent with the possibility that non-O type blood group confers an increased risk of early-onset stroke among OC users who smoke. Further studies are needed to confirm or refute this possibility and to determine whether non-O blood type should be considered in assessing the risk of OC use.

O.38

TRACKING THE USE OF RED BLOOD CELL TRANSFUSION POST-DELAYED CORD CLAMPING IN VERY LOW BIRTH WEIGHT INFANTS OVER A 4-YEAR PERIOD. Mayuri Patel*, Sripriya Sundararajan¹, and Mathangi Gopalakrishnan², ¹Division of Neonatology, Department of Pediatrics, University of Maryland School of Medicine, and ²Department of Pharmacology, University of Maryland School of Pharmacy, Baltimore, MD.

Very low birth weight (VLBW) preterm infants (under 1500g) receive multiple red blood cell (RBC) transfusions. These transfusions are associated with significant morbidities that include necrotizing enterocolitis and retinopathy of prematurity. At UMMC, RBC transfusion guidelines were implemented in the Neonatal Intensive Care Unit (NICU) in 2017, and delayed cord clamping (DCC) was introduced in labor and delivery in 2018 to reduce the RBC transfusion burden in the VLBW infants. We hypothesized that the practice of DCC that facilitates placental transfusion impacts the RBC transfusion requirements in VLBW infants. The objective of this study was to determine 1) the annual RBC transfusion burden and 2) the effect of DCC on the number and rate of RBC transfusions in VLBW infants. Following IRB approval, a retrospective medical chart review was performed in 628 VLBW infants at and above 22 wks gestational age that were admitted to the UMMC NICU between 2016 and 2019. Demographic factors (birthweight (BW), gestational age (GA), and race), number and frequency of RBC transfusions, and DCC status were collected to determine associations between DCC and RBC transfusion. Data analysis included Chi-square test and linear regression methods. The median BW was 1000g (260-1500) and mean GA was 28 wks (22-37). There was not a significantly different overall yearly trend for transfusion status in VLBW infants, but there was a decreasing annual trend in the number of RBC transfusions in the VLBW 1250-1500g population. Infants under 1000g (174) and infants <29 wks (208) received significantly more transfusions compared to VLBW infants 1000-1250g (56), 1250-1500g (106) and > 29 wks (151) ($p < 0.05$). Of the 471 subjects with known transfusion history and DCC status, 54 babies received DCC. There was a strong correlation between DCC and negative transfusion status ($p < 0.01$) after adjusting for BW and GA. The proportion of infants needing RBC transfusion post-DCC was 35% compared to 60% in infants without DCC with a 42% decrease in transfusion risk post-DCC. The practice of DCC reduces the need for and number of transfusions in VLBW infants.

O.39

ULTRA-MASSIVE TRANSFUSION OUTCOMES IN A MODERN ERA: AN EAST MULTICENTER STUDY. Pranaya Terse*, Amanda Chipman¹, and Rosemary Kozar², ¹Division of General Surgery, Department of Surgery and ²R. Adams Cowley Shock Trauma Center, Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

Traumatic injury leading to hemorrhagic shock is the foremost cause of death in the United States among people up to age 46. Blood transfusions are important life-saving interventions for patients with acute blood loss and hemodynamic instability. In various clinical settings such as polytrauma and surgery, massive transfusion protocol (MTP) is applied to maintain intravascular volume and restore oxygen delivery. Massive transfusion is defined as patients who receive 10 or more units of packed red blood cells (pRBCs) within a 24-hour timespan. However, in 20% of MTP cases, patients receive an ultra-massive transfusion (UMT), defined as >20 units pRBCs in 24 hours. Considering limited blood product supply and need for judicious use of blood, the objective of this study was to identify clinical and physiological UMT outcome factors for patients with traumatic injury in a modern time-period (2015-2019). The Eastern Association for the Surgery of Trauma (EAST) sponsored a 15 center, retrospective cohort study compiled of 400 trauma patient cases who received a UMT from 2010-2020. Of the 400 patients, 70 were treated at the R Adams Cowley Shock Trauma Center at the University of Maryland Medical Center. Clinical features of mortality were established through multivariate logistic regression and Classification and Regression Tree Analysis (CART). Among 400 patients with traumatic injury who received UMT, the median age was 37 years, 81% were male, median injury severity score was 34, median shock index was 1.1, and base excess was -13. Median transfusion of pRBC, Fresh Frozen Plasma (FFP), and platelets (PLT) were 29 units, 23 units, and 24 units, respectively. 37% of patients with a transfusion ratio of RBC:PLT > 1.5:1 and 36% of patients with a RBC:FFP > 1.5:1 died within 24 hours of UMT initiation. Transfusion ratio conclusions cannot be made without the percentage of patients who have died due to lower transfusion ratios. CART analysis established associations between absence of severe head injury and resuscitative thoracotomy as well as presence of high platelet counts with increased survival probability. In conclusion, maintaining balanced transfusion ratio portfolios and recording injury severity are imperative for patient survival during UMT.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

O.40

EXTENDING LIMB SALVAGE AFTER FOURTH AND FIFTH TRANSMETATARSAL AMPUTATION IN DIABETIC FOOT INFECTIONS USING ACELL® URINARY BLADDER MATRIX. Phoenix Underwood* and Margaret Lauerman, Division of Trauma, Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

Diabetic foot infections (DFIs) are a feared complication of diabetes mellitus (DM) that present significant challenges for surgical management. Amputation is a dreaded consequence of managing this complicated problem. We present two cases in which the use of ACell® Urinary Bladder Matrix allowed limb salvage. ACell® Urinary Bladder Matrix is available in two forms: Acell® MicroMatrix® powder and a Cytal® Wound Matrix sheets. These sheets are flexible and easily cover flat surfaces while crevices and tunnels can be filled with powder. Several other unique features of ACell® Urinary Bladder Matrix are particularly appealing in DFIs. ACell is believed to have anti-bacterial effects. It preferentially recruits anti-inflammatory M2 macrophages. The intact lamina propria is thought to promote neovascularization and has chemotactic effects in recruiting progenitor stem cells of the host. These effects may improve wound healing. Use of ACell® Urinary Bladder Matrix in DFIs thus may be beneficial in healing DFIs while allowing for limb salvage.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

Poster Presentation Abstracts

Presenters are indicated with “*” next to their names.

P.01 [See Poster](#)

NEONATAL MESENCHYMAL STEM CELL (NMSC) SECRETOME INDUCES CARDIAC REPAIR IN A PORCINE MODEL OF MYOCARDIAL INFARCTION. Samantha Kegel*, Mohamed Abdullah, and Sunjay Kaushal, Division of Cardiac Surgery, Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

Cardiovascular disease is the leading cause of death globally and post-myocardial infarction heart failure results in significant morbidity and mortality with at least 30% of myocardial infarctions (MIs) resulting in clinical heart failure induced by prolonged myocardial ischemia. Treatments for MI are limited, therefore a novel treatment is needed to reduce mortality associated with prolonged myocardial ischemia. Stem cell therapy has gained momentum for the treatment of various conditions and repair of damaged tissue through angiogenesis and immunomodulation. Neonatal mesenchymal stem cells (nMSCs) show significantly increased growth potential, resistance to oxidative stress, and decreased induction of senescence compared to a similar stem cell population: adult cardiac progenitor cells. Additionally, functional recovery indicators such as ejection fraction, fractional shortening, end-diastolic volume, and posterior wall thickness are all significantly improved after nMSC treatment (Kaushal Lab, University of Maryland). We hypothesize that nMSCs modulate the immune response to ischemia, increase angiogenic processes, and promote functional recovery in a porcine model of left ventricle dysfunction. Additionally, nMSCs have 70% protein cargo with significant upregulation of paracrine factors involved in reparative processes. As such, we also hypothesize that nMSC total conditioned medium (TCM) will have similar reparative effects as nMSCs and may outperform nMSC treatment. nMSC treatment decreased infarct size, apoptosis, and inflammation when delivered via intracoronary injection post-MI. Cardiac MRI (cMR) revealed that nMSC treatment promoted functional recovery. Additionally, nMSC treatment induced neovessel and arteriole formation in the border zone, but not the infarct zone. TCM treatment decreased infarct size and apoptosis, but did not significantly decrease inflammation when compared to plasmalyte-treated controls. Ongoing work is focused on revealing specific secreted factors responsible for the reparative effects observed in this study. Ultimately, our work will elucidate potential nMSC treatment and delivery methods in post-MI patients.

This research was supported in part by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research.

P.02 [See Poster](#)

AN ANALYSIS OF KINEMATIC INDICATORS OF MOTOR RECOVERY USING ROBOTIC REHABILITATION THERAPY FOLLOWING UNILATERAL HEMIPARETIC STROKE. Melissa Nicholas*, Elsa Ermer, and Michael Dimyan, Division of Neuro-Rehabilitation, Department of Neurology, University of Maryland School of Medicine, Baltimore, MD.

Stroke is a major cause of long-term disability in the US with many survivors experiencing decreased quality of life due to hemiparesis. Traditional rehabilitation measures involve physical therapy sessions, yet robot-mediated therapy has shown an equal level of benefit in certain individuals. The specific robotic kinematic measures that indicate responsiveness to robotic therapy have not yet been explored. In this study, 42 individuals with mild/moderate to severe upper limb dysfunction (Fugl-Meyer score 10-45) following unilateral stroke underwent robotic therapy for 12-18 weeks. Participants performed 3 sessions/week with each session consisting of 45 minutes of robotic therapy and 15 minutes of transition to task practice. Participants were classified as responders (R) if they had an increase in FM >5 or non-responders (NR). RM-ANOVA with both within-subjects and between-subjects contrasts was performed. Responders had a higher hit ratio

($p=.002$), and lower end of trial distance to target ($p=.006$) when compared to NR. All participants showed an increase in hit ratio ($p<.001$) and a decrease in path ratio ($p=.008$), trial time ($p<.001$), and end of trial distance to target ($p=.001$) with the magnitude of decrease being greater in NR ($p=.042$). Only the NR showed a decrease in time to movement onset ($p=.006$). Regardless of R or NR status, all participants demonstrated an improvement in overall task performance as indicated by the increase in hit ratio and decrease in end of trial distance to target. R tended to perform better on the task, yet the slope of improvement for R was no different than NR, and the NR even displayed a greater magnitude of change on end of trial distance. The difference in slope may be due to a ceiling effect which limits the R performance on the task. Gains made among R in end of trial distance are small, indicating that clinically significant improvements may be seen with minute changes in kinematics. These findings support the idea that individuals who are likely to respond well to robotic therapy demonstrate distinct kinematic profiles on this task.

P.03 [See Poster](#)

PROMIS DEPRESSION AND ANXIETY IN SHOULDER SURGERY PATIENTS. Mitch Baker*, Fernando Albelo¹, Matheus Schneider², Tina Zhang², and Frank Henn, III², ²Department of Orthopaedics, University of Maryland School of Medicine¹, Baltimore, MD.

The purpose of this study was to assess the prevalence of depression and anxiety symptoms in patients undergoing shoulder surgery using the National Institutes of Health Patient- Reported Outcomes Measurement Information System (PROMIS) Depression and Anxiety tests. Additionally, we sought to determine preoperative factors associated with worse PROMIS Depression and Anxiety and whether worse PROMIS Depression and Anxiety was independently associated with worse functional outcomes after shoulder surgery. All patients who underwent shoulder surgery from June 2015 to May 2018 were prospectively enrolled in our orthopaedic registry. Of the 389 patients that completed the baseline questionnaire, 293 (75.3%) completed the two- year follow up assessment. Patient demographic, social and surgical histories were collected at baseline. PROMIS Depression and Anxiety computer adaptive tests were completed preoperatively and two- years after surgery. Average two-year PROMIS Depression and PROMIS Anxiety scores improved significantly from baseline ($p=.017$ and $p<.0001$). PROMIS Anxiety and PROMIS Depression scores were significantly correlated at all time points ($p<.0001$). Worse two- year PROMIS Physical Function was predicted by worse PROMIS Depression and PROMIS Anxiety, while worse two- year American Shoulder and Elbow Surgeons Standardized Form score was only predicted by PROMIS Anxiety. Worse two-year PROMIS Depression was best predicted by annual income less than 70k, recreational drug use, history of depression, ASA score greater than 1. Worse two- year PROMIS Anxiety was best modeled by annual income less than 70k, smoking and, history of depression or anxiety. Average two-year PROMIS Depression and Anxiety scores improved after shoulder surgery, and worse two-year PROMIS Depression and Anxiety scores were associated with worse shoulder function. Multiple socioeconomic and patient demographic variables were found to be independent predictors of worse post-operative PROMIS Depression and PROMIS Anxiety scores. Even after controlling for all potential confounding variables worse PROMIS Anxiety and PROMIS Depression were independent predictors for worse functional outcomes.

P.04 [See Poster](#)

PREOPERATIVE OPIOID USE AND 2-YEAR PATIENT REPORTED OUTCOMES IN HAND SURGERY PATIENTS. Cameran Burt*, Michael McCurdy¹, Matheus Schneider², and Frank Henn, III³, ³Division of Sports Medicine, ²Department of Orthopaedics, ¹University of Maryland School of Medicine, Baltimore, MD.

The goal of this study was to evaluate the relationship between pre-operative opioid use and 2-year patient reported outcomes in patients undergoing elective hand surgery. Patients enrolled in a prospective orthopaedic registry who underwent hand surgery between 2015-2018 at a single

academic institution were evaluated in this study. Medical records were reviewed to determine if patients had an active opioid prescription within 6-weeks prior to their surgery date. Based on this information patients were divided into two groups, pre-operative opioid use and no preoperative opioid use. Patients completed questionnaires pre-operatively and two years after surgery including six Patient Reported Outcomes Measurement Information System (PROMIS) computer adaptive testing domains [Physical Function (PF), Pain Interference (PI), Fatigue, Social Satisfaction (SS), Anxiety, and Depression], the Numeric Pain Score (NPS) for the whole body and the operative hand, the Brief Michigan Hand Questionnaire (BMHQ), and the Marx Upper Extremity Rating Scale (MARX). Also, two-years after surgery patients reported on their surgical satisfaction using the Surgical Satisfaction Questionnaires 8 (SSQ8), and the degree to which their expectations were met 2 years after surgery using the Musculoskeletal Outcomes Data Evaluation and Management System (MODEMS) questionnaire. The patient reported outcomes between the two groups was evaluated using a bivariate analysis and multivariable regression, in order to determine if pre-operative opioid use was associated with two-year patient reported outcomes. An analysis of 204 patients (opioid users, n=63; opioid nonusers, n=141) showed that preoperative opioid use was associated worse PROMIS Fatigue (+4.0 points; P=.04), Anxiety (+4.6 points, P<.01), and Depression (+3.9 points, P<.01). Preoperative opioid use was also associated with worse NPS operative hand, BMHQ, SSQ8, MODEMS sleep, and MODEMS back to job domains at two years post operatively. After controlling for covariates using a multivariable regression, pre-operative opioid use was only found to be a predictor of MODEMS sleep (-0.22 points, P<.01). Preoperative opioid use is associated with worse patient reported outcomes two-years following surgery and predicts lesser degree of met expectations for sleep in hand surgery patients. Future studies should evaluate other variables that may have a relationship with preoperative opioid use and postoperative patient reported outcomes.

P.05 [See Poster](#)

PREOPERATIVE OPIOID USE CORRELATES WITH WORSE PATIENT-REPORTED OUTCOMES AT TWO-YEAR FOLLOW-UP IN PATIENTS UNDERGOING SHOULDER SURGERY. Mike McCurdy*, Cameran Burt¹, Matheus Schneider², and Frank Henn, III², ²Division of Sports Medicine, Department of Orthopaedics, ¹University of Maryland School of Medicine, Baltimore, MD.

The goal of this study was to analyze the relationship of preoperative opioid use and patient-reported outcomes at two-year follow-up in a cohort of patients undergoing shoulder surgery. We retroactively analyzed patients undergoing shoulder surgery from a prospective registry at a single urban institution from June 2015 to July 2017. Bivariate analysis was used to compare patients who used opioids preoperatively and those who did not. Associations found in this analysis were used in a backwards-elimination-stepwise technique multivariable linear regression to test if preoperative opioid use was an independent predictor of our patient-reported outcomes at two-year follow-up. Our analysis was based off questionnaires filled out by each patient during the perioperative period and at their two-year follow-up appointment. These questionnaires utilized a number of patient-reported outcomes including the Patient Reported Outcomes Measurement Information System (PROMIS), the American Shoulder and Elbow Surgeons Assessment (ASES), the Tenger Activity Scale (TAS), the Numeric Pain Scale (NPS), the Marx Upper Extremity Scale (MARS), the Surgical Satisfaction Questionnaire (SSQ-8), and the Musculoskeletal Outcomes Data Evaluation and Management System (MODEMS). Analysis of 257 patients (opioid users n=77; non-opioid users n=180) showed preoperative opioid use to be an independent predictor of worse outcome scores in a number of measurements, including four PROMIS domains [physical function (-2.43, p=0.0008), pain interference (+2.36, p=0.001), social satisfaction (-2.91, p=0.0005), and fatigue (-1.97, p=0.017)], ASES (-2.85, p=0.0251), NPS whole body (+0.74, p<0.0001), NPS shoulder (+0.37, p=0.041), TAS (-0.54, p=0.002), and MARS upper body (-5.38, p=0.0003). Preoperative opioid use was not found to be an independent predictor of change in our patient-reported outcomes from baseline scores obtained perioperatively.

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PREDICTORS OF PATIENT SATISFACTION TWO YEARS FOLLOWING ORTHOPAEDIC SHOULDER SURGERY. Dominic Ventimiglia*, Matthew Chrencik¹, Matheus Schneider², Tina Zhang³, Mohit Gilotra³, and R. Frank Henn III², ²Division of Sports Medicine, ³Department of Orthopaedics, ¹University of Maryland School of Medicine, Baltimore, MD.

Patient satisfaction is important with potential implications for patient behavior and reimbursement, yet patient satisfaction is complex and the factors associated with patient satisfaction are not fully understood. The purpose of this study was to identify preoperative factors associated with patient satisfaction two years after shoulder surgery. All patients undergoing shoulder surgery who were enrolled in a prospective orthopaedic registry between June 2015 and May 2018 were analyzed retrospectively. An electronic questionnaire was used to collect patient information including demographics, surgical history, and patient reported outcome measures. Satisfaction was measured two years after surgery using the Surgical Satisfaction Questionnaire (SSQ-8). In total, 389 patients completed the preoperative questionnaire and 288 (74.0%) completed the two-year follow-up questionnaire. Bivariate analysis was used to determine patient characteristics associated with patient satisfaction, and multivariate linear regression was subsequently used to identify predictors of patient satisfaction. Worse two-year SSQ-8 score was correlated with greater number of comorbidities ($r = -0.16$, $p = 0.006$), annual income less than \$70,000 ($p < .001$), smoking ($p = 0.018$), recreational drug use ($p = 0.027$), preoperative opioid use ($p = 0.024$), and a higher ASA score ($p = 0.010$). Better preoperative patient reported outcome measure scores were associated with increased patient satisfaction, and the strongest associations were observed between SSQ-8 and PROMIS Fatigue ($r = -0.23$), PROMIS Pain Interference ($r = -0.27$) and PROMIS Social Satisfaction ($r = 0.22$). Multivariable linear regression indicated that living with a caretaker ($p = 0.010$), annual income less than \$70,000 ($p < .001$) and ASA score > 1 ($p = 0.015$) were independent predictors of lower patient satisfaction. In conclusion, lower patient satisfaction two years after shoulder surgery is associated with worse preoperative patient-reported outcome scores and predicted by living with a caretaker, lower income, and higher ASA score.

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PREOPERATIVE CHARACTERISTICS PREDICTIVE OF PROMIS PAIN INTERFERENCE TWO YEARS AFTER SHOULDER SURGERY. Matthew Chrencik*, Dominic Vetimiglia¹, Matheus Schneider¹, Tina Zhang¹, Mohit Gilotra¹, and R. Frank Henn, III², ²Division of Sports Medicine, ¹Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

Pain interference is the degree to which pain interferes with an individual's physical, mental, and social activities. The objective of this study was to identify preoperative characteristics associated with worse Patient-Reported Outcomes Measurement Information System (PROMIS) pain interference (PI) scores two years after shoulder surgery. This study was a retrospective analysis of prospectively collected data on 293 patients undergoing shoulder surgery at an urban institution from May 2015 to June 2018. Data collection included: demographic information, clinical history, social factors, prior surgeries, and Current Procedure Terminology (CPT) code(s). Patient-reported outcome surveys assessed: six PROMIS domains, expectations, activity level, and shoulder-specific measures. Bivariate and multivariate analyses were performed to ascertain associations and predictors of two-year PROMIS PI. The mean age was 49.1 ± 16.4 years, and 164 (56%) were male. The average preoperative PROMIS PI was 61.4 ± 7.3 , which improved to 50.9 ± 10.3 two years after surgery ($P < 0.0001$). PROMIS PI scores did not significantly differ across CPT codes. Worse two-year PROMIS PI was significantly correlated with older age, higher BMI, greater comorbidities, more previous surgeries, and multiple socio-demographic and clinical factors ($P \leq 0.044$). Better scores on all preoperative patient-reported outcome measures correlated with less two-year PROMIS

PI ($P \leq 0.0007$). Multivariable analysis demonstrated that worse two-year PROMIS PI was predicted by a Workers' Compensation claim, preoperative opioid use, greater preoperative numeric pain whole body (NPS) score, and greater preoperative PROMIS PI ($P \leq 0.009$, R^2 : 0.34). Less improvement in PROMIS PI from baseline to two years after surgery was predicted by a Workers' Compensation claim, preoperative opioid use, greater preoperative NPS whole body score, and lower preoperative PROMIS PI ($P \leq 0.009$, R^2 : 0.22). These findings may help orthopaedic surgeons screen patients to provide appropriate preoperative counseling and multimodal pain management.

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ANEMIA, SEX, AND RACE AS PREDICTORS OF MORBIDITY AND MORTALITY AFTER KNEE ARTHROPLASTY SURGERY. Monica Taneja*, Michael Mazzeffi¹, Magali Fontaine², Steven M. Frank³, and Kenichi Tanaka¹, ¹Department of Anesthesiology, University of Maryland School of Law and ²Department of Pathology, University of Maryland School of Medicine, and ³Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine, Baltimore, MD.

Previous literature suggests that preoperative anemia contributes to risk of complications after surgery. This study aims to classify the association of preoperative anemia and 30-day complications in patients undergoing Knee Arthroplasty (KA). Our retrospective, cohort analysis identified patients who underwent KA in the National Surgical Quality Improvement Project (NSQIP) database from 2013-2018. Patients were then classified by preoperative hematocrit into three anemia levels no anemia, mild anemia, and moderate/severe anemia. Incidence of specific and composite complications were analyzed using bivariate and multivariate analysis. Our total sample was 243,491 patients, with an anemia prevalence of 12.4% ($n=30,135$). Anemic patients had higher rates of perioperative transfusion ($p < .001$), death ($p < .001$), myocardial infarction ($p < .001$), deep vein thrombosis ($p=.002$), acute renal failure ($p < .001$), and infection ($p < .001$). Multivariate logistic regression showed that mild (OR: 1.36, $p < .001$) and moderate/severe anemia (OR: 1.92, $p < .001$) were associated with increased risk of all-complications compared to non-anemic. Males with moderate/severe anemia showed the highest risk of complications (OR: 2.15, $p < .001$) and sex was found to be a significant effect modifier ($p=.02$). When stratifying by race, African American's with moderate/severe anemia (1.72, $p < .001$) showed lower odds ratios than Caucasians (OR: 1.96 $p < .001$). However, race was not found to be a significant effect modifier ($p=0.68$) Overall, this study suggests that preoperative anemia is significantly associated with postoperative complications in patients undergoing KA. Both mild and moderate anemia show significantly elevated risk, especially in male patients.

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THE IMPACT OF INTERMEDIATE TITER ANTIBODIES TO INFLIXIMAB AND ADALIMUMAB ON CLINICAL OUTCOMES IN PATIENTS WITH CROHN'S DISEASE OR ULCERATIVE COLITIS. Chaoyang Wang*, Mazen Tolaymat¹, and Raymond Cross, Division of Gastroenterology and Hepatology, Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

Anti-TNF drugs, adalimumab (ADA) and infliximab (IFX), are effective treatments for Ulcerative Colitis (UC) and Crohn's Disease (CD). However, up to 30% of patients do not respond to treatment initially (primary non-response) and 40% lose response over time (loss of response). Loss of response is often due to the development of antibodies to ADA (ATA) and IFX (ATI). While it is known that undetectable or low ATA/ATI titers (<200 ng/mL) are associated with better clinical outcomes and high ATA/ATI titers (>1000 ng/mL) are associated with poorer clinical

outcomes, the significance of intermediate ATA/ATI titers (200-999 ng/mL) is currently not well understood. A retrospective chart review was conducted on patients with CD and UC to determine whether there are significant associations between intermediate ATA/ATI titers and adverse clinical outcomes. The primary clinical outcome is persistence on anti-TNF therapy at 1-year follow-up. Secondary clinical outcomes include clinical response to therapy at 1-year follow-up. Study participants consist of UC or CD patients treated with IFX or ADA at the University of Maryland IBD Program between October 2016 and October 2019 that had at least one measurement of ADA/IFX and ATA/ATI during the study period. 376 (ADA = 157; IFX = 219) patient charts were reviewed in total. 271 of 322 low titer patients persisted on their original anti-TNF compared to 9 of 15 intermediate titer patients ($p=0.026$) and 1 of 10 high titer patients ($p>0.0001$). 47, 33, and 251 of 331 low titer patients had no response, partial response, or complete response to their therapy, respectively, compared to 6, 1, and 8 of 15 intermediate titer patients, and 3, 1, and 3 of 10 high titer patients. The difference in distribution of clinical response was significantly different between low titer patients and intermediate titer patients ($p=0.019$), but not different between intermediate titer and high titer patients ($p=0.440$). These findings suggest that patients with intermediate titers were more likely than patients with low titers to lose response to their original anti-TNF and require a change in anti-TNF therapy, predicting poorer clinical outcomes.

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CLINICAL TOXICITY OUTCOMES FROM PROTON BEAM THERAPY FOR GYNECOLOGIC MALIGNANCIES: A MATCHED-PAIR ANALYSIS WITH PHOTON RADIOTHERAPY. Hunter Risher*, Ariel Pollock¹, Kai Sun², Ishan Oza³, Elizabeth Nichols¹, and Pranshu Mohindra¹, ¹Department of Radiation Oncology and ²Division of Biostatistics and Bioinformatics, Department of Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, MD, and ³University of Maryland, College Park, College Park, MD.

Radiation therapy (RT) for gynecologic malignancies, may be associated with gastrointestinal (GI), genitourinary (GU), and hematologic toxicity, particularly when combined with chemotherapy. Studies utilizing photon-based RT have demonstrated the superiority of Volumetric Arc Therapy (VMAT) and Intensity Modulated Radiation Therapy (IMRT) over three-dimensional conformal radiation therapy with respect to reducing toxicity. Proton beam therapy (PBT) with pencil beam scanning (PBS) technology confers greater precision and a more conformal dose distribution, which has the potential to reduce RT-related toxicity. We have therefore conducted a retrospective single-institution study of patients with gynecologic cancers treated with RT to evaluate differences in toxicity outcomes. We built a REDCap database inclusive of 467 primary or recurrent gynecologic cancer patients. Many were treated with PBT (n=92) or VMAT/IMRT (n=192) in the period 2014 to 2020. Patients were included for the current analysis if they received definitive or adjuvant whole pelvic radiation +/- para-aortic radiation. Patients with recurrent disease who received prior in-field radiation were excluded. Ultimately, a 1:2 cohort of n=28 PBT and n=51 photon patients, matched for chemotherapy schedule, RT field and RT setting, was constructed. Chi-square analysis was performed. Median age of PBT and photon patients were 65 (range, 34-93) and 66.5 (range, 30-90) years respectively. The median initial RT dose for PBT and photon patients was 50.4 and 45.0 Gy, respectively. Cancer primary sites include uterine corpus (n=52), cervix (n=16), vagina (n=3), vulva (n=5) and ovary (n=3). Despite higher total dose, the incidence of at least grade 3 GI, GU and hematologic toxicity was lower in the PBT cohort (7% vs 19%, $p=0.14$). While not statistically significant, the current analysis identifies a signal of toxicity reduction with PBS-PBT, which will need to be tested in a larger prospective cohort. Based on these results, we are activating an investigator-initiated phase 2 study testing compliance of PBS-PBT with concurrent chemotherapy in patients receiving adjuvant whole pelvic RT for endometrial cancer.

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ASSESSING ENTHUSIASM OF SCREENING MAMMOGRAPHY TEXT MESSAGES FOR AFRICAN AMERICAN WOMEN. Paapa Nyanin*, Amina Dhahri¹, and Shana Ntiri², ¹Department of Medicine, University of Maryland Prince George's Hospital Center, Cheverly, MD, and ²Department of Family and Community Medicine, University of Maryland School of Medicine, Baltimore, MD.

Rates of early breast cancer detection are lower in African American women than in other groups, due in part to sub-optimal screening. Research has shown that enthusiasm can be a powerful tool in regard to breast cancer screening mammogram adherence. Text message interventions are effective at increasing screening mammogram rates, however, there is little data on what text message content generates the greatest enthusiasm in African American women for the promotion of screening mammography. This study aimed to assess the enthusiasm of African American women for the content of a series of text messages intended to increase uptake of screening mammography. Focus groups consisting of African American breast cancer survivors were conducted. Participants provided feedback on a series of 17 educational and reminder text messages developed to promote screening mammograms in African American women. Focus groups were digitally recorded and transcribed for analysis. Three independent raters analyzed the transcripts using a process of immersion, coding and theme categorization. The amount of enthusiasm garnered from each text message was interpreted through the level of acceptance of each message. The study demonstrated that certain themes derived from each message played a larger role than message type in generating enthusiasm in participants.

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ULTRASOUND BIOMICROSCOPY CHARACTERIZATION OF TISSUE DENSITY IN THE ANTERIOR SEGMENT. Johnny Jung* and Janet Alexander, Division of Pediatric Ophthalmology and Strabismus, Department of Ophthalmology and Visual Sciences, University of Maryland School of Medicine, Baltimore, MD.

Ultrasound biomicroscopy is an imaging modality that allows robust, non-invasive visualization of the anterior segment (AS). By taking advantage of the density-sensitive signals captured in ultrasound, structural changes associated with various ophthalmologic conditions can be observed and monitored. This study aims to provide novel characterizations of AS anatomy in both healthy and cataract eyes. We hypothesize that the ten AS structures of interest have significantly different tissue densities. Integrated densities were calculated from ultrasound biomicroscopy images as a function of signal intensity and area using ImageJ. Various structures of interest (central cornea, peripheral cornea, sclera, ciliary body, ciliary process, and iris) were measured in 53 eyes from 31 patients. Our data suggest that corneal tissue becomes denser peripherally towards the sclera. The ciliary body and ciliary process are less dense than the sclera and the iris becomes denser centrally, away from the ciliary body and towards the pupil. Establishing normal tissue densities may be clinically useful in comparisons to diagnose and monitor conditions such as phthisis bulbi or ectopic ocular growth.

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OPTIMIZING SURGICAL SKILLS TRAINING FOR OPHTHALMOLOGY RESIDENTS USING A NOVEL EVIDENCE-BASED CURRICULUM: A SYSTEMATIC REVIEW AND META-ANALYSIS. Geoffrey Nguyen*, Jamie Palmer¹, Moran R. Levin², Ramya Swamy³, Emilie Ludeman⁴, and Janet Alexander⁵, ¹University of Maryland School of Medicine, Baltimore, MD, and ²Division of Pediatric Ophthalmology, ³Division of Glaucoma, and ⁵Division of Pediatric Ophthalmology and Strabismus, Department of Ophthalmology and Visual Sciences, ¹University of Maryland School of Medicine and ⁴University of Maryland Health Sciences and Human Services Library, University of Maryland School of Nursing, Baltimore, MD.

Surgical skills curriculums are a major topic of discussion among medical educators and surgical residency programs. Ophthalmology is a surgical subspecialty that requires trainees to master a diverse set of surgical skills. With the complexity of newer surgical techniques in this field, there is a need for more flexible educational methods. Microsurgical procedures allow limited direct interactions between the supervising attending and resident, and often results in the trainee learning through observation only. There has been significant study into alternative surgical teaching techniques outside of the operating room, however, there is uncertainty regarding the most effective intervention. The goal of this study was to establish and evaluate evidence-based program adjustments to be included into a microsurgery training curriculum by conducting a systematic review and meta-analysis of the literature. Electronic databases were searched with preset terms. Eligibility criteria included data analyzing associations between surgical teaching techniques and improved surgical outcomes and the organization of the intervention as a microsurgical skills curriculum or course. The articles were independently reviewed by 2 authors and evaluated for quality using the GRADE approach and the Cochrane Collaboration's tool for assessing bias. Data extraction was performed by 2 reviewers and a random-effects analysis was used to pool the outcomes of studies together. 439 studies were reviewed and 13 studies (N = 8905) were included in the meta-analysis. All pooled results reported a positive association with surgical outcomes, however, video-based education (SMD, 2.49 [95% CI, 0.36 to 4.63]; 4 effects [4 studies]; 69; I² = 90%) and stepwise teaching method (OR, 3.84 [95% CI, 2.66 to 5.55]; 6 effects [6 studies]; n = 6968; I² = 39%) interventions were the most favorable. The results from the meta-analysis indicated that the overall effects of video-based education and stepwise teaching interventions may be the most effective for a microsurgery training curriculum. However, all interventions analyzed in this study were associated with improved outcomes and should be considered when implementing and adjusting ophthalmic surgical skills curriculums.

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INTERPROFESSIONAL APPROACH TO EDUCATING MEDICAL STUDENTS ON PEDIATRIC MEDICATION TASTE AND PALATABILITY. Bailey Howard*, Jessica Biggs¹, MacKenzie Crist², Omamya Kishk³, Rebecca Carter⁴, and Regina Macatangay⁵, ¹Division of Newborn Intensive Care Unit, ²Division of Pediatrics and Oncology, and ³Division of Pediatrics, Department of Pharmacology, University of Maryland, Baltimore, and ⁵Division of Hematology and Oncology, ⁴Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD.

Medication palatability is one of many factors influencing medication adherence in the pediatric population, but there is limited research into medical students' knowledge of this relationship. The purpose of this study was to assess the knowledge and beliefs of medical students regarding pediatric medication characteristics, administration, taste, and adherence before and after an interprofessional education session. Pharmacists, pharmacy residents, and pharmacy students taught a lecture addressing pediatric pharmacology, patient cases, medication administration strategies, and methods

to enhance adherence. Participants had the opportunity to taste test amoxicillin, cefdinir, clindamycin, prednisolone, and ranitidine. Students completed a survey before and after the education session, as well as a poll during the taste test. Prior to the session, students had very few lecture hours devoted to these topics and the majority were unfamiliar with medication flavoring and administration to children. After the lecture and taste test, 94% of students stated their opinion on the importance of medication palatability had changed. There was significant improvement in student's beliefs about their pharmacology knowledge ($p < 0.0001$). Additionally, 40% changed their prescribing or patient counseling habits after the session. We believe an interprofessional education session effectively teaches students about pediatric medication taste, adherence, and pharmacology.

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FACTORS ASSOCIATED WITH BLEEDING COMPLICATIONS IN TRACHEOSTOMY PATIENTS. Lawrance Lee*, Cecelia Kim*, Joshua Finkel*, and Mira Ghneim, Division of Surgical Critical Care, Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

Tracheostomy is a common procedure performed to provide long-term ventilatory support in patients with chronic respiratory failure. Post tracheostomy complications include tracheitis, tracheal stenosis, and hemorrhage. The aim of this study was to determine risk factors associated post-tracheostomy hemorrhage. This was a retrospective review of patients with respiratory failure who underwent open or percutaneous tracheostomy placement at the University of Maryland Medical Center from 2015 to 2020. Data collected included patient demographics, clinical and operative characteristics, and hospital course. The primary outcome assessed was post-tracheostomy bleeding requiring operative intervention. Comparisons were made using standard univariate and bivariate analyses. Of the 366 patients who underwent tracheostomy placement, 18 (4.9%) required operative intervention for control of hemorrhage. Preoperative anticoagulation use was associated with an increased risk of bleeding (11.6% vs 2.6%, $p < .05$). In contrast, preoperative antiplatelet use was not associated with an increased risk of postoperative bleeding. Intraoperatively, open vs. percutaneous (4% vs. 6%, $p = 0.8$) and thyroid isthmus preservation or ligation (4% vs. 5%, $p = 0.45$) techniques did not increase postoperative bleeding. Postoperatively, there was a significant increase in risk of bleeding requiring operative intervention in patients who required bedside management of bleeding with application of topical hemostatic agents (28.9% vs. 2.2%, $p < .001$) or required a CT-angiogram of the neck (50.0% vs. 3.0%, $p < .001$). In our patient population, perioperative anticoagulation use, and postoperative bleeding requiring topical hemostatic agent application were associated with an increased risk of tracheostomy revision secondary to bleeding complications. These factors are important to consider when managing patient with post tracheostomy bleeding complications.

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ROLE OF TRNA IN SUBSTANCE USE DISORDERS: A SYSTEMATIC REVIEW. Danny Herrera*, Cassie Wicken*, Jessica Cornell¹, Yunting Fu², and Chamindi Seneviratne¹, ¹Department of Psychiatry, University of Maryland School of Medicine and ²University of Maryland School of Health Sciences Library, Baltimore, MD.

Studies show that substances of abuse, namely tobacco, alcohol, cannabis, opioids, methamphetamine, and cocaine, affect the expression profiles of multiple genes simultaneously, in a manner dependent on drug type, quantity, and patterns of use. This raises the question whether drug use variables affect the expression of specific genes, which may then alter physiological processes that cascade into pathophysiological states pathognomonic of addiction, giving rise to functional gene clusters. The identity of functional gene clusters is therefore of paramount importance as their identification may provide novel targets in the diagnosis and treatment of substance use disorders (SUDs). Several mechanisms of direct and intermediary influence of drug-use variables on the

expression profiles of genes are reported in literature. To this end, we aimed to highlight the potential of transfer ribonucleic acids (tRNAs) as intermediary molecules which may alter the expression of gene clusters in response to drug use. Here, we conducted a systematic review in four databases (PubMed, EMBASE, PsycInfo, and Cochrane Library) using keyword searches pertaining to SUDs and genomic studies, specifically genome-wide association studies, candidate gene analysis, and genome-wide/candidate gene expression studies. Publications were scrutinized by at least one reviewer to assess for reported significant associations with at least one tRNA gene, tRNA-related gene, or single nucleotide polymorphism within a tRNA gene or related gene. Of the 15,812 papers identified through keyword search, 1,037 papers met our inclusion/exclusion criteria. Only 9 papers reported a tRNA SNP, gene, or related gene in significant association with a SUD. These results suggest that while the literature on SUDs is pervasive, there is insufficient focus on the association between SUDs and tRNA mechanisms, that we hypothesize to serve a vital role in (dis)regulation of protein levels underlying SUDs, through impinging on both transcriptional and translational machinery. Further research may elucidate the potential role of tRNA in the regulation of pathophysiology of SUDs, and their utility as biomarkers.