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University of Maryland School of Medicine
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Abstract Booklet

ABSTRACTS

Oral Presentation Abstracts

Presenters are indicated with "*" next to their names.

O.01 1:30 p.m.

IMPLEMENTATION OF A COORDINATED PLAN FOR CHRONIC OPIOID THERAPY IN THE PRIMARY CARE SETTING. Jennifer Woodard*, Stephanie Blease[1], and Kathryn Walker[2], [1]Division of Health Services Research, Department of Palliative Care, MedStar Health Research Institute and [2]Department of Palliative Care, MedStar Health School of Pharmacy, Baltimore, MD.

Deaths from opioid overdose have increased dramatically in the past decade. Half of all dispensed opioid prescriptions are written by primary care clinicians. To improve management of non-cancer chronic pain in adults in the primary care setting, the Centers for Disease Control (CDC) developed a clinical practice guideline in 2016. The aim of this study was to assess documentation practices of primary care clinicians before and after the implementation of a coordinated plan for chronic opioid therapy (COT) at 18 outpatient clinics. This retrospective pre-post study included 18 primary care sites (9 control, 9 intervention) before and after the intervention. Twenty COT patients from each site (defined as receiving opioids ≥ 3 of 6 months) were randomly selected for inclusion. One visit for each patient was selected for review during the study timeframes for baseline (5/16-10/16) and post-implementation (11/16-5/17) periods. The data coded from the chart included 28 criteria based on CDC guidelines and included calculating morphine milligram equivalents (MME). A total of 599 patient charts were reviewed (baseline: 172 control, 166 intervention; post-intervention: 140 control, 121 intervention). There was no significant difference in average MME at baseline or post- intervention. Four encounters included a physician-documented MME. There was an increase in urine drug test screening in the intervention group compared to the control group. The number of patients receiving opioid prescriptions without an office visit decreased in both groups. The only statistically significant changes were small increases in the intervention clinics in the frequency of documentation of pain scores and functional assessments. The implementation of CDC standards in the intervention clinics did not show a significant impact on physician documentation practices in the first 6 month phase. Given the small sample sizes, only large effects would have been detectable; smaller effects may have occurred undetected. Clinician education and improved integration of clinical decision support tools within the electronic medical record is needed to improve adherence to the new CDC guidelines for COT.

This research was supported by MedStar Health.

O.02 1:45 p.m.

THE EFFECTS OF EARLY NICOTINE EXPOSURE ON CORTICOTHALAMIC PATHWAYS. Anna Patnaik*, Lola Akintola, Charlie Raver, and Asaf Keller, Department of Anatomy and Neurobiology, University of Maryland School of Medicine, Baltimore, MD.

Prenatal nicotine exposure, often due to smoking, can cause alterations in neurodevelopment, leading to abnormal sensory processing, attention disorders, and cognitive impairments. Some of the lasting behavioral effects of prenatal nicotine exposure occur through high affinity, β2 subunit containing nicotinic acetylcholine receptors (nAChRs) expressed in the axon terminals of corticothalamic (CT) neurons. In this study we test the hypothesis that manipulating these receptors during early life results in abnormal development of CT axonal projections, and abnormal activity in

CT pathways. We manipulate these receptors in one of two ways: by exposing newborn mice to nicotine, or by conditional suppression of CT β2 nAChRs in transgenic mice. We are testing two predictions: (1) CT pathways from somatosensory cortex form abnormal termination patterns in the thalamus; (2) CT activity patterns, measured by EEG, is abnormal in adult mice. Adult mice injected with viral tracers to label CT axons demonstrated that in animals treated neonatally with nicotine, CT axons form abnormally widespread thalamic terminations. We are currently obtaining the EEG data. Future experiments will test the hypothesis that abnormal development of CT axons may be causally related to the abnormal phenotype of infants exposed to nicotine.

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 2:00 p.m.

SEROTONERGIC CIRCUITS IN CHRONIC PAIN. Olivia Uddin*, Asaf Keller, Alberto Castro, and Charlie Raver, Department of Anatomy and Neurobiology, University of Maryland School of Medicine, Baltimore, MD.

Chronic pain is a devastating condition that impacts millions of patients worldwide, yet available therapies are not optimal. Expanding our understanding of pain mechanisms is, therefore, vital to identifying new therapeutic targets. A compelling line of investigation lies in characterizing circuits among brain regions involved in pain. This project focuses on the relationship between three brain regions previously implicated in pain processing: the lateral division of the central amygdala (CeAl), the parabrachial nucleus (PB) and serotonergic (5HT) neurons in the rostroventral medulla (RVM). Previous research shows that increased activity of 5HT neurons in the RVM may be responsible for manifestations of chronic pain in rodents (PMID 10704997). Based on this and preliminary data from our laboratory, we hypothesized that there exists a dense inhibitory input from CeAl to PB that limits excitatory inputs from PB to the RVM. We hypothesize also that in chronic pain conditions there is loss of this inhibitory input to PB, resulting in excessive excitatory inputs to 5HT neurons in RVM, leading to heightened 5HT neuron firing rates, and thus driving the development of chronic pain. This project tests the prediction that activity of 5HT neurons in RVM is increased in chronic pain. We identify 5HT neurons by 1) an optogenetic method using transgenic mice expressing channelrhodopsin only in 5HT cells and 2) evaluating neuronal firing regularity to differentiate between 5HT and non-5HT cells (PMID 9084584). We have completed analyses of the baseline and mechanically evoked activity of 5 groups of RVM cells in naïve mice: ON, OFF, Neutral, Variable, and 5HT neurons. We are currently comparing the responses of these neuronal classes to those in animals with chronic pain.

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.04 2:15 p.m.

EXPECTANCY AND PERSONALITY AS PREDICTORS OF PLACEBO RESPONSIVENESS: AN ONGOING RCT IN METHADONE-TREATED OPIOID USE DISORDER PATIENTS. Zofia Kozak*, Annabelle Belcher[1], Luana Colloca[2], and Christopher Welsh[1], [1]Department of Psychiatry and [2]Department of Anesthesiology, University of Maryland School of Nursing, Baltimore, MD.

The placebo effect has been shown to reduce symptom severity in a range of conditions. Recent studies have looked at its potential to extend the therapeutic window of pain analgesics using a dose-extension paradigm. The analgesic is paired with a placebo, conferring on it the pain-relieving properties which the placebo takes on when administered alone. This phenomenon has not yet been studied in models of opioid-use-disorder (ODU) treatment, which employs medications acting on

the same target receptors as traditional pain analgesics. It's important to note that only a specific subsect of the general population responds to placebo. Two parameters consistently associated with robust response are possessing specific dopaminergic personality traits and self-reporting high levels of expectancy. The role these play in predicting placebo response in OUD patients has also not yet been examined. This ongoing RCT investigates the role personality and expectancy play in placebo response within an OUD population, within the context of a larger study examining the therapeutic potential of open-label, dose-extension placebo in patients beginning their treatment program. 120 new initiates from a UMD methadone (MTD) treatment center will be approached and randomized into either placebo-dose-extension (PDE) or treatment-as-usual (TAU) groups and followed for four weeks. Placebo/methadone pairing (pharmacological conditioning phase) occurs in the PDE group in Phase 1 (weeks 1-2). In phase 2 (weeks 3-4), they will also be given a take-home placebo to take 12h after morning dosing (dose-extension phase). Both treatment groups will complete personality questionnaires (BIS/BAS) and expectancy assessments at weeks 1 and 4. We predict individuals scoring high on measures of dopaminergic traits and levels of expectancy will not have to increase their MTD dose relative to TAU, due to a longer MTD therapeutic window conferred by the placebo dose-extension. To date, 10 participants are enrolled, 3 of whom have completed phase I, 3 have voluntarily withdrawn, 1 quit the program, and 1 was withdrawn by the PI. This research within a unique patient population will lend further understanding of the potential clinical value of the placebo effect.

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 2:35 p.m.

ASSESSING THE EFFICACY OF LEVETIRACETAM POST TBI IN A RAT MODEL. Amit Sharma*, Marc Simard, and Kaspar Keledjian, Department of Neurosurgery, University of Maryland School of Medicine, Baltimore, MD.

Post-traumatic depression is a major unsolved problem during the chronic phase following traumatic brain injury (TBI). No treatment exists for chronic post-TBI neuroinflammation, and druggable targets to prevent or treat late neurobehavioral sequelae of TBI such as depression have yet to be identified. Molecular mechanisms contributing to chronic astrocyte activation are poorly understood. One mechanism, the non-canonical NF-κB signaling by TWEAK/FN14, yields inherently prolonged NF-κB activation that could potentially contribute to chronic neuroinflammation. In animal models, TWEAK/FN14 have been linked to depressive-like symptoms. Our central hypothesis is that TWEAK/FN14-induced non-canonical NF-κB signaling is an upstream regulator of post-TBI chronic neuroinflammation and is responsible, in part, for abnormal post-TBI neurobehavior. Moreover, we hypothesize that, in a murine model of TBI, delayed treatment with levetiracetam will modulate TWEAK/FN14 signaling, and reduce both chronic neuroinflammation and depression-like behaviors. The behavior was studied using accepted neurobehavioral tests for depressive and other behaviors including open field testing, novel object recognition, elevated plus maze, sucrose preference test, tail suspension, and Porsolt forced swim test. The neuroinflammation will be studied by using immunoblot and qPCR techniques on brain tissues. We expect that delayed LEV treatment will ameliorate post-TBI neurobehavioral abnormalities, including depression-like behaviors, in keeping with its salutary effects on inflammation.

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.06 2:50 p.m.

IMPROVING ADVANCE DIRECTIVE RATES AND ACCESSIBILITY IN AN INTERNAL MEDICINE RESIDENT CLINIC PRACTICE: AN INTER-DISCIPLINARY APPROACH. Brenna Beck*, Leah Millstein[1], and Danielle Baek[2], [1]Division of General Internal Medicine and Pediatrics and [2]Division of Internal Medicine, Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

Although there is a growing need and appropriate emphasis on advance directives (AD) and end-of-life care planning, internal medicine residents are not better trained in advance care discussions or completion. In addition, multiple barriers to successful completion of ADs are encountered. We sought to improve resident comfort and ability in this process through an inter-disciplinary, patient-centered approach. Residents in an internal medicine outpatient continuity clinic assessed their confidence level and self-efficacy in discussing ADs before and after an intervention using a 100 point score (0 = "cannot do at all", 100 = "certain can do"). Residents reviewed educational slides and individually participated in a visit with one of their patients, patient's family, and a licensed clinical social worker to discuss, implement and document an AD with the patient. Patients and social workers evaluated the resident's competency after the visit. To date four visits have been completed. Preliminary results show that residents' self-identified confidence level improved among all participants (n=4) from an average of 68 to 80. Residents felt most comfortable explaining the difference between full code, do not intubate, do not resuscitate and comfort care (pre=90, post=93) and least comfortable with their ability to allocate enough time to discuss advance directives in clinic (pre=48, post=65). Residents also indicated less confidence in identifying cultural barriers to end of life discussions (pre=63, post=73). Confidence improved the most in addressing end of life topics (pre=70, post=88). On a 3 point scale, patients rated residents highly in all categories. Residents were rated by the social worker as demonstrating high overall competency in facilitating the AD discussion (75% rated "demonstrated strong skills"). For the four residents who have completed the visits, our novel curriculum resulted in improved resident self-efficacy and comfort level in AD management. Learning how to discuss AD while part of an inter-disciplinary team was a positive experience and helped the residents gain insight into their patients' understanding of and willingness to complete ADs.

O.07 1:30 p.m.

AUTOSOMAL DOMINANT POLYCYSTIC KIDNEY DISEASE IS ASSOCIATED WITH HIGHER PREVALENCE OF LEFT VENTRICULAR HYPERTROPHY AND INCREASED LEFT VENTRICULAR MASS. Huanwen Chen*, Hong-Zohlman Susie[1], Terry Watnick[2], and Stephen Seliger[2], [1]Division of Cardiovascular Medicine and [2]Division of Nephrology, Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

Hypertension is a highly prevalent and early manifestation of autosomal dominant polycystic kidney disease (ADPKD). Long-standing hypertension contributes to increased left ventricular mass (LVM) and left ventricular hypertrophy (LVH), a major risk factor for cardiovascular morbidity and mortality. Furthermore, ADPKD may lead to LVH through other direct and indirect mechanisms independent of blood pressure. However, data on the relationship of ADPKD and its severity with LVH are conflicting, in part due to differences in measurement techniques and blood pressure control across different studies. In this cross-sectional study, we examined the relationship of ADPKD and its severity – as quantified by total kidney volume (TKV) and estimated glomerular filtration rate (eGFR) – with LVM and LVH quantified by 2D echocardiography. Among 126 adults with ADPKD and eGFR>15 ml/min/1.73m^2 in the Baltimore PKD Center, mean (SD) age was 46±14 years, mean eGFR 68±32, mean SBP 125±14 mm Hg, and 78% had diagnosed hypertension. The prevalence of LVH was 13.5%, significantly greater than among a normative healthy

comparator population after accounting for body size (p=0.03). In unadjusted analyses, greater TKV and lower eGFR were directly correlated with greater LVM indexed to body size (p<0.001 and p=.016, respectively). In multiple linear regression models, greater TKV remained significantly associated with LVM ($\hat{\beta}$=0.19, p=0.04) after adjusting for pertinent confounders (gender, race, age, height, weight, systolic blood pressure, hypertension, and known cardiovascular disease). Overall, our results showed – in a contemporary cohort of ADPKD patients – that the prevalence of LVH is high and significantly greater than expected based on age and body size. Furthermore, we found that ADPKD severity as reflected by total kidney volume is associated with increased LVM independent of known risk factors such as gender, race, age, blood pressure, and cardiovascular disease, which may be due to altered endothelial or myocardial phenotypes associated with ADPKD and awaits further investigation.

This study was funded by the NIDDK-sponsored Baltimore Polycystic Kidney Disease Research and Clinical Core Center (P30DK090868).

O.08 1:45 p.m.

PULSED FOCUSED ULTRASOUND FOR ENHANCING THE DELIVERY OF STEM CELLS IN THE BRAIN. Ololade Sanusi*, Victor Frenkel[1], and Pavlos Anastasiadis[2], [1]Department of Diagnostic Radiology and Nuclear Medicine, University of Maryland School of Medicine, Baltimore, MD.

MRI-guided focused ultrasound (MRgFUS) is a non-invasive therapeutic ultrasound modality. It is currently FDA approved for breast cancer, bone metastases, prostate and uterine fibroids. There is mounted effort to employ MRgFUS for brain cancer and neurodegenerative conditions. However, the blood-brain barrier (BBB) detrimentally impedes the passage of therapeutic (e.g., small molecules, cells) compounds from the brain microvasculature to the underlying interstitial tissues. FUS allows for the transient disruption of the BBB, thereby offering a time window for the application of drug delivery of therapeutic agents towards a more targeted approach; and this would be particularly helpful for the treatment of neurodegenerative disorders. Using a pre-clinical MRgFUS system, mesenchymal stem cells (MSCs) were directly injected into a confined space (striatum) of Sprague Dawley rats. After the injection, the animals were exposed to pulsed FUS (pFUS) with their brain extracted two hours post-exposure. The goal of this study was to develop and optimize a methodology for the visualization of MSCs in rat brains. An effective immunostaining protocol of MSCs *in vivo* was developed over the course of the study.

O.09 2:00 p.m.

DECELLULARIZED RAT LIVER SCAFFOLDS PROMOTE THE ENGRAFTMENT OF FUNCTIONAL ALLOGENIC NEONATAL HEPATOCYTES INTRODUCED VIA THE BILE DUCT. Justin Brilliant*, John LaMattina[1], Wessam Hassanein[2], and Parth Patel[3], [1]Division of Transplant, [2]Department of Surgery, [3]University of Maryland School of Medicine, Baltimore, MD.

Liver transplant is currently the treatment of choice for patients with end-stage liver disease (ESLD). The demand for transplantable livers has unfortunately exceeded the number of available organ donors contributing to mortality for this patient population. Organ bioengineering may be a feasible alternative to liver transplant in order to eradicate donor liver shortages. We examined the ability of a decellularized liver scaffold to support the growth and function of allogenic cells derived from adult and neonatal rat liver cell slurries introduced via the bile duct. Upon introduction of adult and neonatal liver cells on a scaffold, hepatocyte, cholangiocyte, and endothelial cells were allowed to engraft onto the extracellular matrix after 7 days of recellularization. H&E and immunofluorescent staining were performed to assess the co-localization of cholangiocytes,

hepatocytes, endothelial, and Kupffer cells in recellularized grafts. The neonatal liver cell slurry exhibited the growth of all four cell lines, whereas the adult rat liver cell slurry contained only hepatocytes, cholangiocytes, and endothelial cells. Ki-67 staining also showed the proliferative capacity of neonatal cell slurry on the liver scaffold relative to the adult cell slurry. Albumin concentration in the effluent media was measured to assess the function of the recellularized liver following perfusion with adult and neonatal rat liver cell slurries. The concentration of albumin in the perfusate of recellularized liver was greater than the amount generated in a cell culture dish. Furthermore, neonatal liver slurry produced a greater concentration of albumin compared to the adult liver slurry on the liver graft following 7 days of recellularization. RT-PCR will be performed to assess expression levels of 4 CYP450 enzymes to assess liver function in the recellularized scaffold perfused with neonatal liver slurry after 7 days. Initial results from RNA extraction suggest that expression will be increased in the recellularized grafts compared to the decellularized scaffold. These results suggest that recellularized liver grafts can serve as a transplant model and a potential treatment for ESLD.

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 2:15 p.m.

RE-ENDOTHELIALIZATION OF DE-ENDOTHELIALIZED RAT LIVERS. Parth Patel*, John LaMattina[1], Wessam Hassanein[2], and Justin Brilliant[3], [1]Division of Transplant, [2]Department of Surgery, [3]University of Maryland School of Medicine, Baltimore, MD.

Xenotransplantation has been proposed as a potential solution for the organ shortage crisis for decades, but remains plagued by acute and hyperacute rejection, as well as molecular incompatibilities between species. The donor vascular endothelium serves as the initial site of recipient immune exposure to donor antigen, and manipulation of the vascular endothelium could ameliorate or attenuate the xenoantigen response. Here, we build on our experience of constructing hybrid organs based on a decellularized rat liver scaffold. Rat livers were procured using aseptic technique and flushed with heparin. A novel protocol of selective de-endothelialization was developed utilizing collagenase or SDS perfusion using our established bioreactor perfusion system. Treated scaffolds were examined under H&E and immunofluorescent microscopy. Human umbilical vein endothelial cells were then introduced into the de-endothelialized livers, and perfused with culture media. Constructs were subsequently examined immunohistochemically. Collagenase perfusion proved toxic to both hepatocytes and vascular endothelial cells, rendering this technique unsuitable for selective de-endothelialization. SDS concentrations of 0.1% showed selective de-endothelialization. Human umbilical vein cells were successfully engrafted onto the rat livers that were de-endothelialized with SDS at 0.1% concentration. Selective de-endothelialization of a rat liver was successful, and human cells could then engraft into the vacant compartment. This method demonstrates the ability to manipulate a key component of the immune response to xenogeneic antigen.

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.11 2:35 p.m.

DEVELOPMENT OF A NOVEL IMAGE-GUIDED DRUG-DELIVERY PLATFORM FOR DIFFUSE INTRINSIC PONTINE GLIOMA. Ankur Choksi*, Xiaohui Zhang, and Yongjian Liu, Division of Radiological Sciences, Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, MO.

Diffuse intrinsic pontine glioma (DIPG) is a highly aggressive brain tumor that originates in the glial tissues of the pons and is the most common cause of death for children with brain tumors. Because the tumor is anatomically inaccessible and diffuse, surgical interventions are not a therapeutic option while chemotherapy shows poor efficacy likely due to an intact blood-brain barrier. Patients with DIPG are treated with radiation therapy, but the prognosis is poor with a two year survival rate of just 10%, stressing the need for innovative therapies for this disease. It has been shown that focused ultrasound with microbubbles can be used to non-invasively, reversibly, and locally disrupt the blood-brain barrier on the order of 2 – 50 nm. While the DIPG mouse model is being established at Washington University, the current project focuses on the synthesis of radiolabeled, tumor-targeting and chemotherapeutic-loaded copper nanoclusters (CuNCs) and the delivery of these nanoclusters across the blood-brain barrier in a U87 glioblastoma (GBM) mouse model as proof of concept. By doping ^{64}Cu into CuNCs, the ^{64}Cu–CuNCs can be tracked in vivo using positron emission tomography (PET) to quantify ^{64}Cu–CuNCs delivery to the tumor and guide future treatment. The ^{64}Cu–CuNCs are functionalized with FC131, a cyclopentapeptide CXCR4 antagonist, and temozolomide (TMZ), a chemotherapeutic for the treatment of GBM. By the reduction of copper (II) chloride using sodium borohydride in a sodium acetate buffer at pH 5.6 and at 4°C, we have successfully synthesized radiolabeled and functionalized CuNCs. Using DLS and TEM, the hydrodynamic and core size is 5.5 ± 1.1 nm and 2.7 nm respectively. The purity of the temozolomide on the nanoclusters is 98.2% at synthesis and has a half-life of 144.4 hours at 4 °C. From HPLC analysis, each nanocluster is conjugated with 22 molecules of TA-PEG-FC131 and 36 molecules of TA-TMZ. Using well-established gold nanoclusters, we performed a preliminary PET imaging study and found that focused ultrasound treatment is synergistic with the enhanced permeability and retention effect for the delivery of ^{64}Cu-AuNCs across the blood-brain barrier.

Funding for this project (MC-II-2017-661) was provided by the Children's Discovery Institute of Washington University and St. Louis Children's Hospital and a fellowship through the Leah Menshouse Springer Summer Opportunities Program at Siteman Cancer Center.

O.12 2:50 p.m.

FEASIBILITY AND VALIDITY OF AUTO-SEGMENTATION OF SUBCORTICAL STRUCTURES IN PATIENTS WITH BRAIN LESIONS. Jiun Yiing Hu*, Tejan Diwanji, Baoshe Zhang, and Pranshu Mohindra, Department of Radiation Oncology, University of Maryland School of Medicine, Baltimore, MD.

Whole-brain radiation therapy (WBRT) leads to impairments in learning and memory. Volumetric changes in subcortical brain structures including the hippocampal-amygdala complex (HAC) are implicated in cognitive decline in Alzheimer's disease and other dementias. Auto-segmentation (ASeg) techniques have been used to quantify these changes in patients receiving partial brain radiation. However, the validity of ASeg in patients with brain metastases receiving WBRT, has not been proven and is the overall objective of this study. Validation was performed via volumetric comparisons with manual segmentation (MSeg) of HAC by trained raters using 20 MRIs of patients with brain metastases (pre- or post-WBRT). ASeg using FreeSurfer, an open-source software developed for healthy subjects, was feasible in 18 out of 20 patients (90%), with 2 failures due to interference from brain lesions or edema. On visual inspection of ASeg volumes, 2 additional patients were excluded due to erroneous segmentation, leaving 34 patients (85% of total dataset). Spearman correlation analysis was performed to evaluate the relationship between averaged MSeg hippocampal (HC) volumes by 2 blinded raters and ASeg volumes (N = 10, 20 HC). Similarly, MSeg HAC volumes by 1 rater were analyzed with ASeg HAC volumes (N = 18, 34 HAC). While MSeg HC volumes by one rater were significantly correlated with that of the second rater ($r = 0.45$, $p = 0.04$), their averaged volumes and ASeg volumes were non-significantly correlated ($r = 0.08$,

p = 0.74). In the single rater analysis of HAC volumes, MSeg and ASeg were non-significantly correlated (r = -0.05, p = 0.77) with ASeg volumes staying relatively invariant relative to changes in MSeg volumes. In conclusion, despite brain metastases and related edema, FreeSurfer-based ASeg successfully yielded 34 (85%) HC. Ongoing additional spatial HC/HAC analysis will attempt to further characterize the weak MSeg vs Aseg correlation observed while exploring intra-rater variation and treatment-induced changes in HC volume.

This work was supported by the AΩA 2017 Carolyn L. Kuckein Student Research Fellowship and the Radiation Oncology Summer Fellowship.

O.13 3:05 p.m.

AGE- AND SEX- ASSOCIATED DIFFERENCES IN HUMAN MOTOR CORTEX NEUROPHYSIOLOGICAL LOCALIZATION. Emma Kaplan*, Elsa Ermer, George Wittenberg, and Michael Dimyan, Division of Rehabilitation, Department of Neurology, University of Maryland School of Medicine, Baltimore, MD.

Sexual dimorphism and age-related changes in the body have a profound impact on how humans develop normally and experience disease. These differences may affect treatment targeting to different groups. This project aims to elucidate how the primary motor cortex (M1) may vary with sex and age in the healthy human brain. We hypothesized that distance between the two opposite hemispheres' M1s would be smaller in old, female participants than in young, male participants independent of head size. We measured distances between the two opposite hemispheres' M1s along X (right-left), Y (anterior-posterior), and Z (superior-inferior) directions in young (age<30 years, n=22) and old (age>60 years, n=20) healthy participants. ANCOVA analyses comparing distances [between-subjects factors: age and sex; covariate: head size] revealed a significant interaction between age and sex for M1 distance in the X direction controlled for head size ($F(1, 33)= 6.48$, $p= .02$, $\eta p2 = .02$). The X distances (mean±standard error) in young males (70.85±6.09) were significantly smaller than in young females (88.24±3.75; $p= .02$) and old males (88.63±4.21; $p= .02$). In the Z direction, young males (8.59±3.64) also had significantly smaller distances than old males (19.42±2.52; $p= .03$); ($F(1, 33)= 6.01$, $p= .02$, $\eta p2= 0.15$). In contrast, young males had significantly larger distances in the Y direction (15.85±2.8) than young females (7.61±1.73; $p= .02$) and old males (7.40±1.94; $p= .02$); ($F(1, 33)= 5.96$, $p= .02$, $\eta p2= .15$). These data suggest that the functional anatomy of M1 is dependent on factors affected by an interaction between age and sex throughout adult development.

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 EHK), by NINDS K23NS088107, UMOAIC Pepper Center Junior Scholar and Pilot Awards (to MAD), and VA RR&D Center Award (to the VAMHCS).

O.14 3:30 p.m.

DYNAMICS OF BREAST CANCER CELL CLUSTERING. Trevor Mathias* and Stuart Martin, Division of Oncology, Department of Physiology, University of Maryland School of Medicine, Baltimore, MD.

Breast cancer is the most frequently diagnosed cancer in women and the second most common cancer overall, according to estimates for 2017. Nearly all deaths from breast cancer can be attributed to metastasis, the process of cancer cells traveling and growing in distant organs including the bones, lungs, liver, and brain. Many factors contribute to the development of metastatic lesions, but it has been shown that circulating tumor cells (CTCs) play a pivotal role in this process. Recent data has shown the ability of CTCs to form clusters increases their metastatic potential and leads to

a decline in animal survival in mice models. Previous data has shown that microtubules play an important role in CTC attachment and extravasation. Preliminary whole cell imaging via confocal microscopy has shown that microtubules contribute to the cell-to-cell contacts of cancer cells. Currently many microtubule inhibitors and stabilizers are FDA-approved for clinical use and may provide a readily-available pharmacologic intervention in order to alter the formation of these CTC clusters. In order to elucidate the role microtubules play in the formation of these clusters, we have examined the stability of cell line derived CTC clusters in vitro in the presence of vinorelbine, a potent microtubule inhibitor. In the presence of vinorelbine we observed diminished CTC cluster formation and increased fragility of these clusters. Utilizing whole-cell immunofluorescence via confocal microscopy, we observed that plakoglobin, a junction protein thought to be involved in CTC clusters, is differentially localized in adherent compared to suspended cells. We aim to confirm these findings ex vivo utilizing CTCs and clusters isolated from patient samples and animal models using several isolation techniques.

Funding sources include NCI R01-CA124704, NCI R01-CA154624, and support by the University of Maryland MSTP T32 Training Grant.

O.15 3:45 p.m.

PC-CELL DERIVED GROWTH FACTOR (GP88) AS A PROGNOSTIC BIOMARKER FOR SURVIVAL IN METASTATIC BREAST CANCER PATIENTS. Katelyn Seale*, Paula Rosenblatt[1], Nancy Tait[2], Ginette Serrero[3], and Katherine Tkaczuk[1], [1]Division of Hematology and Oncology, Department of Medicine, University of Maryland School of Medicine and [2]University of Maryland Medical Center, Baltimore, MD and [3]A&G Pharmaceutical, Inc., Columbia, MD.

In the diagnosis and treatment of breast cancer, biomarkers can serve as inexpensive and predictive tests. Currently used serum biomarkers (CA15-3, CA27-29, and CEA) may serve as surrogate markers for disease state, but they have limitations; a marker that drives tumorigenesis would be a more ideal marker. One such biomarker of interest is the 88 kDa glycoprotein PC cell-derived growth factor (GP-88), which functions as a growth promoter for tumorigenic cells. Previous studies have shown overexpression of GP-88 in breast cancer tumors and higher serum levels of GP-88 in metastatic breast cancer patients compared to earlier stage patients and healthy volunteers. Considering these previous results, this study aimed to establish a relationship between GP-88 levels and survival in metastatic breast cancer patients. The University of Maryland Greenebaum Comprehensive Cancer Center collected over a decade of GP-88 samples from patients under an IRB approved protocol. The GP-88 serum levels were determined by an enzyme immunoassay developed by A&G Pharmaceutical, Inc. Kaplan-Meier survival curves were plotted for 103 metastatic breast cancer patients based on their most recent GP-88 serum values. Two distinct cancer outcome groups were determined, with one group having GP-88 levels $\leq$ 55 ng/ml (n=78) and the other group having GP-88 values > 55 ng/ml (n=25). The elevated GP-88 group had significantly decreased survival compared to the non-elevated group. GP-88 values associated with disease state as determined by RECIST 1.1 criteria at the time of sample collection were also analyzed; GP-88 values collected while patients exhibited progressive disease had a higher mean (49.74 $\pm$ 2.58 ng/ml) compared to the values collected at other disease states, including partial response (41.47 $\pm$ 3.68 ng/ml), and complete response (34.53 $\pm$ 3.43 ng/ml) (p=0.0205). These results further support GP-88's potential role as a predictive biomarker in breast cancer, demonstrating the need for further evaluation of the association of GP-88 level with breast cancer disease state.

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.16 4:00 p.m.

FLT3 ITD AML OUTCOMES ARE IMPACTED BY EXPOSURE TO CYTARABINE BASED CONSOLIDATION, TKI THERAPY, AND PRESENCE OF MRD PRIOR TO TRANSPLANT. Melanie Rebechi* and Keith Pratz, Division of Hematologic Malignancies, Department of Oncology, Johns Hopkins Medicine School of Medicine, Baltimore, MD.

FLT3 ITD mutated acute myeloid leukemia (AML) is associated with high rates of relapse and short relapse free survival. Prognosis after relapse is extremely poor, making optimization of initial therapy important. Most data now suggest allogeneic transplant should be the standard destination therapy for FLT3 ITD AML in first remission. Although peri-transplant tyrosine kinase inhibitor (TKI) use is common, there is no consensus on the best way to incorporate TKIs into the management of these patients. A comprehensive review of treatment outcomes is needed to determine which strategies improve outcomes. We conducted a retrospective chart review for 112 patients with FLT3 ITD AML seen at Johns Hopkins Hospital from 2005-2016 who underwent bone marrow transplantation to collect demographic, diagnostic, treatment, response, and survival data. Patients with NPM1 mutations had improved relapse free survival (RFS) ($p=0.019$). Minimal residual disease (MRD) negativity prior to transplant was associated with improved RFS ($p=0.002$) and overall survival (OS) ($p=0.044$). Consolidation was associated with lower rates of MRD ($p=0.005$), and improved RFS ($p=0.023$) and OS ($p=0.014$). In the absence of consolidation, pre-transplant TKI use was associated with longer RFS (median 1.819 years vs 0.855 years, $p = 0.211$) and OS (median 1.995 years vs 1.249 years, $p=0.438$). Non-myeloablative conditioning regimens trended toward favorable outcomes over myeloablative regimens despite older age and lower rates of NPM1 mutations. Outcomes were similar between matched and haploidentical donors. Post-transplant TKI use improved RFS ($p=0.034$) and OS ($p=0.010$). Remission status at time of transplant is key to outcomes. Consolidation, as well as TKI use pre- and post-transplant are associated with favorable outcomes. Although patients who received consolidation had better outcomes, it is unclear if patient characteristics (higher NPM1%, lower allelic ratio, and younger age) confounded those outcomes. This data supports treatment of FLT3 ITD AML patients to include induction, one cycle of post remission consolidation, TKI use prior to transplant, and transplant with post-transplant TKI maintenance.

O.17 4:15 p.m.

TARGETING CENTROSOMAL CLUSTERING IN COMBINATION WITH RADIATION THERAPY AS A NOVEL TREATMENT FOR LUNG CANCER. Natasha Raman*, Ghali Lemtiri-Chlieh[1], Katriana Nugent[1], Matthew Ballew[1], Andrew Holland[2], and Phuoc Tran[3], [1]Division of Molecular Radiation Sciences, [3]Department of Radiation Oncology and [2]Department of Biochemistry and Molecular Biology, Johns Hopkins Medicine School of Medicine, Baltimore, MD.

Lung cancer is the most common cause of cancer mortality with an overall survival rate of 16%. In contrast to most normal cells, the vast majority of lung cancers contain extra copies of centrosomes. Cells with supernumerary centrosomes form multipolar mitotic spindles, which, if not corrected, lead to lethal multipolar divisions or "mitotic catastrophe". To overcome this, lung cancer cells cluster their centrosomes into two spindle poles, enabling tumor cells to survive at the cost of increasing chromosome segregation errors. We hypothesize that the inhibition of centrosomal clustering will result in the preferential targeting of cancer cells with supernumerary centrosomes while leaving healthy tissue unaffected. Utilizing in vitro and in vivo models, we determined the effect of inhibiting centrosomal clustering pathways genetically with griseofulvin and pharmacologically, by knockdown of the centrosomal clustering gene HSET, on lung cancer cell growth and radiosensitivity. We examined the effect of griseofulvin and HSET knockdown with and without radiation on in vitro cell viability, clonogenic survival, and immunofluorescence. Using

3 NSCLC cell lines as well as a control non-cancer cell line we showed that, in a concentration-dependent manner, griseofulvin can induce multipolar spindles and cell death specifically in the NSCLC cell lines. Griseofulvin radiosensitized NSCLC cells as shown by cellular viability assays and clonogenic assays with the most profound effect in H460 and H358 cell lines. Increased cell death is through apoptosis as determined by cleaved caspase-3 protein levels. Immunofluorescence co-staining of pericentrin and α-tubulin suggested griseofulvin induces multipolar spindle formation in a concentration dependent manner. HSET is shown to have increased expression in cancer cells and is able to be knocked down with siRNA. Our data has shown promising results that inhibition of centrosomal clustering forces KRAS mutant lung cancer cells with extra centrosomes into lethal multipolar divisions or "mitotic catastrophe" and also results in increased sensitivity to radiotherapy.

O.18 4:35 p.m.

USING METABOLIC PATHWAYS TO IMPROVE DIAGNOSIS AND RISK-STRATIFICATION OF PROSTATE CANCER. Aymen Alqazzaz*, Dexue Fu[1], Arman Karimi[2], Gustavo Ferreira[2], Mary McKenna[2], and M. Minhaj Siddiqui[1], [1]Division of Urology, Department of Surgery and [2]Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD.

Prostate cancer has well-characterized changes that take place metabolically in the citric acid cycle (CAC) such as increased lactate formation, reversal of physiologic buildup of citrate and breakdown into downstream CAC products. Metabolic MR spectroscopy utilizing ^{13}C-labeled pyruvate now allows for clinical characterization of metabolic pathways in tissue. However, the traditionally utilized substrate of [1-^{13}C]pyruvate has limitations because as the pyruvate is broken down, the labeled carbon does not enter the CAC and instead is lost as CO_2. We propose that [2-^{13}C]pyruvate, is better to characterize changes in the CAC. Specifically, ^{13}C-pyruvate can be converted to acetyl CoA and subsequently metabolized in the CAC, reduced to lactate (Warburg effect) or transaminated to alanine. By exposing prostate cancer cells to [2-^{13}C]pyruvate and determining the relative labeling of lactate, glutamate, and alanine, we can elucidate which metabolic pathways (CAC, Warburg, transamination) are utilized in prostate cancer metabolism. The aim of this study was to determine how the metabolism of [2-^{13}C]pyruvate via the CAC, reduction to lactate, and transamination differed in high and low malignancy prostate cancer cells.

The work is funded by the DOD.

O.19 4:50 p.m.

ROBUSTNESS OF DOSIMETRIC PLANNING IN ACCOUNTING FOR RECTAL VOLUME UNCERTAINTY DURING PROTON RADIATION OF THE PROSTATE. Arielle Brackett*, Adeel Kaiser, and Mingyao Zhu, Department of Radiation Oncology, University of Maryland School of Medicine, Baltimore, MD.

Proton radiation used in cancer therapy is extremely sensitive to changes in tissue density. Even small changes in tumor or normal tissue anatomy may significantly affect radiation doses to these structures, making it paramount to accurately account for prostate gland positioning during proton radiotherapy. Prostatic motion is largely influenced by variations in bladder and rectum volumes. As a result, several approaches have been studied to enhance consistency in rectum and bladder filling, including dietary adjustments, pre-treatment pelvic imaging, and the use of an endorectal balloon (ERB). These techniques mitigate, but do not eliminate, volume uncertainty. Furthermore, in the case of ERBs, an invasive approach is required that limits patient satisfaction, thus increasing desirability of an alternative method to account for prostatic motion. The aim of this study is to evaluate the robustness of a novel dosimetric planning technique in accounting for rectal volume uncertainty during proton radiation of the prostate. This technique utilizes robustness optimization features of RayStation v6, a treatment planning software, and incorporates both positional and

density uncertainties. Treatment plans that were previously created for six prostate cancer patients at the Maryland Proton Treatment Center were reconstructed with this technique and applied to artificially expanded and contracted rectum volumes (4 per patient: +1.5cm, +1.0cm, +5mm, -5mm). Standard rectal dose-volume parameters for both the original and adjusted rectum volumes were then assessed and compared. In the treatment plans studied, all dosing constraints were met for original rectum volumes, as the radiation dose to the rectum fell within clinically accepted limits to minimize toxicity. When these plans were applied to the adjusted volumes, dosing constraints were exceeded in only 4 of 96 artificial scenarios studied. This preliminary data suggests good robustness of this treatment planning technique in regards to rectum volume. Future work could incorporate additional modifications to further improve robustness and obviate the need for ERBs.

This research was supported by the Radiation Oncology Summer Research Fellowship Program, University of Maryland School of Medicine, Department of Radiation Oncology.

O.20 5:05 p.m.

OUTCOMES AND PATTERNS OF FAILURE FOLLOWING RADIOTHERAPY IN THYMIC NEOPLASMS. Ankur Vaidya* and Charles Simone, Proton Center, Department of Radiation Oncology, University of Maryland School of Medicine, Baltimore, MD.

Surgical resection is the current standard of care for thymic neoplasms. Radiotherapy (RT) may also reduce failures and improve overall survival in the postoperative setting, or control disease locally for inoperable patients. However, how RT affects patterns of failure and influences clinical outcomes is not currently fully understood. We hypothesized that adjuvant RT reduces local, nodal, pericardial, pleural, and distant failures compared with historical rates for patients not treated with postoperative irradiation, and that definitive RT can provide durable local control and overall survival in patients not undergoing resection. We are performing an IRB-approved multi-institutional retrospective study of patients treated with RT for a confirmed thymic neoplasm to evaluate local/locoregional control, disease-free survival, overall survival, and patterns of failure following RT. Twenty-three consecutive patients receiving radiation therapy within the University of Maryland System were analyzed. Patients were predominantly male (57%), Black (52%), and a median age of 53 years. They either had thymic carcinoma (39%) or thymoma (61%), with a median tumor size of 8 cm. Patients underwent resection (87%) with negative (53%) or microscopically positive margins (27%) followed by adjuvant irradiation (82%) to a median dose of 50.4 Gy or definitive irradiation (18%) to a median dose of 68.4 Gy. Sixty-four percent also received chemotherapy. The following failures were identified in these patients: local (14%), nodal (33%), pleural (17%), pericardial (5%), distal metastasis (27%). Patterns of failure and survival analysis are ongoing in collaboration with data being collected from 8 other institutions. Preliminary single-institution analysis suggests that adjuvant radiation therapy may provide benefit for patients with thymic malignancies. Analysis from additional centers is ongoing and will help inform how adjuvant radiation therapy impacts failure patterns for thymic tumors and the utility of definitive radiation therapy for patients with unresectable thymic malignancies.

This research was supported in part by the University of Maryland Summer Fellowship in Radiation Oncology via an Endowment Fund for Academic Excellence in Radiation Oncology.

O.21 3:30 p.m.

NURD 2.0: PREDICTION OF TIBIAL NONUNION AFTER IM NAIL FIXATION AT ANY TIME WITHIN 3 MONTHS OF INJURY. Josef Jolissaint*, Kevin O'Halloran[1], Anthony Carlini[2], Keir Ross[3], Renan C. Castillo[2], and Robert V. O'Toole[3],[1]Department of Orthopaedics, Bay Medical Sacred Heart, Panama City, FL and [2]Johns Hopkins University School of Bloomberg School of

Public Health and [3]R. Adams Cowley Shock Trauma Center, Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

The ability to predict nonunion after tibial shaft fracture would be helpful to clinicians and patients. Previous risk models have been developed at discrete time points, but there exists no composite model that can predict nonunion regardless of the time of follow-up within the first 3 months. Our hypothesis is that a score (Nonunion Risk Determination score 2.0 [NURD 2.0]) will have adequate utility for clinical use. In order to create a model that encompassed all time points, we combined data from 3 previously presented analyses. These data were based on a cohort of tibial shaft fractures treated with nails at our center from 2007 to 2014. We excluded patients who did not have contact between bone ends, who had planned bone graft procedures for acute bone defects, and those without adequate follow-up. Three models were combined that entailed 382 patients at time 0, 323 patients at 6 weeks, and 240 patients at 12 weeks. The nonunion rate in the entire cohort was 14.7%. We included 42 clinical and radiographic variables that had been previously hypothesized to be associated with nonunion. Bivariate and multivariate regression analyses determined variables significantly associated with nonunion. Predictive power was evaluated using the area under the curve (AUC). The original NURD score was significantly improved through addition of 6 and 12-week RUST (Radiographic Union Score for Tibial Fractures) scores, infection and complications, smoking status, and the need for flaps. Taken as a whole over the course of 12 weeks, the NURD-based model produced an AUC of 0.87 at the initial time of fixation and improved to over 0.9 at 6 and 12 weeks. This approach could be used to bin patients into 5 clinically important risk strata ($P < 0.001$). Patients in the lowest risk strata had 0% probability of nonunion (0/97 patients). Patients in the second lowest risk strata had a 4.1% (3/73) probability of nonunion. Patients in the highest risk strata had 47.5% (38/80) probability of nonunion. We were able to create a new nonunion risk score that can predict nonunion at various time points in the first 3 months. Patients in the 2 highest risk categories, have a sufficiently high probability of nonunion to merit increased follow-up and possibly acceleration of intervention protocols. The new model (NURD 2.0) is a significant improvement over prior models that are based on a single time point from surgery. A computerized version of the score will allow surgeons and patients to use the score to help make treatment decisions regarding the need for nonunion surgery.

O.22 3:45 p.m.

PREOPERATIVE FACTORS ASSOCIATED WITH DEPRESSION OR ANXIETY IN KNEE SURGERY PATIENTS. Ashley La*, Julio Jauregui, Vidushan Nadarajah, Shaun Medina, Michael Smuda, and R. Frank Henn, Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

Preoperative depression and anxiety in patients undergoing surgery have been shown to be associated with increased postoperative complications, decreased functional improvement, and long-term dissatisfaction. There is very little data regarding depression and anxiety assessment in patients undergoing knee surgery. The purpose of this prospective study was to measure the relationship between a diagnosis of depression or anxiety and Patient-Reported Outcomes Measurement Information System (PROMIS) domains, as well as determine which preoperative factors are associated with depression or anxiety in patients undergoing knee surgery. We hypothesized that patients with depression or anxiety would have worse preoperative pain, function, and general health status. Patients provided informed consent to participate in an Institutional Review Board (IRB)-approved electronic research registry. Collected data includes a series of patient-reported questionnaires as well as information extracted from medical record. Out of 328 knee surgery patients, 10.7% had a self-reported previous clinical diagnosis of depression or anxiety. Patients with depression or anxiety were found to have higher PROMIS Depression scores and PROMIS Anxiety

scores. Furthermore, depression or anxiety was associated with older age, female gender, marital status, higher Charlson comorbidity scores, higher number of comorbidities, preoperative narcotics use, and higher American Society of Anesthesiologists (ASA) scores. Patients with depression or anxiety had more Visual Analogue Scale (VAS) pain and worse PROMIS Pain Interference, Fatigue, and Social Satisfaction scores. Patients with depression or anxiety were also found to have lower International Knee Documentation Committee (IKDC) scores, Tegner scores prior to knee symptoms, International Physical Activity Questionnaire (IPAQ) scores, Activity Rating Scale (ARS) scores, and PROMIS Physical Function scores. The results firmly support our hypothesis. Identification and treatment of depression and anxiety before surgery may help optimize postoperative 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.

O.23 4:00 p.m.

PREOPERATIVE PATIENT EXPECTATIONS OF KNEE SURGERY. Kali Stevens*, Julio Jauregui[1], Vidushan Nadarajah[1], Shaun Medina[1], Michael Smuda[1], and R. Frank Henn III[2], [2]Division of Sports Medicine, [1]Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

Limited validated data exists regarding expectations of patients undergoing knee surgery and the patient characteristics that influence treatment expectations. We hypothesized that younger patients with worse function and worse general health would have greater expectations of knee surgery. Three-hundred-ninety-nine patients who underwent knee surgery at one institution were enrolled in the study. Each patient prospectively completed a preoperative questionnaire that included demographics, Patient-Reported Outcomes Measurement Information System (PROMIS) computer adaptive testing in six domains, and the International Knee Documentation Committee (IKDC) Subjective Knee Evaluation Form. Expectations were evaluated using the Musculoskeletal Outcomes Data Evaluation and Management System (MODEMS) questionnaire, from which expectation scores in six domains and a mean expectations score were calculated. Greater preoperative expectations of knee surgery was associated with higher income, surgically naïve knee, better PROMIS Depression and Anxiety scores, greater lower extremity activity, lower comorbidity, and lower overall bodily pain ($p<0.05$ for all). Age was not associated with expectations. Greater expectations regarding the likelihood of relief from symptoms, to do more household and yard activities, to sleep more comfortably, to return to work, to exercise, and to prevent future disability independently correlated with measures including the six PROMIS domains, IKDC score, pre-injury and current Tegner Activity Scale scores, lower extremity activity, physical activity in the past seven days, comorbidity, and pain in the area of operation and overall bodily pain, with correlations ranging from -0.22 to 0.19 ($p<0.05$ for all). Preoperative expectations of patients undergoing knee surgery are associated with prior knee surgery, income, general and mental health, activity, pain, and functional status, which may have implications for patient selection, preoperative education, and risk factor modification.

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.24 4:15 p.m.

BENEFITS OF TELE-SURGERY CLINICS WITHIN THE VA HEALTH CARE SYSTEM. Regina Saylor*, Preeti John[1], and Valsamma Punnoose[2], [1]Division of General Surgery, Department of Surgery, University of Maryland School of Medicine and [2]Division of General Surgery, Department of Surgery, VA Medical Center School of Nursing, Baltimore, MD.

Telemedicine enables communication between patients and physicians at separate locations, utilizing secure video conferencing technologies which are widely available within the VA system. Focused surgical evaluation of remotely located patients in both pre-and post-operative settings can be facilitated through mobile technology, potentially improving perioperative care by eliminating distance as a barrier to patient access. In-person visits and transportation costs are reduced, enhancing patient convenience and decreasing healthcare costs. A retrospective review of tele-surgery clinic encounters in the General Surgery department at the Baltimore VA Medical Center was conducted over a two-year period. Patients provided informed consent and were queried for satisfaction following all encounters. The attending surgeon and nurse practitioner involved completed VA course requirements for providing telemedicine services. Financial analysis was performed using inter-facility transfer expense data from vendor contracts. 30 encounters were fulfilled for 23 patients who consented to utilizing tele-surgery clinic services. 24 were post-op visits, 6 were pre-operative evaluations. Decubitus ulcers, wounds, surgical incision sites, and soft tissue lesions were assessed. Approximate time for each encounter was 25 minutes. 52% of patients resided in rehabilitation facilities, 26% were non-ambulatory. Median age of patients was 52. Each one-way transfer of a patient between the VA hospital and associated facilities costs approximately $480 (range $168 - $917), or roundtrip cost of $960. Therefore, provision of tele-surgery clinic services to just 23 patients may result in transportation savings of $29,000. Finally, patients expressed great satisfaction and had adequate time for questions. Tele-surgery clinics afford an efficient way of evaluating remotely located patients and should be incorporated into routine surgical practice for the benefit of veterans and the VA Health Care System. Comprehensive, patient-centered care can be provided without compromising patient satisfaction. Benefits include financial savings for the institution, patient convenience, and high patient satisfaction.

O.25 4:35 p.m.

PSEUDOANEURYSM IN SPLENIC INJURIES. Nana Simpson*, Margaret Lauerman[1], and Kathirkamanthan Shanmuganathan[2], [1]Division of Trauma and Critical Care, Department of Surgery and [2]Division of Trauma, Department of Diagnostic Radiology and Nuclear Medicine, University of Maryland School of Medicine, Baltimore, MD.

Following blunt abdominal trauma, the spleen is an organ that is commonly injured. Given the spleen's role in maintaining lymphatic function for blood filtration, splenic injuries can be very problematic such as in cases of sepsis. Splenic injuries are treated using various approaches, where each intervention is selected based on the severity of the injury. Splenic injury severity is determined by first identifying the presence of parenchymal issues, vascular lesions, or pseudoaneurysms (PSA). Disruptions to the spleen are then ranked using a scale grading system. While large parenchymal disruptions and PSA are correlated with high scale grades, pseudoaneurysms may appear alongside smaller scale parenchymal disruptions. This study aims to quantify rates of persistent PSA after traumatic injury as well as new PSA that develop during the course of treatment. We evaluated the splenic injuries through use of computerized tomography (CT) scans of the abdomen after the application of contrast during arterial/portal venous phases. Using retrospective analysis, we reviewed CT scans of patients with blunt abdominal injuries admitted into R Adams Crowley Shock Trauma Center during January 2014 to December 2016. Overall 195 patients with splenic injury were diagnosed on CT scan. From the imaging, we measured splenic laceration size, PSA size and number, subcapsular hematoma size, and location/amount of hemoperitoneum. These parameters were followed after the initial intervention during the hospitalization to identify frequency and size changes in PSA development. On initial CT between those with and without persistent PSA, there was no difference between the multiple PSA ($p=0.27$), free hemoperitoneum ($p=1.00$), presence of splenic laceration ($p=0.63$), and subcapsular hematoma presence ($p=0.42$). While CT is an effective

method of quantifying rates of persistent PSA, certain parameters present when diagnosing splenic injuries may not be indicative of a difference between these rates.

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.26 4:50 p.m.

HEALTHCARE REFORM IN MARYLAND: IMPACT ON VENTRAL HERNIA REPAIR. Sarah Kaslow*, Gina Adrales[1], Miloslawa Stem[2], and Joseph Canner[3], [1]Division of Minimally Invasive Surgery, [2]Department of Surgery, Johns Hopkins School of Medicine and [3]Johns Hopkins Surgery Center for Outcomes Research, Baltimore, MD.

In January 2014 Maryland enacted a Global Budget Revenue (GBR) system in which all payers and hospitals are connected in a fixed payment capitated system to improve access to preventive care and care coordination. Many determinants of health addressed by GBR are also predictors of emergent ventral hernia repair (VHR). We aimed 1) to investigate associations between GBR implementation and the proportion of VHRs performed emergently, and 2) to study how implementation impacted risk factors of emergent VHR. Patients with a diagnosis of ventral hernia who underwent surgical repair were identified in the Maryland Health Services Cost Review Commission patient-level case mix data from 2011 through Q3 2015, excluding trauma diagnoses. Patients were stratified into two groups: pre- and post-GBR implementation. Multivariable logistic regression was used to identify risk factors for emergent VHR performed pre- and post-implementation and to assess the impact of GBR on emergent cases. A total of 8,938 patients were identified. 3,770 (42.2%) patients underwent an emergent procedure: 2,517 (68.0%) pre- and 1,253 (33.9%) post-implementation. The proportion of emergent VHRs remained the same after implementation (33.2% in 2011-2013 vs. 33.6% in 2014-2015, $p=0.71$). Adjusted analysis showed that implementation had no significant impact on requiring an emergent procedure (OR 1.01, 95% CI 0.92-1.11, $p=0.81$). The patient risk factors for emergent VHR (age ≥75, Black race, Charlson Comorbidity Index, insurance) did not change dramatically after GBR implementation. However, a Charlson score of 2 or higher was associated with emergent VHR before implementation (Score 0: Ref; Score 2: OR 1.27, 95% CI 1.07-1.52, $p=0.01$; score ≥3: OR 1.30, 95% CI 1.10-1.53, $p<0.001$), while a score of 1 or higher was associated with emergent VHR after implementation (score 1: OR 1.32, 95% CI 1.09-1.60, $p=0.01$; score 2: OR 1.35, 95% CI 1.06-1.72, $p=0.02$; score ≥3: OR 1.75, 95% CI 1.38-2.20, $p<0.001$). Additionally, median income in the highest two quartiles had a lower risk of emergent VHR before implementation (1st quartile: Ref; 3rd quartile: OR 0.68, 95% CI 0.58-0.79, $p<0.001$; 4th quartile: OR 0.74, 95% CI 0.63-0.87, $p<0.001$); this association was not statistically significant in the post-implementation period. GBR implementation had no significant impact on emergent VHR or the factors associated with emergent VHR. However, lower risk patients (i.e. lower Charlson Comorbidity score) were more likely to undergo emergent VHR after GBR implementation which may be due to surgical trends other than GBR such as watchful waiting. While higher income was protective against emergent VHR before implementation, the association between income and emergent VHR was not present after GBR implementation. Additional study is needed to determine if GBR improved access to care and lessened the impact of income or if there were other contributing factors.

O.27 1:30 p.m.

PREDICTORS OF POST-DISCHARGE OUTCOMES AND CARE SEEKING BEHAVIORS AMONG CHILDREN WITH ACUTE INFECTIOUS ILLNESS IN SOUTHWESTERN UGANDA. Jasmine Blake*, Matthew Wiens[1], Aliza Gellman-Chomsky[2], and and Peter Moschovis[3], [1]Department of Epidemiology and Public Health, University of British Columbia School of

Population and Public Health, Vancouver, Canada and [2]Division of Pediatric Global Health, Department of Pediatrics, Massachusetts General Hospital for Children and [3]Division of Pediatric Global Health, Department of Pediatrics, Massachusetts General Hospital, Boston, MA.

Substantial progress has been made in reducing under-5 mortality rates among children (U5MR), yet, in Sub-Saharan Africa, rates continue to be elevated largely due to acute infectious illnesses. Our previous work demonstrated that post-discharge and in-hospital mortality rates among children with acute infectious illness are similar yet, little is known about the predictors of health outcomes and care-seeking behaviors following hospital discharge. This study aims to understand predictors of post-discharge outcomes and care-seeking behaviors among children in Uganda. Children 6 months to 5 years of age with a proven or suspected acute infectious illness were enrolled. Following hospital discharge, children received telephone and/or in person follow-up visits at 2, 4, and 6 months. Utilizing this data, geospatial, univariate and multivariate logistic regression analyses were performed to determine predictors of post-discharge outcomes and care-seeking behaviors. Of 1,307 children enrolled, 1,242 were discharged alive of whom 68 (5.5%) died and 206 (16.6%) were readmitted. Analysis determined that 1 kilometer increases in distance from the nearest level three health facility increased the odds of mortality by 8% (OR 1.08 95% CI 0.99-1.17). Additionally, 1 kilometer increases in distance from the nearest health facility increased the odds of mortality by 9% (OR 1.09 95% CI 0.93-1.27) though results were not statistically significant. Previous hospitalization within 7 days and 7-30 days increased odds of post-discharge readmission as compared to no hospitalization (OR 3.08 95% CI 1.58-6.02 and OR 1.87 95% CI 1.04-3.38, respectively). Predictors of care-seeking included age >24 months (OR 2.80 95% CI 1.01-5.61) and 1 kilometer increases in distance from the nearest health facility (OR1.23 95% CI 1.01-1.50). Several predictors of post-discharge outcomes and care-seeking behavior were determined, most notably, the effect of distance from a healthy facility on post-discharge death. These results provide insight for the development of targeted post-discharge community-based interventions and health system structuring to reduce U5MR and morbidity in Sub-Saharan Africa.

Ms. Blake received funding from the Center for Diversity and Inclusion at Massachusetts General Hospital to conduct research under the Student Research Training Program.

O.28 1:45 p.m.

WEB-BASED DATA CAPTURE FOR A PROSPECTIVE MULTI-SITE STUDY OF CHRONIC TYPHOID CARRIER PREVALENCE IN CHOLECYSTECTOMY PATIENTS IN SANTIAGO, CHILE. Michael Sikorski*, Rosanna Lagos[1], and Myron Levine[2], [1], Department of Pediatrics, Center for Vaccine Development - Chile, Santiago, Chile and [2]Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

Chile has an unusually high prevalence of cholelithiasis and gallbladder disease, rendering the population uniquely susceptible to the chronic biliary carrier state of Salmonella Typhi, where the bacilli infect a morbid gallbladder and continually excrete. The present study seeks to quantify S. Typhi carriers in Santiago, Chile among cholecystectomy patients ≥ 55 years of age versus those of 18-35 years of age, compare this with the carrier prevalence in the 1980s, and correlate carrier status with serum IgG Vi antibody levels. It is hypothesized that the younger group will present with a significantly lower prevalence of chronic carriers than the older group due to major shifts in policy and vaccinations by 1991. This summer, I designed and implemented a web-based data capture system utilizing the Research Electronic Data Capture (REDCap™) web application to coordinate four primary hospital sites in Santiago and labs in Santiago, Baltimore, and Bethesda. 12 instruments containing 449 distinct fields were created to collect data on recruitment, enrollment, hospitalization, sample processing, lab results, and 6- and 12-month follow ups. Quality control and assurance protocols for this prospective multi-site study were integrated through 19 automated data quality

checks, a data resolution workflow, electronic signatures, audit trails, and unique user roles. I trained four study site nurses and ten other collaborators on both the desktop and mobile versions. Since July 2017, 154 participants have been recruited and enrolled, primary specimen collection of stool, serum, dried blood spot, capillary tube blood, bile, gallbladder tissue, and gallstones has been completed, and bacteria culture and qPCR processing at the Chilean Institute of Public Health are underway. One preliminary anonymous bile sample yielded evidence of S. Typhi growth, verifying our processing methods. It is expected that of about 3000 healthy Santiago residents undergoing cholecystectomies from 2017-2019, about 1-3% in the ≥ 55 age group and < 0.5% in the 18-35 age group will be chronic carriers. The results will ultimately help guide future typhoid elimination strategies.

This research was supported by the Bill & Melinda Gates Foundation and the University of Maryland School of Medicine Medical Scientist Training Program (MSTP).

O.29 2:00 p.m.

CROSS-COMMUNICATION BETWEEN LEUKOCYTES TRIGGERS DIFFERENTIAL IMMUNE RESPONSES AGAINST *SALMONELLA ENTERICA* SEROVARS TYPHI AND PARATYPHI. Darpan Kayastha*, Rosangela Mezghanni, Haiyan Chen, and Marcelo Sztein, Center for Vaccine Development, University of Maryland School of Medicine, Baltimore, MD.

Enteric fevers encompass typhoid fever, caused by the Gram-negative intracellular bacterium *Salmonella enterica* serovar Typhi (ST), and paratyphoid fever, caused largely by Paratyphi A (PA) and Paratyphi B (PB). Typhoid and paratyphoid fevers are life-threatening illnesses exhibiting very similar clinical features. The recognition of these pathogens by intestinal epithelial cells and cross-communication with cells of the immune system are critical for the direction and regulation of protective innate and adaptive immune responses against *Salmonella* infection. The mechanism by which these cells recognize and distinguish between pathogens with high levels of homology between them, as in between these bacterial serovars, however, is still poorly understood. Using an innovative, three-dimensional (3D) organotypic model of the human intestinal mucosa developed by our laboratory and three genetically similar *Salmonella enterica* serovars PA, PB, and ST, we observed statistically significant differences in the gene expression and secretion levels of chemokine (C-C motif) ligand 3 (CCL3), a macrophage/neutrophil chemoattractor known to play a role in *Salmonella* infections, following exposure to these *Salmonella* serovars. Also, we observed consistently differing levels of Polymorphonuclear leukocyte (PMN, e.g. neutrophil) migration between infection conditions that either included or excluded the presence of Peripheral Blood Mononuclear Cells (PBMCs, i.e. lymphocytes and monocytes), strongly suggesting the existence of modulatory cross-communication and feedback mechanisms between PBMCs and PMNs against these homologous pathogens. A better understanding of this leukocyte cross-communication will help in the ability to modulate inflammatory neutrophil migration, which has been implicated in tissue destruction and gut epithelial barrier disruption, and dictate the outcome of *Salmonella* infection. Finally, further mechanistic studies are needed to confirm these observations.

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.30 2:15 p.m.

IMPACT OF NUCLEOS(T)IDE ANALOGUES ON T CELL FUNCTIONS IN CHRONIC HEPATITIS B SUBJECTS. Ji Ae Yoon*, Shyamasundaran Kottilil, and Lydia Tang, Division of Infectious Diseases, Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

Chronic hepatitis B virus (CHB) infection is a global health burden as it affect over 240 million people. Nucleos(t)ide analogues (NA) compose one class of treatment agents for CHB. NA act directly on the viral life cycle by inhibiting hepatitis B virus (HBV) DNA polymerase activity and effectively suppress HBV DNA replication in CHB patients. NA is the treatment of choice because of their potent suppressive effects and lack of significant toxicities. However, NA fail to completely eradicate the virus due to the persistence of covalently closed circular DNA and thus, the majority of CHB patients must resort to life-long suppressive NA therapy. T cell-mediated immunity including cytokine production has an essential role in the outcome of CHB. In CHB, T cell immunity is dysfunctional in association with persistent exposure to high levels of HBV DNA. NA may contribute to the recovery of T cell-mediated immunity by reducing the HBV DNA load. However, it is unclear how and to what extent suppression of HBV by NA can restore HBV-specific T cell function. This project evaluates the immediate changes (within days) in T cell function, as reflected by cytokine production, with NA therapy in CHB patients from the clinical trial HOPE. We collected serum samples from 11 CHB patients pre- and post-initiation of NA therapy and compared the production of 26 cytokines in the serum. Of the patients, 6 were naïve to NA therapy and 5 were switched from one NA therapy to another. In the 6 treatment naïve patients, there was a trend toward reduction in the mean and a regression toward the mean post-initiation of NA therapy in the chemokines, MIP-1B, RANTES, and SDF-1A. Levels of MCP-1 was significantly reduced post-initiation of NA therapy. These changes likely represent changes in intrahepatic inflammation and chemotaxis of T cells from intrahepatic compartment with suppression of HBV replication by NA. Future planned studies with a greater number of patients will determine the changes in these cytokines. Understanding the changes in the expression pattern of cytokines will elucidate the immunomodulatory effect of NA and the immune reconstitution of host immunity in response to suppression of HBV DNA.

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, and supported by the Infectious Disease Society of America.

O.31 2:35 p.m.

EX VIVO LUNG XENOTRANSPLANTATION: THE ROLE OF E- AND P-SELECTIN RECEPTOR ANTAGONISM ON LEUCKOCYTE AND PLATELET ACTIVATION AND THROMBOSIS. Stephen Devlin*, Richard Pierson III[1], Anges Azimzadeh[2], Lars Burdorf[1], and Arielle Cimeno[2], [1]Division of Cardiac Surgery, [2]Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

The shortage of human organs available for transplant is a major problem faced by patients experiencing end stage organ failure. Xenotransplantation may be a viable solution to the lack of human donor organs available for transplantation. Lung xenograft failure is due to a combination of inflammation, coagulation, and tissue injury mediated by cellular adhesive mechanisms. A small molecule E-selectin antagonist (GMI1271) and recombinant human P-selectin glycoprotein ligand-1 immunoglobulin (rhPSGL-1) have been shown to inhibit rolling of human neutrophils to porcine endothelial cells in a microfluidic chamber assay. Recombinant humanized anti-CD18 antibody (H52) binds to LFA-1 on leukocytes inhibiting leukocyte adhesion to endothelial cells. This study aims to determine the effects of GMI1271, rhPSGL-1 and H52 on inflammation, coagulation, and thrombosis in ex vivo experiments in which genetically modified porcine lungs are perfused with human blood. We hypothesized that blood samples collected from ex vivo experiments in which GMI1271, rhPSGL-1 and H52 were administered will exhibit decreased amounts of biomarkers of leukocyte and platelet activation and inflammation because these drugs cause a defect in leukocyte adhesion to endothelial cells, thereby decreasing secondary platelet and coagulation activation. Blood

samples were collected from six paired lung perfusion experiments in which one lung was treated with the GMI1271, rhPSGL-1, and H52, and the contralateral lung was untreated. F1+2 and β-thromboglobulin levels were determined at multiple time points throughout the experiment using enzyme linked immunosorbent assays (ELISA). Neutrophils and monocyte levels were determined using an automated CBC machine. Platelet levels were determined via flow cytometry. Pulmonary vascular resistance and mean airway pressure were also monitored throughout the experiments. All ex vivo perfusion experiments lasted until elective termination at 480 minutes. Preliminary results reveal non-significant differences in F1+2, β-thromboglobulin, neutrophil, monocyte, and platelet levels between the blood samples collected from the treated and control groups. Further statistical analysis is ongoing.

This research was supported in part by the American Association of Thoracic Surgery (AATS).

O.32 2:50 p.m.

SPECTRAL OPTIMIZATION OF PORTAL VENOUS PHASE VIRTUAL MONOCHROMATIC DUAL ENERGY CT AND COMPARISON WITH ARTERIAL PHASE SINGLE ENERGY CT ANGIOGRAPHY FOR BLEEDING PELVIC FRACTURES. Kevin Fan* and David Dreizin, Division of Trauma Radiology, Department of Diagnostic Radiology and Nuclear Medicine, University of Maryland School of Medicine, Baltimore, MD.

The purpose of this study was to optimize image quality of Virtual Monochromatic Plus (VMI+) portal venous phase datasets from dual energy CT (DECT) angiography in patients with bleeding pelvic fractures, acquired on a second generation dual-energy dual-source scanner, with that of arterial phase CT angiography performed using a single-energy 64-section MDCT scanner. For this HIPAA compliant IRB approved study, 17 consecutive prospectively enrolled patients with pelvic fractures and intravenous contrast extravasation (ICE) who underwent dual energy CT of the abdomen and pelvis between July 2016 to May 2017 (age > 18 years) compared to the arterial-phase CT exams of 20 retrospectively selected patients with pelvic fractures and ICE on 64-section MDCT. Virtual monochromatic images were created at 40, 50, 60, and 70 keV from DECT portal venous phase (PVP) low (100 kVp) and high energy (150 kVp with Sn filter) data. The mean attenuation in the aorta, contrast blush, and muscle were measured, as well as the standard deviation in the anterior abdominal fat. Contrast/Noise ratio (CNR) and Signal/Noise ratio (SNR) were calculated for the aorta and contrast blush. Subjective assessment of image quality was performed by two experienced trauma radiologists blinded to the results using a 1-5 point Likert scale. The readers ranked image quality with respect to abdominal organs, conspicuity of ICE, and conspicuity of 3rd and 4th order pelvic arterial branches for each subject. Measurements were compared using the Wilcoxon rank-sum test. Of the four VMI+ reconstructions, 40 keV showed significantly higher attenuation in the aorta and foci of blush (508 HU, 359 HU) compared to the 64-slice arterial phase images (389 HU, 214 HU). There was no significant difference in SNR and CNR. One reader found 40keV to be significantly superior to 64-slice arterial phase images in visualizing solid organs, but there was no significant difference in reader assessment of blush and branch conspicuity. Conspicuity of arterial bleeding on PVP optimized using VMI+ is similar to if not better than arterial bleeding on conventional arterial phase single energy scans. In the future, assessment of PVP images with DECT virtual mono-energetic images could improve diagnostic certainty.

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.33 3:05 p.m.

OBSERVATION OF ERYTHROCYTE DYNAMICS IN THE OCULAR MICROVASCULATURE. Corinne Renner*, Breanna Tracey*, and Osamah Saeedi, Department of Ophthalmology and Visual Sciences, University of Maryland School of Medicine, Baltimore, MD.

Glaucoma is a leading cause of irreversible blindness worldwide. Reduction of intraocular pressure is the only currently proven therapy for primary open-angle glaucoma (POAG). Despite this therapy, many patients continue to irreversibly lose vision because of this disease, suggesting that other critical factors play a role in the progression of POAG. There is strong evidence supporting a vascular component to the development and progression of POAG, but technology limitations in this field restricted researchers to assessments of bulk blood flow. Erythrocyte mediated angiography (EMA) is a novel and sensitive imaging technique for determining individual erythrocyte flow and dynamics in participants (glaucoma patients and controls) subject to both room air and oxygen. Erythrocyte velocity is a potentially important biomarker for the development and progression of POAG, but no automated software exists for these novel EMA images. A custom MATLAB script for image registration and erythrocyte tracking was written to analyze erythrocyte velocity in small arteries and veins within the optic nerve head and retina. The MATLAB script was validated by comparison with manual erythrocyte tracking in ImageJ, showing no statistical difference between the two methods. This protocol provides a consistent and reproducible method for analyzing erythrocyte velocity from EMA images, providing important insights into the role of the vasculature in the development and progression of POAG. Using this protocol, EMA data from 7 patients showed a statistically significant increase in velocity when patients were exposed to oxygen vs. room air, validating oxygen as an accurate method for observing autoregulation in the ocular vasculature. The insights from this pilot study may set the foundation for the development of new, sensitive biomarkers of early glaucomatous optic neuropathy and become a powerful tool for drug development in the future.

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 and supported by Fight for Sight.

Poster Presentation Abstracts

Presenters are indicated with "*" next to their names.

P.02 1:30 p.m. (Presenter withdrew from presenting)
COMPARISON OF AUTOINJECTOR AND IMPROVISED INTRANASAL DELIVERY SYSTEM FOR ADMINISTRATION OF NALOXONE. Jane Chen*, Thomas Del Ninno[1], Michelle Romeo[2], Jackie Zhang[2], and R. Gentry Wilkerson[1], [1]Department of Emergency Medicine, [2]University of Maryland School of Medicine, Baltimore, MD.

In the United States, there is an epidemic in the non-medical use of prescription opioids as well as heroin. In 2015, more than 33,000 people died from opioid overdose in the US. The treatment for overdose is administration of the opioid antagonist naloxone. In the past, the lack of FDA-approved delivery devices led to the use of improvised kits. An autoinjector was approved in 2015, but its cost compels some to continue to use improvised kits. The objective of this study was to assess the ability of an "at-risk" population to recognize scenarios in which naloxone administration is indicated and to administer it in a simulated setting using an autoinjector or an improvised intranasal device. This randomized, open-label, two-treatment, two-sequence crossover study compared the use of a naloxone autoinjector (NAI) (EVZIO; Kaleo, Inc., Richmond, VA, USA) and an improvised intranasal (IIN) delivery system before and after an educational session in an "at-risk" population. A multiple-choice test was used to assess participants' awareness of scenarios for naloxone administration. Patients were considered "at risk" if they were using illicit opioids, had previously overdosed, were on multiple or high-dose opioid pain medications. Patients were randomly assigned to first perform either NAI or IIN delivery. During the simulation, critical steps to deliver naloxone appropriately were recorded. If even one step was missed, it was considered non-administration. Subjects with prior naloxone training were not excluded. Fifty patients were enrolled in the study. Two were withdrawn due to somnolence. Results were evaluated using Fisher's exact test. The rates of successful administration with the NAI and the IIN delivery system were significantly different before training (64.6% vs 12.5% [$p<0.01$]). After training, there was a trend toward higher success with the NAI (83.3% vs 95.8% [$p=0.09$]). The only subjects who used the IIN kit successfully were those who had prior training or had previously witnessed its use. Without proper training, it is unlikely that an at-risk person would be able to successfully administer naloxone to a person with an opioid overdose.

This research was supported by the University of Maryland Emergency Department Grant.

P.03 1:30 p.m.
ANESTHETIC REQUIREMENTS OF PATIENTS UNDERGOING RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (REBOA). Ashton Engdahl*, Philip Wasicek[1], Samuel Galvagno[2], Megan Anders[3], and Maureen McCunn[2], [1]Department of Surgery and [2]Division of Trauma, [3]Department of Anesthesiology, University of Maryland School of Medicine, Baltimore, MD.

Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) is a temporizing maneuver to provide minimally invasive proximal aortic control to mitigate non-compressible non-thoracic torso hemorrhage. There are several indications for REBOA following trauma, however there is a paucity of literature describing the implications of REBOA for the anesthesiologist. We hypothesized that patients who underwent REBOA would 1) be critically ill, and receive massive transfusion as well as vasoactive medications 2) receive a much lower dose of anesthetic (inhalational and adjuncts) compared to the expected dose for their given age and 3) manifest significant metabolic derangements. We conducted a retrospective case series study to characterize parameters

of anesthetic management and physiology in patients with REBOA. Patients admitted to R Adams Cowley Shock Trauma Center between 01 January 2013 and 20 December 2016 who underwent REBOA, survived to have an index operation, and had active aortic occlusion at the start of their index operation were included. Demographics, operative details, and hospital course data were extracted from medical records. In addition, procedural data were collected from video monitoring. 25 patients were included, and analyzed in two separate groups based on what level of aortic occlusion was performed (infra-renal vs. supra-celiac). In both groups the patients were critically ill, had a high in-hospital mortality rate (64%), and suffered significant physiologic derangements in the immediate resuscitation period. These derangements included acidosis, hypotension, hyperglycemia, and hypothermia. All patients received blood products and crystalloid. 64% of patients received at least one vasopressor, 28% received tranexamic acid, and 12% received colloid other than blood. The average minimum alveolar concentration, as approximated by end tidal concentration and age, was 0.3. The information gathered from this study serves as an important starting point for clinical practice guidelines, clinician education, and research into anesthetic management of patients undergoing REBOA.

This study was funded in part by a grant from the Department of Defense titled "Clinical Study of Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) for Severe Pelvic Fracture and Intra-Abdominal Hemorrhagic Shock using Continuous Vital Signs," grant number W81XWH-15-1-0025.

P.04 1:30 p.m.

THERAPEUTIC POLYMERIC NANOPARTICLES FOR TAILORED GENE EXPRESSION AND IMPROVED WOUND HEALING. Louis Born*, Frank Lay[1], Eddy Salgado[2], Zahra Alikhassy[1], Steven Jay[3], and John Harmon[1], [1]Department of Surgery, Johns Hopkins School of Medicine, Baltimore, MD, and [2]Department of Materials Science and Engineering and [3]Department of Bioengineering, University of Maryland College Park, College Park, MD.

Over three million Americans suffer from non-healing wounds, with a majority being elderly and/or diabetic. Wound healing is dynamic and genetically complex as there are a variety of factors expressed throughout the stages of inflammation, proliferation, and maturation. Many genes involved in wound healing have been shown to be downregulated with age or the onset of disease, leading to compromised healing. Mimicking the expression of key genes that occur in normal healing may result in improved healing for those with non-healing wounds. To deliver such genes, cationic polymers have been used to protect nucleic acids in the extracellular environment as well as enhance entry into the cell. One such polymer used for this purpose is chitosan. In addition to its uses in gene delivery, it has also been shown to be beneficial in wound healing and is incorporated into a number of wound dressings. In this work, we synthesized chitosan nanoparticles using an electrostatic crosslinker. They were used as tangential adjuncts to plasmid DNA for gene delivery in the skin. We investigated the in situ effects of nanoparticle density on DNA/chitosan interaction and discovered progressive DNA condensation with increasing nanoparticle concentration. This translated to a unique pattern of gene expression in an in vivo rat wound healing model. Expression was either significantly increased for short-term durations or prolonged at more modest levels depending on nanoparticle concentration. Alone, these nanoparticles improved healing in in vivo wound models. Animals treated with nanoparticles showed more rapid wound closure compared to an untreated group ($p<0.05$). This work presents a promising system of gene delivery in the skin for wound healing.

This research was supported by the Wound Healing Society Foundation's Chitosan in Research Grant sponsored by Medline Industries and by the National Institutes of Health.

P.05 1:30 p.m.

HIV AND CANCER OUTCOMES AMONG HIV-INFECTED PATIENTS DIAGNOSED WITH CANCER AND FOLLOWED IN A MULTIDISCIPLINARY INFECTIOUS DISEASE/ CANCER CLINIC. Helen Cheung* and David Riedel, Division of Infectious Disease, Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

Patients diagnosed with HIV have an increased risk of AIDS-defining cancers (ADCs) and non-AIDS defining cancers (NADCs) as well as increased mortality rates compared to non-HIV infected counterparts. HIV-infected patients diagnosed with cancer must visit multiple specialists who may not synchronize care and address potential toxicities of simultaneous antiretroviral therapy and cancer treatments. Historical studies of HIV-infected patients noted improved virologic suppression, CD4 T-lymphocyte counts, and adherence with access to multidisciplinary services. This study examines whether dually diagnosed patients seen in a multidisciplinary clinic (HIV specialists, pharmacists, social workers, etc.) embedded within an oncology outpatient center, will result in improved virologic suppression and subsequently better patient outcomes. We hypothesize that HIV-infected patients with cancer seen in this clinic will have greater virologic suppression compared to historical controls. Retrospective chart reviews were performed and data collected included demographic, cancer-related, HIV-related, and treatment-related variables. These results will be compared to a historical cohort of controls seen between 2007-2011. Between 2012-2016, 207 patients were screened, and 43 patients were identified that met the inclusion criteria. The median age at cancer diagnosis was 46 years (range, 23-76), and 70% of patients were male. The mode of HIV transmission included 10 (23%) intravenous drug use, 14 (33%) heterosexual transmission, 17 (40%) men who have sex with men, and 2 (5%) were unknown. 23 (53%) had ADCs, and 20 (47%) had NADCs; 30% had stage I-III disease, 53% had stage IV disease, 5% had unknown staging, while 12% was not applicable. The median number of visits to the clinic was 6 (range, 2-35). As of December 31, 2016, 22 (51%) patients achieved oncologic remission, 4 (9%) had relapse/progression, 9 (21%) died, and 8 (19%) were unknown. Further analysis of both HIV and cancer treatment outcomes for these patients is in progress. Understanding how integrated care for patients with both HIV and cancer diagnoses has potential implications regarding the management of HIV and cancer as separate comorbidities.

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.06 1:30 p.m.

ARTESUNATE SYNERGIZES WITH OTHER BCL-2 FAMILY INHIBITORS IN AML AND ALL CELL LINES. Allison Durham*, Blake Moses[1], and Curt Civin[2], [1] Center for Stem Cell Biology and Regenerative Medicine, Department of Medicine, University of Maryland School of Medicine, and [2]Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD.

Artensunate (AS) and its derivatives, including ART-838, were found to have anti-leukemic activity in a drug screen. Preliminary studies suggest that AS acts by inhibiting MCL-1 and may synergize with BCL-2 inhibitors including ABT-199 (venetoclax). MCL-1 is part of the BCL-2 family of anti-apoptotic proteins, which also includes BCL-XL. The aims of this project were to 1) further probe the molecular mechanism by which AS decreases MCL-1 levels in ALL and AML cells lines and 2) investigate synergy between AS and other BCL-2 family inhibitors. In a Western Blot analysis, AS and ART-838 lowered MCL-1 protein levels in ML2 cells compared to DMSO vehicle control and AraC. To determine when MCL-1 levels begin to decrease, ML2 cells were treated with 10 uM AS or DMSO-vehicle control and prepared for protein isolation at 0, 2, 4, 6, 8, 10, and 24h before performing a Western Blot. MCL-1 decreased between 10 and 24h in AS-treated cells vs. control,

while BCL-2 levels were unchanged. To evaluate potential synergy with ABT-199, ALL and AML cell lines were cultured with ABT-199 10-10,000 nM, AS 100, 200, 250, 500 nM, or both in combination for 48h before measuring AlmarBlue absorbance. The IC¬50 of each drug for each cell line was calculated and used to perform combination index (CI) experiments. KOPN8 or ML2 cells were cultured with a range of AS and ABT-199 concentrations at a constant ratio and incubated for 48h before measuring AlmarBlue absorbance. Synergy was assessed by calculating CI values using CompuSyn software. AS synergized potently with ABT-199 in both cell lines. Similar experiments were performed with A-1155463, a BCL-XL inhibitor, which also synergized with AS at concentrations ~100-fold higher than ABT-199. The potent synergy observed between AS and ABT-199 make this an attractive new drug combination for use in ALL and AML chemotherapy regimens.

This research was supported by the American Society of Hematology (ASH).

P.07 1:30 p.m.

CELL CYCLE REGULATION BY PPP1R1A IN EWING SARCOMA CELLS. Megan Hodges*, Mitchell Cairo, and Wen Luo, Division of Hematology and Oncology, Department of Pediatrics, New York Medical College School of Medicine, Hawthorne, NY.

Ewing sarcoma is the second most common primary bone sarcoma affecting children and adolescents with a dismal survival rate upon recurrent disease or metastasis. Previous work has shown that PPP1R1A is one of the significantly upregulated targets of the aberrant EWS/FLI transcription factor in Ewing Sarcoma cells. PPP1R1A is activated through phosphorylation by PKA and acts as a potent inhibitor of PP1 allowing increased phosphorylation of various target proteins involved in cell division and cancer development. PPP1R1A was also observed to significantly regulate genes encoding histones whose expression is tightly controlled by the cell cycle. Here, we examined the role of PPP1R1A in regulating Rb phosphorylation and histone mRNA transcription. We were able to demonstrate that PPP1R1A promotes cell proliferation through regulation of the G1/S transition of the cell cycle by controlling Rb phosphorylation. We also determined that PPP1R1A modulates histone transcription which may also affect cell cycle progression.

P.08 1:30 p.m.

LEARNING CURVE FOR MAGNETIC RESONANCE IMAGING/ULTRASOUND-FUSION BIOPSY IN DETECTING PROSTATE CANCER USING CUSUM ANALYSIS. Nancy Ye*, Mohummad Siddiqui[1], Jasleen Chopra[2], Michael Naslund[1], Jade Wong-You-Cheong[2], and Amelia Wnorowski[2], [1]Division of Urology, Department of Surgery and [2]Department of Radiology, University of Maryland School of Medicine, Baltimore, MD.

Targeted magnetic resonance imaging (MRI) with ultrasound (US) fusion guided biopsy has been shown to improve detection of prostate cancer. This approach, however, requires integration of radiologists, who may not be heavily experienced in prostate MRI, and surgeons, who may not be familiar with fusion biopsy. Objective methods of assessment for learning curves, such as the cumulative sum (CUSUM) analysis, may identify the presence and duration of a learning curve for this process. The aim of this study was to determine the learning curve for MRI/US fusion guided biopsy in detecting prostate cancer using CUSUM analysis. 2 urologists performed MRI/US fusion guided prostate biopsies between March 2015 and May 2017. MRI was interpreted by 1 of 4 radiologists. The primary outcome measure was the rate of diagnosis of prostate cancer in relation to MRI Prostate Imaging Reporting and Data System (PI−RADS) score. For patients with multiple lesions, the highest suspicion lesion was assessed. The CUSUM analysis assesses how close or how far to target accuracy actual performance is, on a sequential case−by−case basis. For this analysis, target performances of >90% cancer detection rate (CDR) for PIRADS 5, >50% CDR for PIRADS

4, and <20% CDR for PIRADS 1−3. Retrospective data were collected and analyzed using CUSUM methods. In total, complete data were available for MRI/US fusion guided biopsies performed on 72 patients. 26 of these patients were PIRADS 1−3, 33 were PIRADS 4, and 13 were PIRADS 5. Figure 1 features the CUSUM learning curve analysis for these 72 cases, and demonstrates intermittent poor performance (upward−sloping line) and good performance (downward−sloping line) until approximately 50 cases. At this inflection point, there was a steadily downward−sloping line consistent with evidence that no further learning curve was encountered. CUSUM analysis objectively assesses the acquisition of competence in MRI/US fusion guided prostate biopsies in detecting prostate cancer. At a new center implementing this technology, the learning curve was approximately 50 cases before consistent, high performance for prostate cancer detection.

P.09 1:30 p.m.

MULTICENTER REPORT ON TOXICITIES OF CONCURRENT NIVOLUMAB AND RADIATION THERAPY. Maliha Zanib*, Pranshu Mohindra[1], Zeljko Vujaskovic[2], Charles Simone[1], and Neha Amin[1], [2]Division of Translational Radiation Sciences, [1]Department of Radiation Oncology, University of Maryland School of Medicine, Baltimore, MD.

Nivolumab (NIVO) is an anti-PD-1 monoclonal antibody that has been rapidly adopted for a wide range of advanced malignancies over the past 3 years. This has led to more scenarios where patients on NIVO may be considered for concurrent radiation therapy (RT)-NIVO off clinical trial, yet there are limited data on safety and toxicities of combined RT-NIVO. We reviewed our experience to assess the acute toxicity profile of concurrent RT-NIVO. A retrospective review of all consecutive patients from Jan 2015 to Feb 2017 who received RT-NIVO was conducted at 2 separate centers. Concurrent RT-NIVO was defined as RT completed between 1 day prior to initial NIVO and 1 month after last NIVO infusion. Patient and treatment characteristics, side effects, and post-treatment scans were collected and analyzed. Of the 165 patients who received NIVO, 77 received RT (46.7%) but only 26 (15.8%) received concurrent RT-NIVO (38 treatment sites). For these 26 patients, RT intent was definitive in 16% and palliative in 84%. Target RT sites were central thorax/abdomen (34%), extremity (24%), chest wall/axilla (16%), brain (13%), and head/neck (13%). Of the 26 patients, 18% experienced Grade 2-3 acute toxicities in the radiation field, with the highest rate of toxicities in patients who received RT to the central thorax/abdomen (31%). One unexpected outcome in a patient who received concurrent Stereotactic Body Radiation Therapy (SBRT)-NIVO to the left adrenal was development of G3 pancreatitis and an 83% increase in tumor volume suggestive of tumor progression. In this cohort with varied sites, RT treatments, and histology, concurrent RT-NIVO was generally well tolerated when using palliative doses to extremities and limited fields in the head/neck region with more toxicities seen with RT targeting the central thorax/abdomen. Until there are more definitive data available, patients should be counseled of potentially increased side effects with RT-NIVO in the abdomen/thorax. Larger multi-institutional retrospective studies and future prospective trials assessing concurrent RT-NIVO will deepen our understanding of the toxicity profile of RT-NIVO to help guide radiation oncologists.

P.10 1:30 p.m.

PEDIATRIC ECG SCREENING FOR LEFT VENTRICULAR HYPERTROPHY. Molly Burgoyne* and Geoffrey Rosenthal, Division of Pediatric Cardiology, Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD.

Left ventricular hypertrophy (LVH) is a condition in which the muscle wall of the heart's left pumping chamber becomes thickened, and it is a significant risk factor for the development of cardiac events including myocardial infarction, rhythm disturbances, congestive heart failure, and sudden death. Studies demonstrate that electrocardiograph (ECG) criteria for diagnosis of LVH

have high levels of specificity but are often highly insensitive. Therefore, when LVH is identified by ECG, physicians must use echocardiogram (ECHO) to confirm or refute the diagnosis. More sensitive screening criteria for ECG measurements are needed to accurately diagnose LVH. The purpose of this study is to develop a new ECG algorithm to screen for LVH in pediatric patients. ECG and ECHO measurements from 36 pediatric cardiology patients with and without LVH were analyzed to develop a predictive model that can diagnose LVH more sensitively. Results demonstrated that not only are current predictors of LVH unreliable, but also that there are other variables that should be considered when assessing LVH risk. Conclusions drawn from this study will allow future research to further refine the ECG criteria for diagnosing LVH, which will improve the quality of patient care.

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.11 1:30 p.m.

COMPARISON OF PULMONARY ARTERY CATHETER (PAC)-DERIVED CARDIAC OUTPUT AND ECHOCARDIOGRAPHICALLY-DERIVED CARDIAC OUTPUT. Stephanie Kolb*, Peter Olivieri[1], Rajan Patel[2], Thomas Scalea[3], and Sarah Murthi[4], [1]Division of Pulmanary and Critical Care, Department of Medicine, [2]Department of Anesthesiology, and [3]Division of Trauma Surgery and [4]Division of Surgical Critical Care, Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

Cardiac output (CO), CO indexed (CI) for body surface area (BSA), and stroke volume (SV) are hemodynamic variables that can provide crucial information about the cardiac function of critically ill patients. The gold standard method for measurement is a pulmonary artery catheter (PAC), which is invasive and risky to place. Transthoracic echo (TTE) can measure the same variables more safely and with less pain. The goal of this study is to test the hypothesis that TTE can accurately estimate CO, CI and SV compared to the PAC. Intensive Care Unit (ICU) patients with a PAC placed for clinical indications, or those undergoing PAC placement in the Cardiac Catheterization Lab (CCL) were eligible for enrollment. TTE CO was calculated by measurement of the left ventricular outflow tract diameter (LVOTD) and left ventricular outflow tract velocity time integral (LVOT VTI). The correlation between PAC and TTE derived measurements was determined. Bland-Altman (BA) plots were constructed to compare differences. Over a one-year period, 81 patients were enrolled, 50 from the ICU and 31 from the CCL. The CO, CI and SV could be calculated by TTE in 59 (73% of patients enrolled). In 6 patients the LVOT VTI could not be measured and in 20 the LVOTD could not be measured. For the population as a whole the correlation was r=0.84. For CO, CI and SV the bias was: -0.18 with an upper limit (UL) of 2.17 and lower limit (LL) of -2.51; 0.05 (UL 1.19, LL -1.29), and -2.6 (UL 28 LL -33). The percentage error for each metric was 40-42%. We conclude that TTE measurement of CO is feasible and less invasive then PAC. There is a high degree of correlation, but the percent error is also relatively high. Further research is needed to develop this metric, as echo is non-invasive and risk free.

P.12 1:30 p.m.

SECONDHAND SMOKE IS LINKED TO HIGHER RISK OF NON-CARDIOVASCULAR MORTALITY BUT NOT OF CARDIOVASCULAR MORTALITY IN COMMUNITY-DWELLING OLDER ADULTS: FINDINGS FROM CARDIOVASCULAR HEALTH STUDY (CHS). Amiya Ahmed*, Evangelos Kanonidis[1], Apostolos Tsimploulis[2], Poonam Bhyan[2], Richard Allman[3], and Ali Ahmed[4], [1]Department of Precision Medicine, The Roslin Institute, University of Edinburgh, Edinburgh, United Kingdom and [2]Department of Medicine, Georgetown University Hospital and Washington Hospital Center, [3]Office of Geriatrics and Extended Care Services, U.S.

Department of Veterans Affairs, and [4]Department of Medicine, Veterans Affairs Medical Center, Washington, DC.

Secondhand smoke is a modifiable environmental risk factor for cardiovascular (CV) and non-CV morbidity and mortality. However, little is known about these risks in community-dwelling older adults. Of the 5795 community-dwelling older adults, age ≥65 years, in the NHLBI public-use CHS data, 5604 had detailed data on smoking, including pack-years and exposure to secondhand smoke. Of these, 5338 were free of prevalent heart failure (HF) at baseline. We restricted our analysis to 2558 never-smokers, defined by 0 pack-years of smoking. Of the 2558 never-smokers, 243 were exposed to secondhand smoke, which was defined as a positive response to the question, "*Does anyone living w/ you smoke cig regularly?*" Multivariable-adjusted Cox-regression models were used to estimate associations of exposure to secondhand smoke with centrally-adjudicated incident HF and mortality over 13 years of follow-up. Participants had a mean (±SD) age of 74 (±6) years, 71% were women and 16% were African American. Those exposed to secondhand smoke were more likely to be younger (72 vs 74 years; $p<0.001$) and African American (26 vs 15%; $p<0.001$), but had no sex differences (68 vs 71%; $p=0.25$). Among community-dwelling older adults who never smoked, exposure to secondhand smoke is associated with a higher risk of all-cause mortality that was primarily driven by a higher risk of non-CV mortality, but has no association with CV mortality or incident HF.

P.13 1:30 p.m.

PHARMACOGENETICS OF SGLT2 INHIBITORS: IDENTIFYING GENETIC VARIANTS ASSOCIATED WITH DRUG EFFECTS. Hua-Ren Cherng*, Amber Beitelshees, and Simeon Taylor, Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

Physicians generally choose among 12 classes of drugs when treating type 2 diabetes mellitus, but there is little data regarding which drug should be prescribed for each individual patient. One class, sodium glucose cotransporter-2 inhibitors (SGLT2i), has been reported to induce glucosuria, uricosuria, and decrease cardiovascular risk. However, increased bone fracture and ketoacidosis risks are well documented in patients taking SGLT2i. Given the wide variability in pharmacodynamic and adverse response to SGLT2i, some proportion of this variation may be explained by genetic variation. This clinical study first examined the effect of canagliflozin, a SGLT2i, on bone metabolism biomarkers. We hypothesized that changes in parathyroid hormone (PTH) and serum phosphate would be correlated with changes in serum calcitriol following administration of canagliflozin. Then, we sought to evaluate a common exonic SNP in SLC2A9, a uric acid/glucose antiporter (GLUT9), that is associated with decreased serum uric acid levels. This SNP may modulate the response to SGLT2i. We hypothesized that this SNP would diminish the action of canagliflozin to increase uricosuria. Healthy Amish participants were treated with either a single 300 mg dose of canagliflozin or QD x 5d 300 mg canagliflozin. Relevant primary endpoints were collected including glucose excretion, plasma uric acid levels, and biomarkers. Statistical analyses included paired t-tests, ANOVA, and multivariate linear regression. PTH, calcitriol, and phosphate levels all showed significant changes following drug administration, but the correlations differed from that of normal physiologic responses. GLUT9 genotype was found to be significantly associated with the uricosuric effect of the drug. Following adjustment for baseline uric acid level, this association went away, suggesting that higher baseline uric acid led to greater mean changes in plasma uric acid after drug administration. Current research demonstrates that pharmacogenetics also has a statistical impact on glucosuria in subjects taking canagliflozin and may be responsible for the wide variation in efficacy seen in patients taking SGLT2i.

Support for this project was provided by American College of Medical Genetics and 5-NIHR21DK105401-02 to Dr. Simeon Taylor.

P.14 1:30 p.m.

USE OF DEXAMETHASONE FOR PERSISTENT PERIHEMATOMAL EDEMA IN PRIMARY INTRACEREBRAL HEMORRHAGE. Richa Manglorkar* and Wendy Wan-Tsu Chang, Department of Emergency Medicine, University of Maryland School of Medicine, Baltimore, MD.

Management of patients with acute primary intracerebral hemorrhage (ICH) is focused on reduction of secondary brain injury from the mechanical and cellular effects of the hematoma and associated edema. Hemoglobin and its breakdown products have been demonstrated to be neurotoxic, exacerbate acute perihematoma edema, and contribute to disruption of the blood-brain barrier. This suggests that there are components of cytotoxic edema related to cellular death as well as vasogenic edema related to disruption of the blood-brain barrier that contribute to the development of perihematoma edema seen with ICH. Perihematoma edema develops early after ICH and increases within 7 to 11 days after ictus. Corticosteroid such as dexamethasone is commonly used for treatment of vasogenic edema associated with brain tumors with great success. Early studies in the 1970s and 1980s on the use of steroids in ICH showed no benefit in outcomes, instead, increased infectious complications. However, there have been no studies since that examine in detail the time window, dose, and duration of steroid treatment and its effect on perihematoma edema and associated outcomes. There exists a knowledge gap between the pathophysiology of delayed cerebral edema with acute primary ICH and potential treatment options. We aim to characterize the use of dexamethasone for delayed cerebral edema and its potential effects on outcome.

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.15 1:30 p.m.

EVALUATING THE USE OF THE OTTAWA SAH HEMORRHAGE RULE TO MINIMIZE MISSED DIAGNOSES. Makoto Tanigawa* and Wan-Tsu Chang, Division of Neurocritical Care, Department of Emergency Medicine, University of Maryland School of Medicine, Baltimore, MD.

Aneurysmal subarachnoid hemorrhage (SAH) is a rare but serious condition that affects 30,000 people annually in the United States and is associated with a 30-day mortality of 45%. Outcome is highly dependent on early diagnosis and aggressive intervention including immediate aneurysm repair as aneurysms can rebleed within days or weeks after initial presentation, associated with worse prognosis. In particular, diagnosis is complicated in patients who present with a headache and no other neurological symptoms, by the fact that SAH is rare, and headaches, although a common symptom in SAH, have a long list of differential diagnoses. This results in a misdiagnosis rate of 5%. The Ottawa SAH Rule, developed as a result of a multi-center cohort study in Canadian tertiary care centers published in 2013, was 100% sensitive and 15% specific for identifying SAH in patients who initially presented with a chief complaint of a headache. Our goal is to evaluate the use of the Ottawa SAH rule in patients who presented to the UMMC Neuro ICU after a missed diagnosis of SAH in their initial medical encounter. Out of 185 SAH patients cared for in the UMMC Neuro ICU from July 2014 – August 2017, 89 patients (48%) initially presented with a headache and no other neurological deficits. Of those patients, 6 patients (7%) were identified as misdiagnosed on their initial medical encounter. These patients initially presented to Emergency Departments, primary care physician offices, and Urgent Care facilities with their symptom of headache. Mean delay in correct diagnosis was 3 days, and all misdiagnosed patients (100%) met one or more of the inclusion criteria for the Ottawa SAH Rule. Use of this rule may help guide physicians in assessment and evaluation of patients who present with a headache.

P.16 1:30 p.m.

RACE/ETHNIC VARIATIONS OF PERIHEMATOMAL EDEMA AFTER ICH AND IMPACT ON OUTCOME. Ashwin Reddi* and Gunjan Parikh, Division of Critical Care, Department of Neurology, University of Maryland School of Medicine, Baltimore, MD.

Intracranial hemorrhage (ICH) is associated with high rates of morbidity and mortality. The initial hemorrhage triggers an inflammatory response in adjacent tissue that may drive secondary brain injury as evidenced by perihematomal edema (PHE). The ERICH study examined racial and ethnic differences in ICH patients, and was able to determine many specific risk factors (such as hypertension and tobacco use) for the development of ICH. However, the role of race and ethnicity and other ICU factors in the development of PHE remains unclear. This study has developed a method to quantify absolute and relative PHE volumes following ICH using MRI, and compare differences in these volumes among different racial and ethnic groups. This project has additionally tracked progress of these patients, and evaluated a potential relationship between PHE volume and negative outcomes among various racial and ethnic groups. We hypothesized that there is a significant variation in PHE development in different racial and ethnic groups, and that differences in absolute and relative PHE volumes can be used to predict outcomes in these patients. Patients were be taken from the existing ERICH study pool, and will include those that have suffered a deep spontaneous supratentorial ICH measuring less than 60 cc's, and have undergone an MRI less than 72 hours after admission. Seventy-five of each Caucasian, African American, and Hispanic patients were included in the study. We expect to see a larger PHE volume in African American patients, which in turn has led to a disproportionately lower GCS and NIHSS scores in these patients. These findings lead us to conclude that PHE volumes can be larger in specific ethnic groups, and can be linked to a host of negative outcomes.

P.17 2:35 p.m.

JNK AS A BIOMARKER OF RELAPSE AND RESPONSE TO TREATMENT WITH GLATIRAMER ACETATE IN MULTIPLE SCLEROSIS. Freidrich Anselmo*, Alexandru Tatomir, Jonathan Ciriello, and Horea Rus, Department of Neurology, University of Maryland School of Medicine, Baltimore, MD.

Multiple sclerosis (MS) is an inflammatory demyelinating disease of the central nervous system, whose pathogenesis has been found to be mediated by apoptotic-resistant autoreactive T cells. Recently, the JNK pathway was found to play an important role in the regulation of T-cell apoptosis in MS, and JNK2 transcripts were found to be upregulated in relapsing MS patients. In this study, we longitudinally investigated the role of phosphorylated JNK (phospho-JNK) as a possible biomarker of relapse and of response to glatiramer acetate (GA) treatment in relapsing remitting MS patients. A cohort of 15 GA-treated patients was clinically monitored using the Expanded Disability Status Scale (EDSS) and peripheral blood mononuclear cells were collected at 0, 3, 6, and 12 months after initiation of the therapy. We measured phospho-JNK1/2/3, JNK1/3, and JNK2 protein expression by western blot analysis. We found that during relapse patients have higher levels of JNK1/3 p54 ($p < 0.0001$) and JNK2 p54 ($p < 0.007$) isoforms compared to stable patients. Non-responders to GA treatment were defined as patients who exhibited at least two relapses following initiation of GA treatment. Significantly higher levels of JNK1/3 p54 isoform ($p = 0.01$) and JNK2 p54 isoform ($p = 0.0006$) were found in GA non-responders compared to responders. Receiver operating characteristic (ROC) analysis was used to assess the predictive power of JNK as possible biomarker of relapse and response to GA treatment. The probability of accurately detecting relapse was 86% ($p = 0.0001$) for JNK1/3 p54 and 77% ($p = 0.007$) for JNK2 p54. The probability of detecting response to GA was 76% for JNK1/3 p54 ($p = 0.0002$) and 89% ($p = 0.0002$) for JNK2 p54. There was a significantly positive correlation between EDSS and JNK1/3 p54 ($r = 0.59$,

p = 0.0002) and with JNK2 p54 (r= 0.42, p = 0.01). Our data suggest that the JNK p54 isoform could serve as potential biomarker for MS relapse and response to GA treatment.

This project was funded through a grant from Veterans Administration Merit Award (to H.Rus). Freidrich Anselmo 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.18 2:35 p.m.

EFFECTS OF CD28/B7 COSTIMULATION BLOCKADE ON THE PD-1/PD-L1 AXIS IN *MACACA FASCICULARIS* WITH CARDIAC ALLOGRAFTS. George Crabill*, Natalie O'Neill, Zhang Tianshu, Richard Pierson III, and Agnes Azimzadeh, Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

Organ transplantation is one of the most effective methods of treating end stage organ failure. However, current immunosuppressive drugs do not prevent chronic rejection and are associated with significant side effects. The emerging field of immunotherapy is providing new strategies to specifically and effectively modulate the immune system to ensure the long term survival of transplanted grafts. Substantial basic research is ongoing to determine the characteristics and interrelationships of costimulatory and coinhibitory signaling pathways in immune cells. Coinhibitory receptors are used by the immune system to maintain self-tolerance by preventing the activation and proliferation of T and B cells. The same coinhibitory receptors however, can by co-opted therapeutically to manipulate the transplant recipient's immune response. This study focused on analyzing the coinhibitory axis of PD-1: PD-L1 in *Macaca fascicularis* with cardiac allografts that were treated with costimulation blockade targeting the CD28/B7 pathway. The CD28/B7 pathway is a key costimulatory pathway for the activation of lymphocytes and we hypothesized that the PD-1 axis would be enhanced by the blocking their interaction. Flow cytometry was used to determine the absolute and relative surface expression of PD-1 in peripheral blood lymphocytes and to determine the phenotype of cells expressing PD-1. PD-1 expression was found to be present on $CD4^+$ and $CD8^+$ T cells at baseline in all animals. Expression over time after transplantation appeared quite stable, and is being further analyzed as a function of drug dosing and graft survival time. Nanostring data of total RNA is currently being analyzed to determine the change in gene expression of the receptor PD-1 and its ligands. Preliminary data suggests that, compared to normal untransplanted monkey heart tissue, expression of both PD-1, PDL1, and PD-L2 is increased one month after transplantation in animals that received a cardiac transplant and a CD28 blocking therapy (sc28AT). Immunohistochemistry staining is being conducted to confirm expression at the protein level and determine the proximity of PD-1 and PD-L1 in biopsies from transplanted cardiac tissue when treated with costimulation blockade targeting the CD28/B7 pathway. Results from these studies will provide insight in the mechanisms of action of CD28 blockade and may identify additional potential therapeutic targets for combination immunomodulation therapy in transplantation.

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.19 2:35 p.m.

EFFECTS OF 1-BENZYLIMIDAZOLE AND GENE MODIFICATIONS ON EICOSANOID AND LEUKOTRIENE SYNTHESIS IN XENOGRAFT LUNG PERFUSION AND TRANSPLANTATION MODELS. Yinglun Wu*, Richard Pierson, Agnes Azimzadeh, and Lars Burdorf, Department of Surgery, University of Maryland School of Medicine, Baltimore, MD.

Xenografts from genetically modified pig organs provide a promising solution to address the worldwide shortage of organ donors. Genetic modifications have greatly improved graft survival and reduced hyperacute rejection in many pig organs including the heart, kidney, and liver, but graft

outcomes in lungs are still poor. Recent data from our lab shows that the administration of 1-Benzylimidazole (BIA), a thromboxane synthase inhibitor (TSI), protects lung xenografts and lowers pulmonary vascular resistance. Although preliminary results suggest that BIA inhibits the synthesis of pro-inflammatory eicosanoids such as thromboxane B2 in ex vivo lung perfusion models, the consequences of TSIs on eicosanoid and leukotriene synthesis, and the balance between members of the eicosanoid pathway, are still poorly understood. My project aims to (1) confirm that BIA has the expected effect on thromboxane B2 elaboration, both ex vivo and in vivo; (2) determine how the elaboration of other eicosanoids (PGI2, PGE2) and leukotrienes (LTB4, LTE4) is modulated in the presence of BIA; and (3) explore whether additional gene modifications (hCD55, Neu5GcKO, hEPCR.HO-1.hTBM.hCD47) influence eicosanoid elaboration or alter graft outcomes following BIA treatment. To address these aims, I have (1) analyzed retrospective data from ex vivo perfusions and in vivo transplantations and (2) am generating new data from previously collected plasma samples by measuring levels of eicosanoids and leukotrienes via enzyme-linked immunosorbent assay (ELISA). My preliminary analysis has confirmed that the addition of BIA significantly decreases the rise in TXB2 levels ex vivo, but the effects of BIA in vivo remain inconclusive. In addition to the effect of BIA on TXB2, my preliminary results suggest that BIA may have an effect on eicosanoid (PGI2) synthesis. As reported previously by the Pierson/Azimzadeh lab, GalTKO.hCD46 genetically modified pig lungs show significantly reduced increases in TXB2 when BIA is administered. Interestingly, additional modifications such as hCD55, Neu5GcKO, and hEPCR.HO-1.hTBM.hCD47 reduce the rise in TXB2 levels even further, both in the presence and absence of BIA.

This work was supported by the Program for Research Initiated by Students and Mentors (PRISM), University of Maryland School of Medicine Office of Student Research, by NIH NIAID U19 AI010959, and by unrestricted educational gifts from the United Therapeut Therapeutics and Lung Biotechnology LLC, as well as from the University of Maryland General Clinic Research Center.

P.20 2:35 p.m.

ELUCIDATING THE ROLE OF TXNIP IN MICROGLIAL ACTIVATION. Jane Chen*, Brian Polster, Niraj Bhatt, and Sausan Jaber, Department of Anesthesiology, University of Maryland School of Medicine, Baltimore, MD.

Under conditions of stress, for instance traumatic brain injury (TBI), mitochondria undergo a process of structural remodeling associated with respiratory inhibition. This has been observed in microglia during a proinflammatory activation state termed M1. Thioredoxin-interacting protein (TXNIP) is a thioredoxin-binding protein that can inhibit the antioxidant protein thioredoxin, which may result in accumulation of reactive oxygen species (ROS) and cellular oxidative stress. In macrophages, TXNIP has been found to translocate to mitochondria during inflammation and activate the NLRP3 inflammasome complex to mediate interleukin-1b (IL-1b) secretion. Roles for TXNIP in microglia, the innate immune cells of the brain, are almost entirely unexplored. We are optimizing a microglial knockdown of TXNIP using siRNA to test the hypothesis that TXNIP is required for proinflammatory microglial activation and the accompanying shift in cellular bioenergetics from oxidative phosphorylation to glycolysis. Pending successful knockdown, we will culture microglia, perform TXNIP knockdown, and analyze activation state and cellular bioenergetics by Western blotting and by Seahorse respirometry.

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, and by the Polster Lab at UMB.

P.21 2:35 p.m.

THE C-KIT RECEPTOR; A STEM CELL MARKER EXPRESSED IN KIDNEY COLLECTING DUCT INTERCALATED CELLS. Andrea Theodoru*, Maria Merkulova, Teodor Paunescu, and Anil Nair, Massachusetts General Hospital, Boston, MA.

The receptor tyrosine kinase, c-Kit, is an important stem cell marker whose expression has been described in bone marrow, liver, heart, amniotic fluid, and lungs. C-Kit has also been detected in the thick ascending limb of the kidney, which neonatal rat studies have shown to have regenerative potential (1). However, the role of c-Kit expression in kidney collecting duct intercalated cells (IC) is largely uncharacterized. In hemopoietic progenitor cells, c-Kit expression declined as erythroid progenitor cells matured into erythrocytes (2); similarly, we hypothesized that c-Kit might reflect stem cell activity in IC, and that its expression might also decline as the kidney develops. We used wild type mice and mice expressing EGFP in ICs to study the expression of c-Kit in IC via immunofluorescence and western blotting from the day of birth to adulthood. Our results show that there is a decline in basolateral membrane c-Kit expression after neonatal day 4, which continues until day 25, the age of adulthood in mice. Western blotting showed a marked decrease after day 20 and immunofluorescence confirmed this result in ICs. This was an initial study into the characterization of c-Kit receptors in the kidney. Our findings are in line with the interpretation of c-Kit expression as an indicator of the potential of ICs for regeneration and pluripotency. IC cell regeneration via a c-Kit mediated pathway could have major implications for kidney regeneration after injury, and this now requires further in depth studies to test this hypothesis.

This research was supported by the Dennis Brown Laboratory at Massachusetts General Hospital, Department of Nephrology.

P.22 2:35 p.m.

USE OF MESENCHYMAL STEM CELLS TO TREAT MUSCLE STRAIN INJURIES. Megan Lerner*, Richard M. Lovering, Shama R. Iyer, Joseph P. Stains, Craig H. Bennett, and R. Frank Henn III, Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

Muscle strains are one of the most common complaints treated by physicians. Standard therapy for acute muscle strains usually involves rest, ice, and nonsteroidal anti-inflammatory medications, but currently there is no clear consensus on how to accelerate recovery. It is now known that mesenchymal stem cells (MSCs) can support development of new muscle by providing myogenic growth factors and enhancing satellite cell function. A treatment that shortens recovery time could have a large impact in athletics, but could have a tremendous impact in patients with muscular dystrophies. The purpose of this study was to determine the effects of MSCs on injured muscle. We tested the hypothesis that MSC delivery at the site of muscle injury will shorten recovery time. The tibialis anterior muscles (TAs) of anesthetized Sprague-Dawley rats (N=9) were injured by lengthening contractions. The injured TA was injected with either MSCs (1E5, Lonza Biotechnologies), "sham" treatment (equivalent volume of sterile saline), or received no treatment (N=3 per group). Maximal torque was measured at optimal muscle length pre- and post-injury, and at days 1, 3, 5, 7 and 9 after injury until recovery was complete. All animals sustained almost identical loss of muscle force after injury (60 +/- 2%). MSC-treatment had a beneficial effect at within 3 days after injury, resulting in a faster, and overall greater, recovery of function compared to sham and no treatment groups. The sham injections had no effect compared to no treatment. We conclude that MSC injection may be a promising treatment option for muscle strain injuries. Our long-term goal is to inject injured muscle with MSCs containing superparamagnetic iron oxide nanoparticles (SPIONs), which can be tracked by MRI and delivered to targeted sites in-vivo for predetermined

periods of time. We have started these experiments and, if successful, such a method could improve muscle regeneration and subsequent functional recovery of the injured muscle.

P.23 2:35 p.m.

CHARACTERIZING THE EFFECTS OF CELL PASSAGING ON TRANSPLANTING HUMAN NEURAL CREST STEM CELLS FOR PERIPHERAL NERVE INJURY REPAIR. Huanwen Chen*, Jian Du, Kailiang Zhou, and Xiaofeng Jia, Department of Neurosurgery, University of Maryland School of Medicine, Baltimore, MD.

Peripheral nerve injury is a major burden to societies worldwide, however, current therapy options (e.g. autologous nerve grafts) are unable to produce satisfactory outcomes. Many studies have shown that stem cell transplantation holds great potential for peripheral nerve repair, and human neural crest stem cells (hNCSCs), which give rise to a variety of tissues in the peripheral nervous system, are particularly promising. NCSCs are one of the best candidates for clinical translation, however, to ensure the viability and quality of NCSCs for research and clinical use, the effect of in vitro cell passaging on therapeutic effects needs be evaluated given that passaging is required to expand NCSCs to meet the demands of transplantation in preclinical research and clinical trials. To date, no study has investigated the quality of NCSCs past the 5th passage in vivo. In this study, we employed a multimodal evaluation system to investigate changes in outcomes between transplantation with 5th (p5) and 6th passage (p6) NCSCs in a 15-mm rat sciatic nerve injury and repair model. Using CatWalk gait analysis, gastrocnemius muscle index, electrophysiology, immunohistochemistry, and histomorphometric analysis, we showed that p6 NCSCs demonstrated decreased cell survival, Schwann-cell differentiation, axonal growth, and functional outcomes compared to p5 NCSCs (all $p < 0.05$). In conclusion, p6 NCSCs showed significantly reduced therapeutic efficacy compared to p5 NCSCs for peripheral nerve regeneration.

The work was supported by Maryland Stem Cell Research Fund (2013-MSCRFE-146-00) (to XJ), and R01HL118084 from NIH (to XJ).

P.24 2:35 p.m.

PANCREATIC ISLET CELL INTERACTION WITH EXOCRINE TISSUE: AN *IN VITRO* CULTURE. Hallie Whalen*, Amanda Jones[1], Timothy Hostelley[2], Jessica Dunleavey[2], Norann Zaghloul[2], and Magali Fontaine[1], [1]Department of Pathology and [2]Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

Islet cells, which represent only 2% of the pancreatic tissue, regulate glucose metabolism through the release of insulin and glucagon. The remaining pancreatic tissue is composed of exocrine cells which release zymogen proteases, as digestive enzymes. A complex interplay between the endocrine and the exocrine cells exists as evidenced by the ability of the endocrine hormones to stimulate exocrine enzyme release and the ability of the exocrine cells to transdifferentiate into islet cells. The exocrine tissue may also play a role in sustaining islet cell mass and function. For this project, we are investigating the role of exocrine secretome on pancreatic islet cell function and proliferation *in vitro*. Islet cells are harvested from C57/BL6 wild-type mice, purified using a Euro-Ficoll gradient, and cultured in RPMI supplemented medium. The remaining exocrine tissue is saved and cultured separately *in vitro* with supplemented RPMI medium. Exocrine tissue supernatant is harvested and transferred to the islet tissue culture at a 1:2 dilution with RPMI medium for 48 hours. Islet function and proliferation are then tested and compared to islets cultured with untreated medium, serving as control. Islet function is measured with a glucose stimulated insulin secretion assay, where islets are stimulated in low and high glucose solutions for 1 hour and then insulin concentration is determined using an insulin ELISA. Islet proliferation is measured by flow

cytometry for Ki67 expression, a cell proliferation marker. Islet cell function and proliferation will be compared between the experimental group treated with exocrine supernatant and the control group. Through these preliminary experiments, we expect to understand if the exocrine secretome may have a beneficial effect on islet cell function and survival.

This research was supported by The Summer Program in Obesity, Diabetes and Nutrition Research Training (SPORT) Grant under NIH award number T35DK09573 and by The Living Legacy Foundation.

P.25 2:35 p.m.

NOVEL APPROACHES TO PREDICTION OF CARDIAC ELECTROPHYSIOLOGICAL TISSUE PROPERTIES FROM PET PERFUSION AND VIABILITY MEASUREMENTS. Benjamin Gutierrez* and Mark Smith, Department of Diagnostic Radiology and Nuclear Medicine, University of Maryland School of Medicine, Baltimore, MD.

Ventricular tachycardia (VT) is responsible for a significant number of deaths in the US every year. The most effective therapy for people at risk of VT is implantable cardioverter defibrillators (ICD). Some patients who receive ICDs may need further intervention because of slowly conducting regions of the heart associated with scar tissue. These scar tissue areas can create reentry loops causing a pathological cycle of depolarization. Slowly conducting regions can be electrically isolated by ablating the scar border, thus preventing wavefronts from entering the scar tissue and preventing ventricular tachycardia. Currently, electrophysiology (EP) is used to create a voltage map of the endocardial surface to determine if tissue conductance is high (normal) or low (scar tissue) and radiofrequency ablation is guided using this mapping. However, EP mapping alone has several drawbacks, including time needed to perform EP voltage mapping, inaccurate readings due to poor surface contact, and an overall low success rate of the ablation procedure of 58% after 6 months. With these drawbacks, a method to non-invasively provide pre-procedural tissue classification to aid in the EP classification by voltage mapping could speed up VT ablation procedures and localization of scar tissue. The goal of this project was to investigate methods for improving the use of PET cardiovascular imaging for pre-procedural classification of scar tissue prior to EP ablation procedures to treat left ventricular tachycardia. We did this by performing EP and PET registration and examining reproducibility between researchers, combining the PET metabolism and flow data to create a unified classifier, and attempting to adjust for anatomic based regional differences affecting the PET data. The metric for comparison was the area under the receiver operating characteristic (ROC) curve (AUC) for PET prediction of EP-derived tissue category (scar, abnormal). In each of these areas of investigation, none of the new methods significantly improved the prediction of EP tissue category. These results may be indicative of the inherent physiologic differences in what is being measured with PET and EP along with the difficulty in reliably registering the two modalities. Future work will investigate more sophisticated PET-EP registration methods prior to the prediction step.

P.26 2:35 p.m.

THE RACIAL/ETHNIC DIFFERENCES IN THE ASSOCIATION BETWEEN OBESITY AND GESTATIONAL DIABETES. Kathleen Browne* and Ruofan Yao, Division of Maternal Fetal Medicine, Department of Obstetrics, Gynecology and Reproductive Sciences, University of Maryland School of Medicine, Baltimore, MD.

Obesity and gestational diabetes (GDM) likely interact to increase the risk of stillbirth. We aim to describe the racial/ethnic differences in the interaction between obesity and GDM. This was a retrospective cohort analysis of singleton non-anomalous births in Texas between 2006 and 2011. Analysis were stratified based on maternal pre-pregnancy BMI class and racial/ethnic category (4

BMI and 4 racial/ethnic categories). Underweight and pregestational diabetic women were excluded. The rates of stillbirth were calculated for each stratum among pregnancies with gestational diabetes. Cox proportional hazard regression analysis was performed to estimate the risks of stillbirth associated with GDM for each racial/ethnic and obese stratum compared to normal weight, non-GDM, Non-Hispanic White pregnancies. After all exclusions there were more than 2.3 million births for analysis and over 88 thousand complicated by GDM. The rate of stillbirth among non-GDM, Non-Hispanic White, normal weight pregnancies was 38.3/1,000 births before 36 weeks GA. In comparison, among GDM and morbidly obese pregnancies, the stillbirth rate for Non-Hispanic White was 66.1/1,000 (aHR: 2.21, [1.34, 3.65]), the rate for Non-Hispanic Black was 119.3/1,000 (aHR: 4.15, [2.62, 6.60]), the rate for Hispanics was 81.3/1,000 (aHR: 2.61, [1.87, 3.64]), and the rate for Asian was 187.5/1,000 (aHR: 7.32 [2.35, 22.84]). The rate of stillbirth among non-GDM, Non-Hispanic White, normal weight pregnancies after 36 weeks GA was 0.5/1,000 births. In comparison, among GDM and morbidly obese pregnancies, the stillbirth rate for Non-Hispanic White was 5.9/1,000 (aHR: 15.58, [8.97, 27.08]), the rate for Non-Hispanic Black was 13.6/1,000 (aHR: 37.48, [21.91, 64.11]), the rate for Hispanics was 8.8/1,000 (aHR: 23.56, [16.34, 33.96]), and the rate for Asian was 6.0/1,000 (aHR: 17.79 [2.49, 127.28]). Before 36 weeks GA, Asians had the highest risk of obesity associated stillbirths among GDM patients, while Non-Hispanic White and Hispanics had lower risks of stillbirths. After 36 weeks GA, Non-Hispanic Black had highest risks of obesity associated stillbirths among GDM patients, while Non-Hispanic White had the lowest risk followed by Asians.

P.27 2:35 p.m.

OPTIMAL DELIVERY OF FETUSES WITH CONGENITAL HEART DEFECTS. Breanne Bears*, Shifa Turan, Chris Harman, and Turan Ozhan, Division of Maternal Fetal Medicine, Department of Obstetrics, Gynecology and Reproductive Sciences, University of Maryland School of Medicine, Baltimore, MD.

Studies of pregnancy complicated by fetal congenital heart disease (CHD) show higher rates of Cesarean section (CS) delivery in CHD diagnosed prenatally than in CHD diagnosed after birth, suggesting provider knowledge of fetal CHD provokes a decision for CS. We hypothesized there is no significant difference in outcome for CHD babies delivered vaginally compared to those delivered by CS. This is a retrospective cohort study. Fetuses with CHD diagnosed antenatally (2007-2016) were identified, excluding chromosome abnormalities. Obstetric data assessed included: initiation of labor (spontaneous or induction of labor (IOL), route of delivery, and CS indication (elective, CS in labor-maternal reasons, CS in labor-fetal reasons). Immediate neonatal condition (continuous variables Apgar1/5, umbilical artery cord (UA) pH; categorical variables Apgar5, umbilical artery cord (UA) pH; categorical variables Apgar5 <7 and UA pH <7.10) were related to obstetric designation. Data were analyzed with Chi square and Mann-Whitney U. 254 CHD cases met inclusion criteria: 155 (61%) vaginal (VD) and 98 (39%) CS. CS indications were: elective 32 (32.7%) maternal 21 (21.4%) and fetal 45 (45.9%). Of VD, 110 (71%) were IOL and 45 (29%) spontaneous. CHD babies showed no clinical difference in median Apgar1/5 between VD (8/9) and overall CS (8/9) ($p>0.05$). Average UA pH was slightly higher in VD (7.26) than total CS (7.21; $p=0.001$). However, when CS indication was analyzed, only fetal showed lower Apgars and UA pH than vaginal delivery ($p<0.0001$/$p=0.005$; $p<0.00001$). Low Apgar5 occurred in 9/155 vaginal, 3/32 eCS, 3/21 maternal-CS and 8/45 fetal-CS ($p=0.08$). UA pH was < 7.10 in 3 vaginal, 3 eCS, and 3 maternal-CS but 9 fetal-CS ($p =0.0002$). Vaginal birth is the preferred route of delivery for infants with CHD. Elective CS does not result in improved neonatal condition. Simply planning elective CS for prenatally-diagnosed CHD should be discouraged.

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.28 2:35 p.m.

INDUCTION WITH INTRACERVICAL FOLEY BALLOON INCREASES THE RISK OF PRIMARY CESAREAN DELIVERY IN NULLIPAROUS WOMEN. Martha Coghlan*, Julie Hurvitz[1], Kristin Atkins[2], Ruofan Yao[2], Ozhan Turan[2], and Sarah Crimmins[2], [1]Department of Obstetrics, Gynecology and Reproductive Sciences, University of Maryland Medical Center and [2]Division of Maternal-Fetal Medicine, Department of Obstetrics, Gynecology and Reproductive Sciences, University of Maryland School of Medicine, Baltimore, MD.

We hypothesize that mechanical cervical dilation with a Foley balloon (FB) will improve the rate of successful induction (IOL) in nulliparous women. This is a retrospective cohort study of all singleton nulliparous women receiving misoprostol for IOL between 2013-2016 at a single tertiary urban medical center. Exclusion criteria were stillbirths and cervical dilation greater than 1 cm at the time of admission. Maternal demographics, induction characteristics, delivery, and neonatal information were collected. The primary exposure of interest was FB placement. The primary outcome was cesarean delivery (CD). Secondary outcomes were achievement of complete cervical dilation, chorioamnionitis, postpartum hemorrhage, Apgar scores, cord gases, and admissions to the neonatal intensive care unit. Univariate and multivariable logistic regression analyses were performed to estimate the risk of adverse outcomes associated with FB placement. Adjusted odds ratios (aOR) with 95% confidence intervals were calculated adjusting for starting cervical effacement and BMI. A total of 238 women underwent induction with misoprostol. FB was placed in 92 women. The starting effacement and dilation was similar in both groups (effacement: FB: 25% (0-90) v no FB: 25% (0-100) and dilation: FB: 0 cm(0-1) v no FB: 0.5 cm (0-1), $p>0.05$). Individuals who received a FB were more likely to have a primary CD (49.5% v 26.9 %, $p<0.001$, aOR: 2.5 [1.5-4.2]), were less likely to reach complete cervical dilation (56.5% v 79.2%, $p<0.001$, aOR: 2.6 [1.5-4.5]), and more likely to have a postpartum hemorrhage(15.1% v 5.7%, $p<0.004$, aOR: 2.6 [1.2-5.9]). None of the other secondary outcomes were significantly different. Mechanical dilation of cervix in nulliparous women was associated with a decreased success rate of induction of labor and higher risk of peripartum complications. These findings mandate further investigation with a randomized control trial into the cervical ripening process in and methods of induction for nulliparous women.

P.29 2:35 p.m.

EXAMINING HOW TEMPERAMENT RELATES TO BMI AMONG TODDLERS OF LOW-INCOME MOTHERS. Chelsea Alvarado*, Bridget Armstrong, and Maureen Black, Division of Growth and Nutrition, Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD.

Child temperament, and its impact on parent-child feeding interactions, is thought to have a central role in influencing children's BMI in early life. This project examines how toddler fussiness relates to weight. Participants are mothers from low-income families and their child, age 12-31 months, enrolled in the Toddlers Overweight Prevention Study (TOPS), a NIH-funded trial. At enrollment, children and mothers were weighed and measured. BMI scores were calculated. BMI z-scores, adjusted for age and gender, were calculated for children and maternal weight status was determined, based on their BMI scores. Temperament was assessed by the Brief Infant-Toddler Social and Emotional Assessment (BITSEA), a 63-item maternal-report questionnaire. Children with a "problem score" above the 75th percentile were classified as temperamentally difficult. This analysis used enrollment data to test the hypothesis that toddler temperament (fussy/difficult) is related to toddler BMI. Covariates considered include WIC participation, food insecurity and toddler

gender/age. Independent sample t-tests were performed using SPSS (Version 22) to assess the relation between temperament and toddler BMI. Results showed that, among toddlers, 14.2% were overweight and 8.8% were obese. Toddlers classified as temperamentally difficult had significantly lower BMI z-scores compared to toddlers with BITSEA scores within the normal range. The inclusion of several feeding-specific items on the BITSEA Problem scale suggest that the classification of difficult temperament may have included toddlers with feeding problems, including pickiness and food refusal. Future work on this project will include exploration of maternal feeding patterns to examine their association with toddler temperament and weight.

The TOPS study was supported by grant R01-HD05609 from the National Institute of Child Health and Human Development. This research was supported by The Summer Program in Obesity, Diabetes and Nutrition Research Training (SPORT) Grant under NIH award number T35DK095737.

P.30 2:35 p.m.

ANTERIOR SEGMENT STRUCTURAL VARIANTS IN PEDIATRIC PATIENTS WITH DOWN SYNDROME. Zahur Sallman*, Osamah Saeedi[1], Gianna Stoleru[2], Mona Kaleem[1], and Janet Alexander[1], [1]Department of Ophthalmology and Visual Sciences, [2]University of Maryland School of Medicine, Baltimore, MD.

Ophthalmic disorders, specifically cataracts, are a rare but serious concern for pediatric Down syndrome (DS) patients. Early detection and intervention has been key to preventing congenital cataracts, which can cause amblyopia or permanent blindness in affected children. Previous studies have identified structural differences between the anterior segment of DS eyes and control eyes. However, there is currently no way to predict which DS patients will develop cataracts or at what stage in their growth that this may occur. The first aim of this project focuses on obtaining specific structural measurements from acquired images of the anterior segment of the eye in pediatric DS and age-matched controls utilizing Ultrasound Biomicroscopy (UBM). Using a preexisting protocol developed by the University of Maryland School of Medicine, images of the anterior segment cross section (horizontal and vertical), dedicated images of the angle (12, 3, 6, and 9 o'clock), and single dedicated images of the ciliary body and central cornea were obtained in both patient groups preoperatively and in some cases, postoperatively. Preoperative consent for UBM imaging was obtained for all patients according to IRB protocol. Our preliminary data includes measurements from a control group consisting of 14 patients, (7 children and 7 young adults), with unilateral cataracts, and a DS group consisting of 6 patients, (4 children and 2 young adults), with bilateral cataracts. ImageJ software was used to measure specific parameters in the anterior segment images, including aspects of the cornea, iris, ciliary body, lens (if present), as well as that of the anterior chamber itself. These measurements will soon be compared with determined normative literature values using statistical programs (SPSS and SAS) and t-tests. Any significant trends will be extracted and confounding variables will be evaluated and included in the models. We expect preliminary results from statistical analysis in the near future.

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.31 2:35 p.m.

COMPARISON OF PHACOEMULSIFICATION ENERGY USED IN FEMTOSECOND LASER ASSISTED CATARACT SURGERY (FLACS) AND CONVENTIONAL PHACOEMULSIFICATION. Sharon Ong*, Osamah Saeedi[1], Syed Karim[1], and Luke Chang[2], [1]Department of Ophthalmology and Visual Sciences, [2]University of Maryland School of Medicine, Baltimore, MD.

Femtosecond laser assisted cataract surgery (FLACS) is rapidly gaining popularity due to its precision and performance of lens fragmentation, ideally allowing for more efficient removal of cataracts. This study's purpose is to investigate the differences in phacoemulsification energy used in FLACS compared with conventional phacoemulsification. We conducted a retrospective study in a large ophthalmology private practice on all uncomplicated cataract surgeries performed with phacoemulsification from November 2013 to December 2015. Three surgeons with varying levels of experience performed both FLACS and conventional phacoemulsification. Demographic and intraoperative variables collected prospectively at the time of surgery include surgeon, phaco energy as measured by cumulative dissipated energy (CDE), age, operative eye, procedure performed, intraocular lens (IOL) lens power and type, patient allergies, past medical history, and ASA rating. Bivariate analysis was performed with CDE as a dependent variable. Surgeon experience, type of surgery, and age were independent variables. Multivariable statistical analysis was subsequently performed on variables that were statistically significant. 1885 surgeries were reviewed. 629 (33.4%) were FLACS cases, and 1252 (66.4%) were normal phacoemulsification procedures. FLACS procedures had lower CDE as compared to conventional phacoemulsification (13.79 ±9.50 vs 15.39±20.70; p=0.024). Patients who had FLACS were notably younger than those undergoing normal phacoemulsification—69.86 ±7.84 and 71.88 ±23.71, respectively (P=0.038). Lower age and greater surgeon experience were associated with lower CDE (p= 0.001, p= 0.001). Multivariable analysis showed that, when age and surgeon were accounted for, there was no association between the type of surgery performed and phacoemulsification energy as determined by CDE (Table 1). In a large private practice setting with multiple surgeons, FLACS use was not associated with a difference in phacoemulsification energy. Individual surgeons may experience less phacoemulsification with FLACS, potentially related to surgical technique.

P.32 2:35 p.m.

QUALITY INITIATIVE PROJECT TO ASSESS COMPLIANCE WITH NEONATAL PACKED RED BLOOD CELL TRANSFUSION GUIDELINES POST-IMPLEMENTATION IN THE NEWBORN INTENSIVE CARE UNIT. Jacqueline Krevitz*, Sripriya Sundararajan[1], and Alexandre D. Medina[2], [1] Neonatal Intensive Care Unit, [2]Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD.

Packed red blood cells (pRBCs) are critical for survival, and often administered to neonates in the neonatal intensive care unit (NICU) for anemia of prematurity or hypovolemia from blood loss. However, excessive pRBC transfusions has been associated with morbidities such as retinopathy of prematurity, necrotizing enterocolitis, and chronic lung disease of prematurity. In January 2017, pRBC transfusion guidelines were implemented in an effort to reduce the number of pRBC transfusions to neonates at the University of Maryland Medical Center NICU. The objective of this project was to measure compliance of these guidelines post-implementation by the NICU staff, including both resident and the neonatal nurse practitioner (NNP) team members. We hypothesized that there would be less than 75% compliance and that the resident team would have higher compliance than the NNP team. As per the guidelines, three parameters including hematocrit, fraction of inspired oxygen, and respiratory support were used to determine pRBC requirement. An audit of pRBC administration in the NICU between January 1 and June 30, 2017 was performed from electronic medical records. Transfusion data from 63 eligible neonates recorded from EPIC was then compared to the indications for established pRBC transfusion guidelines. Statistical analyses, including chi-square and t-test, were performed to determine compliance to the guidelines for the different subsets of the NICU staff. Preliminary results show overall compliance of 84% with higher compliance in resident compared to NNP team (90% vs. 78%, p=0.03). 56% of the NICU staff ordered 15ml/kg of pRBC volume and 33% of the NICU staff administered lasix post-

pRBC transfusion. Despite high compliance with the distributed guidelines, the blood transfusion order set was incompletely filled at the time of transfusion order in EPIC (1%). An EPIC pRBC transfusion scorecard is currently being generated to ensure proper documentation of the transfusion indication.

P.33 2:35 p.m.

ASSOCIATION OF RED BLOOD CELL TRANSFUSION AND SEVERITY OF CHRONIC LUNG DISEASE OF PREMATURITY IN VERY LOW BIRTHWEIGHT INFANTS. Vivien Xie*, Alexandre Medina de Jesus[1], Kelly Tracey[2], and Sripriya Sundararajan[2], [2]Division of Neonatology, [1]Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD.

Very low birthweight (VLBW) infants are premature infants weighing <1500g with underdeveloped lungs, and they receive multiple red blood cell transfusions (RBCT) due to anemia of prematurity. The structural and biochemical immaturity of the lung predisposes them to receiving supplemental oxygen (O2) and mechanical ventilation. Overventilation is a major adverse effect and can lead to a multifactorial condition known as chronic lung disease of prematurity, or bronchopulmonary dysplasia (BPD). BPD is associated with prolonged NICU hospital days, neurodevelopmental delay, multiple RBCTs, and increased risk of pulmonary dysfunction as an adult. We hypothesized that RBCT modulates the risk of development of BPD in VLBW infants by impacting respiratory requirements. A retrospective chart review of 290 VLBW neonates admitted to the University of Maryland Medical Center NICU between 1/01/2015 and 12/31/2016 was performed. The frequency and timing of RBCTs during their hospital course was recorded and severity of BPD (NICHD consensus definition) was determined. Statistical analyses included t-tests and multivariate logistic regression. Of the 231 neonates who met inclusion criteria, following adjustment for risk factors and comorbid illnesses associated with prematurity, RBCT was significantly associated with development of moderate-severe BPD with adjusted odds ratio of 1.2 (95%CI, 1.064-1.497; p=0.008). We then compared the effects of RBCT on the respiratory variables of supplemental O2 and positive pressure ventilation (PPV). Variable association was found between RBCT and changes in supplemental oxygen administration in infants with and without BPD. Number of RBCT was not predictive of number of days spent on PPV in infants with BPD. Despite establishing previous reports of association of BPD with RBCT, our study did not establish association of RBCT with PPV, a reliable proxy for lung disease severity. Additional research on the mechanism of BPD besides cautious approach to RBCT is warranted in VLBW infants.

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.34 4:15 p.m.

BEYOND ENTRY AND EXIT: INFECTION PREVENTION AT THE BEDSIDE. Jennifer Woodard*, Surbhi Leekha[1], Sarah Jackson[2], and Kerri Thom[1], [1]Department of Epidemiology and Public Health, University of Maryland School of Medicine and [2]Department of Epidemiology and Public Health, University of Maryland Graduate School, Baltimore, MD.

Hand hygiene (HH) is essential to infection prevention. HH compliance has largely focused on room entry and exit. However, several opportunities occur during patient care at the bedside where compliance is less known. In this study we aimed to assess compliance and healthcare worker (HCW) knowledge and attitudes regarding the WHO 5 moments for HH. We performed a point prevalence survey of HCWs providing care in the medical, surgical, and cardiac surgical intensive care units (ICU) from July to August 2016 utilizing a modified WHO HH observation form. A 26-question electronic survey assessing knowledge, opinions, and barriers to HH was distributed to

HCWs. Subsequently, a subgroup of 13 HCWs were recruited to participate in a modified Delphi approach to assess the WHO 5 moments in terms of priority. We observed 104 unique HCW-patient interactions and identified 302 opportunities for HH at the bedside (2.9 opportunities per interaction). HH was appropriately performed at 106 (35%) opportunities. Compliance was similar for opportunities with patients on contact precautions (56/160, 35%) and those not on contact precautions (50/142, 35%). Compliance by moment was as follows: 37% (25/68) before patient contact, 9% (6/70) before a clean procedure, 5% (1/22) after body fluid exposure, 63% (55/88) after patient contact and 35% (19/54) after contact with patient surroundings. HH compliance at entry and exit for the same time period was 90% (167/185). 218 HCWs completed the survey; 181 (83%) reported ever receiving HH education, and 129 (59%) reported receiving education in the past year. 63 (29%) said they were familiar with the WHO 5 moments, but only 13 (21%) were able to recall all 5 moments. In the Delphi group, 46% (6/13) ranked "before clean/aseptic procedure" as the most important moment to prevent infection. The least important moment for infection prevention, according to 86% (11/13) of the group, was "after touching patient surroundings." We found that there were frequent opportunities for HH in the ICU, but proper HH was rarely performed. Lack of recognition of HH opportunities at the bedside may contribute to lower compliance when these opportunities occur.

This research was supported by the QIPS Council.

P.35 4:15 p.m.

SICKLE CELL PATIENT EDUCATION: ASSESSMENT OF THE EMMI ELECTRONIC TEACHING MODULE. Tammie Tam*, Lewis Hsu[1], and Jennie Law[2], [1]Division of Hematology and Oncology, Department of Pediatrics, University of Illinois at Chicago School of Medicine, Chicago, IL and [2]Division of Hematology and Oncology, Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

In recent studies, patients with sickle cell disease (SCD) report lack of involvement in decisions regarding their own health, poor communication with healthcare professionals, as well as inadequate access to ambulatory care. Given gaps in the knowledge and comfort level of healthcare providers who care for patients with SCD, there is a clear imperative to improve patient health literacy and enhance patient confidence in self-care. To meet these needs, an interactive electronic teaching module for SCD was developed with input from physicians and patients. It includes information about how self-care can help decrease emergency department usage and mitigate triggers of vaso-occlusive pain crisis, as well as strategies for patients to manage their pain at home with both pharmacologic and nonpharmacologic measures. However, the module has not been validated. This pilot study aims to determine whether patients with SCD can improve their baseline knowledge regarding self-management of sickle cell pain via this electronic teaching module, as measured by improvement from pre-module to post-module sickle cell disease pain management knowledge based questionnaire. An additional aim is to assess whether the module is well-received by study participants using a post-module survey. The study was approved by IRB. We enrolled 17 adults with SCD in clinic at baseline. Study participants completed a Surveymonkey knowledge-based questionnaire before and after watching the Emmi electronic teaching module and a post-module electronic survey. Scores on the knowledge-based questionnaires showed a significant average increase of 5 points, or a 16% increase (paired t-test ($n=16$) = 6.37, $p < .001$). The post-module survey results indicated that the module is well-received by approximately 59% of participants and 88% of participants reported that they learned from the module. The interactive module with questionnaires usually took an hour to complete. Limitations to this pilot study include small population size due to eligibility criteria and single institution. This study has the potential to provide

an immediate impact in health literacy for an underserved patient population and in turn possibly improve disease specific outcomes.

This research had no financial backing from Emmi Solutions. Emmi Solutions did provide in-kind assistance with access to the module and the development of the questionnaire and survey. 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.36 4:15 p.m.

EFFECT OF GUIDELINE IMPLEMENTATION ON THE CARE OF PATIENTS WITH SICKLE CELL DISEASE VASO-OCCLUSIVE CRISIS. Katherine Tran*, Thomas del Ninno[1], Maria R Baer[2], Jennie Law[3], and Gentry Wilkerson[4], [1]Department of Emergency Medicine, University of Maryland Medical Center and [2]Department of Hematologic Malignancies, [3]Department of Hematology and Medical Oncology, and [4]Department of Emergency Medicine, University of Maryland School of Medicine, Baltimore, MD.

A frequent complication of sickle cell disease (SCD) is vaso-occlusive crisis (VOC), the cardinal symptom of which is severe pain requiring intensive analgesic therapy. Because of the complex pain medication requirements, these crises are often managed poorly by medical care providers. VOC in patients with SCD account for more than 200,000 emergency department (ED) visits each year in the United States creating a large economic burden. Our goal was to evaluate the quality of care provided to SCD patients experiencing a VOC before and after implementation of an accepted care guideline in the ED. This guideline was the first comprehensive protocol-driven approach to SCD VOC management in the ED at the University of Maryland Medical Center. The clinical care guideline was largely focused on the timing of analgesic administration. De-identified patient metrics and medical record data for adults presenting to the ED with an acute VOC in the 6 months prior to implementation of the care guideline and the 6 months following its implementation were collected retrospectively. The primary outcome of interest was hospital admission. Secondary outcomes were time from ED registration to first dose of analgesic and time between doses of analgesics. In the 6 months before guideline implementation, 56 unique patients made 183 visits to the ED. In the subsequent 6 months, 57 unique patients accounted for 198 visits. Their rates of admission did not differ significantly (43.7% vs 48.5% [P=0.36]). Although there was a trend toward shorter time from the first to the second dose of analgesic, the difference was not statistically significant. The percentage of patients meeting the guideline recommendation to receive a first dose of analgesic pain medication within 60 minutes also did not differ significantly before or after implementation of the guideline (38% vs 39% respectively) suggesting that the guideline was not used a majority of the time. More education on the care of patients with SCD in the ED is needed to encourage use of the clinical care guideline before we can determine if it will change outcomes for patients seen in the ED with SCD VOC.

P.37 4:15 p.m.

INCIDENCE OF INFANT CAR SEAT CHALLENGE FAILURE AMONG INFANTS WHO WERE NOT PRETERM OR LOW BIRTH WEIGHT. Katherine Billings*, MaryBrooke Burval*, and Natalie Davis, Division of Neonatology, Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD.

The Infant Car Seat Challenge (ICSC) was developed to screen for infants who may experience hypoxia or bradycardia in a car seat; these may indicate or contribute to multiple negative outcomes. The American Academy of Pediatrics recommends ICSC testing prior to discharge for premature (<37 weeks gestational age, GA) and low birth weight (LBW, <2.5kg) infants; however, many hospitals screen other groups of neonates. Although data exist for ICSC failure incidence in

premature (~5-25%) and LBW (~5%) infants, data on failure incidence in other groups tested are limited. This study evaluates ICSC failure incidence and risk factors in subjects who are neither preterm nor LBW through a retrospective medical record review of neonates born in 2013-2014 at the University of Maryland Medical Center (UMMC). Inclusion criteria were: ≥37 weeks GA, born ≥2.5kg, and survival to discharge. Exclusion criteria were: family declined ICSC or patient transfer prior to discharge from UMMC. This study compared demographic and clinical characteristics between subjects who did and did not undergo ICSC and between those who failed vs. passed the initial ICSC. Analysis was conducted using T-test, Fisher Exact, Chi-square, and nonparametric Wilcoxon Rank Sum testing methods. Between 2013 and 2014, 2528 neonates were born ≥37 weeks GA and ≥2.5kg. Of these, 127 (5%) underwent ICSC testing. Infants tested were significantly more likely ($p<.001$) to be diagnosed with hypoxic ischemic encephalopathy, require positive pressure ventilation (PPV) during resuscitation, be treated with respiratory support, be small for gestational age (SGA), and be initially admitted to the NICU. Of those tested, 5.5% failed (n=7). Those who failed were significantly less likely to have required PPV during initial resuscitation ($p=0.04$) and were more likely to be SGA ($p=0.04$). This is the first study to assess incidence of ICSC testing in full term, non-LBW infants. It found a similar incidence of failure in this cohort as has been previously reported in LBW and preterm infants. Additionally, it identified clinical variables that predicted ICSC testing in neonates, though few of those were predictors of ICSC failure.

P.38 4:15 p.m.

INTERVENTIONS AFTER FAILURE OF THE INFANT CAR SEAT CHALLENGE. Savannah Cheo* and Natalie Davis, Division of Neonatology, Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD.

Infants born premature (<37 weeks gestational age, GA) and low birth weight (<2.5kg, LBW) are at significant risk of breathing difficulties when placed in their car safety seat. The infant car seat challenge (ICSC), or period of observation in a car safety seat before discharge to monitor for episodes of apnea, bradycardia and desaturation, is one of the most common tests performed on preterm neonates in the United States. However, minimal evidence exists to guide clinicians in performance of this test. Our objective was to perform a survey to identify which inclusion criteria, failure criteria, and most importantly what follow up is occurring after failed ICSCs in Neonatal Intensive Care Units (NICUs) across the nation. We performed a telephone survey of randomly selected Level II and III NICUs including academic and community centers representing each region of the US. We obtained information on whether they perform ICSCs, whether they have an official protocol, inclusion criteria, failure criteria, and follow up of failed ICSC including repeat testing and discharge in a car bed. We attempted to contact 237 NICUs, of whom 47% were academic centers. We obtained data on ICSC from 168 centers (71%). Of these, 164 did perform some form of ICSC. The most common failure criteria was "oxygen saturation less than 90% for longer than 10 seconds, heart rate below 80 beats per minute for longer than 10 seconds, or apnea longer than 20 seconds." As for testing duration, a minimum of 90 minutes was set for 85% of responders, a minimum of 60 minutes for 10%, and minimum of 30 minutes for 2%. We found that after failure, 97% perform repeat testing and 75% discharge home in car beds. Of those that use car beds, 76% require testing in the car bed prior to discharge. This is the first study of its kind to look at a national sample to determine follow up after failure of the ICSC. There is a significant lack of standardization in testing protocols and what interventions should be applied post-failure. We hope to identify these discrepancies and fill the knowledge gap concerning how the ICSC is being implemented across the country.

P.39 4:15 p.m.

EFFECTS OF LONG-TERM CAFFEINE CONSUMPTION ON AUTOSOMAL DOMINANT POLYCYSTIC KIDNEY DISEASE SEVERITY. Huanwen Chen*, Terry Watnick, and Stephen Seliger, Division of Nephrology, Department of Medicine, University of Maryland School of Medicine, Baltimore, MD.

Autosomal Dominant Polycystic Kidney Disease (ADPKD) is the most common genetically inherited kidney disease, and accounts for approximately 5% of all ESRD patients in the United States. While there is no specific treatment for ADPKD, nephrologists widely recommend patients reduce caffeine intake based on cell and animal studies showing that caffeine can accelerate disease progression. However, the effect of long-term caffeine consumption on ADPKD severity in humans is uncertain. Especially in light of recent large clinical studies showing that moderate caffeine intake is associated with lower mortality and cardiovascular disease, the relationship between caffeine and ADPKD must be elucidated in order for nephrologists to optimize their recommendations. In this study, we evaluated 122 ADPKD patients with eGFR>15 ml/min/1.73m2 for disease severity (as defined by total kidney volume [TKV] on MRI and estimated glomerular filtration rate [eGFR]), and collected information on their habitual and long-term caffeine (caffeinated tea or coffee) consumption. 60% of participants were women, the mean ± SD for age was 46 ± 14, eGFR was 67 ± 32, and 79% were diagnosed with hypertension. Among long-term caffeine consumers (defined as ≥10 "cup-years"; N=64 [57%]) neither TKV nor eGFR was significantly different compared to patients without long-term caffeine consumption ($p>0.05$ for both). Furthermore, in multiple linear regression models, we found that neither long-term caffeine consumption nor cup-years were associated with TKV or eGFR when adjusting for demographic data, blood pressure, and history of hypertension ($p>0.05$ for both). In short, we did not find any significant relationships between long-term caffeine consumption and ADPKD severity. This finding questions whether current clinical practice is optimal and appropriate, and awaits further validation.

This study was funded by the NIDDK-sponsored Baltimore Polycystic Kidney Disease Research and Clinical Core Center (P30DK090868).

P.40 4:15 p.m.

GENDER DIFFERENCES IN THE FUNCTIONAL RECOVERY TRAJECTORY POST HIP-FRACTURE AND ITS VARIABILITY BASED ON PATIENT BMI AT THE TIME OF INJURY. Owen Lee Park*, Denise Orwig, Erik Barr, and Jay Magaziner, Department of Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, MD.

While body mass index (BMI) is a risk factor for hip fracture, it is unknown whether there is an association between BMI and functional recovery. This study aimed to examine the gender difference in functional recovery over 6 months post-hip fracture and identify whether BMI differentially influences functional recovery for men and women. We hypothesized that (1) women will recover faster and more fully after hip fracture, that (2) recovery trajectory will be better, irrespective of BMI, for women than men, and that (3) those with low or high BMI will recover less than those with medium level BMI, irrespective of gender. This is a retrospective data analysis (n=263; 131 F: 132 M) using the Baltimore Hip Studies 7th cohort that enrolled patients from 8 acute care medical centers, with equal numbers of male and female hip fracture patients. Functional recovery was captured by the Short Physical Performance Battery (SPPB) score and gait speed at 2 and 6 months post hip fracture. BMI was used both as a continuous and categorical variable. Covariates included pre-fracture lower extremity activities of daily living, age and Charlson Comorbidity Index. Cross-sectional data was analyzed using the Pearson correlation coefficient and linear regression. Longitudinal data was analyzed using Generalized Estimating Equations (GEE).

Cross-sectional analyses showed that the correlation between continuous BMI and functional outcomes was non-significant in both sex strata and at both follow-up time points. There was also a non-significant association of categorical BMI and gait speed and SPPB score. Our longitudinal analysis showed no significant difference between functional recovery trajectories by BMI category. However, in all of our models, there was the trend for the obese group consistently having the lowest performance scores, and both genders improving over time regardless of BMI. We concluded that BMI does not seem to differentially affect the recovery trajectories for male and female hip fracture patients.

This work was supported by grants from the National Institute on Aging (R37 AG09901 MERIT Award, R01 AG029315, T32 AG00262, P30 AG028747), and from The Summer Program in Obesity, Diabetes and Nutrition Research Training (SPORT) Grant under NIH award number T35DK095737.

P.41 4:15 p.m.

ADMISSION HYPERGLYCEMIA AS A RISK FACTOR FOR SURGICAL SITE INFECTION IN ORTHOPAEDIC TRAUMA. Braden Anderson* and Justin Richards, Division of Trauma Anesthesiology, Department of Anesthesiology, University of Maryland School of Medicine, Baltimore, MD.

The association between hyperglycemia at admission and adverse infectious outcomes has not been carefully examined in orthopaedic surgery. Our objective was to examine the relationship between admission blood glucose values ≥200 mg/dL and 90-day surgical site infection rates in orthopaedic trauma patients without a history of diabetes. Records of patients requiring acute operative management for orthopaedic injuries at a single academic tertiary care trauma center from 2006 to 2015 were reviewed. Patients with a deep surgical site infection were recorded. A convenience sample (in a 2:1 ratio) of non-infected patients with operative orthopaedic injuries served as the control group. Patients were excluded if they had a history of diabetes, a history of corticosteroid use, or admission to the intensive care unit. Admission blood glucose values, as defined by the first available value upon admission, were recorded for all patients. Hyperglycemia was defined as admission blood glucose ≥200 mg/dL. The primary outcome event was 90-day deep surgical site infection. The association of deep surgical site infection with demographics, region of fracture injury, and necessity of flap coverage for tissue damage was assessed by univariate analysis. A multivariable logistic regression model was used to calculate the odds ratio for the risk of surgical site infection in patients with admission hyperglycemia after controlling for other significant confounding variables. The odds ratios were reported with 95% confidence intervals and a p-value of < 0.05. Admission blood glucose levels ≥200 mg/dL were a significant independent risk factor for 90-day surgical site infection in orthopaedic trauma patients without a history of diabetes. Admission glucose values may therefore serve as an important risk factor for infection in orthopaedic trauma patients without a history of diabetes who are not admitted to the ICU.

P.42 4:15 p.m.

MAGNETIC RESONANCE IMAGING CHARACTERIZATION AND CLINICAL OUTCOMES AFTER CARTIFORM ALLOGRAFT TRANSPLANTATION AS A PRIMARY REPARATIVE TREATMENT FOR KNEE CARTILAGE INJURIES. Michelle Moore*, Craig Bennett[1], Vidushan Nadarajah[2], and Ralph F. Henn III[2], [1]Division of Sports Medicine, [2]Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

Currently, there is no uniform consensus regarding the most appropriate surgical treatment for grade 3 and grade 4 articular cartilage defects of the knee. Two options include autograft or allograft articular cartilage implants, but there is minimal prospective data regarding clinical outcomes

following this procedure. This prospective study of 10 patients aims to assess the clinical outcomes of Cartiform® viable osteochondral allograft implantation for the treatment of grade 3 and grade 4 articular cartilage defects in the knee. We hypothesize that Cartiform® implantation in this patient population will improve cartilage integrity and lead to improved functional status. Inclusion criteria included patients between the ages of 18 to 65 years who had Cartiform® implantation performed by a senior orthopaedic surgeon at the University of Maryland Rehabilitation and Orthopaedic institute. All patients completed four Patient Reported Outcome surveys (KOOS, VR-12, IKDC subjective, and WOMAC) to obtain data on pain, quality of life, physical function, return to activity, and activities of daily living. Each patient underwent T2 mapping MRIs at a post-operative period of 2 years to assess cartilage integrity. MRI data will be analyzed using the MRI Osteoarthritis Knee Score (MOAKS) and the Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) scoring systems. The outcome measures showed increased functional scores with respect to activities of daily living, but showed lower functional scores with respect to sports and recreation. All patients returned to their normal daily activities, but only 4 out of 10 returned to running and/or sports. Once the MOAKS and MOCART scoring is complete, we will determine correlation between the clinical outcome scores and MRI scores. The literature shows a weak to moderate correlation between MRI scores and clinical functional scores following autologous chondrocyte implantation (ACI), microfracture, and osteochondral autograft transfer system (OATS).

This study is funded by Arthrex, Inc. All data collected for this study will be shared with Arthrex, Inc. The data shared will be in either aggregate or deidentified form, as is standard practice.

P.43 4:15 p.m.

ESTABLISHMENT OF NORMAL RANGES OF UPPER EXTREMITY LENGTH AND CIRCUMFERENCE IN THE PEDIATRIC POPULATION. Alexandra Laps*, Tyler Edmond[1], and Joshua Abzug[2], [2]Division of Pediatrics, Department of Orthopaedics, [1]University of Maryland School of Medicine, Baltimore, MD.

Upper extremity length and circumference abnormalities are present in a number of conditions in the pediatric population such as Marfan syndrome, mesomelia and hypochondroplasia. In most cases, upper limb hypoplasia and hypertrophy are diagnosed when one limb appears significantly different from the other upon physical exam. However, when this discrepancy exists it can be difficult to determine which limb needs to be corrected. Furthermore, when both limbs are identical, the diagnosis of upper limb hypoplasia and hypertrophy becomes much more difficult due to the lack of normative values for upper extremity length, circumference and rate of growth in the pediatric population. The goal of the present study is to establish normal values for upper extremity length, circumference and rate of growth in children ages 0-17. In order to accomplish this, four measurements were taken on each arm including: the length of the upper arm measured from the tip of the acromion to the elbow flexion crease, the circumference of the upper arm measured at 5 or 10 cm proximal to the elbow flexion crease depending on the size of the patient (aiming for the middle of the upper arm), the length of the forearm measured from the elbow flexion crease to the wrist flexion crease, and the circumference of the forearm measured at 5 or 10 cm distal to the elbow flexion crease depending on the size of the patient (aiming for the middle of the forearm). Data from pediatric patients and their siblings with no history of upper limb abnormalities or surgeries was collected, and average values for arm and forearm length and circumference were determined for each age between 0 and 17. Multivariable linear regression analysis was performed to generate a predictive model for both right and left arm and forearm length and circumference values, and a total of eight predictive equations were generated on the basis of height, weight, sex, and age. Multivariate correlation analyses generated pairwise comparisons that indicate a significant correlation (p-values < 0.0001) between each of the four measurements taken from the right and left

upper limbs. Thus, we have found that there is no significant difference between the right and left upper extremities in terms of arm length, arm circumference, forearm length, and forearm circumference. The establishment of normal values for upper extremity length and circumference will be a useful diagnostic tool for upper extremity hypoplasia and hypertrophy and allow future studies to determine the impact of this variable on the surgical and nonsurgical management of all upper extremity injuries and disease processes in the pediatric population.

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CLINICAL EVALUATION OF A MODIFIED TECHNIQUE FOR ANTERIOR CRUCIATE RECONSTRUCTION IN SKELETALLY IMMATURE YOUTHS. Aloise Diedrich*, Craig H. Bennett, Vidushan Nadarajah, Ian Bussey, and Raplh F. Henn, III, Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

Repair of the anterior cruciate ligament (ACL) in skeletally immature patients remains an area of continued investigation, as angular deformity and leg length discrepancy can result if the physes is disrupted during reconstruction. Outcomes on a physeal-sparing ACL reconstruction (ACLR), called the Anderson technique, have been described and reported in the literature. While this approach may prevent physeal related complications, it likely confers less durability than adult reconstructive techniques. The purpose of this study was to evaluate the clinical outcomes of ACLR using our modified Anderson technique that uses an increased vertical tunnel position more consistent with anatomic alignment. All 10 patients enrolled in the study had their ACLR between 2010 and 2016 (7 double-bundle, 3 single-bundle). Patients were evaluated for functional outcomes, graft survival, radiographic and clinical evidence of growth disturbance, and the need for additional procedures. The mean age at time of surgery was 11.7 years (range, 8-14 years; 3 females, 7 males). The mean follow-up duration was 2.1 years (range, 1.0-3.4 years). Overall, 3 knees (30%) underwent reoperation. Of these, 2 patients (20%) underwent revision ACL surgery 2.5 years postoperatively. The mean Pediatric International Knee Documentation Committee score was 95.47 $\pm$ 0.81, and the mean Lysholm score was 95.50 $\pm$ 3.32. The median pre-injury Tegner activity level was 8 (range, 6-10), and the median postoperative Tegner activity level was 8 (range, 6-10). Of the 8 knees that did not require revision ACL surgery, all had a normal Lachman test result, with a firm endpoint. Of the 8 knees, 5 had a normal pivot shift test. At follow-up, 70% had closed physes. There were no angular deformities or limb-length discrepancies. At a mean 2-year follow-up, the study findings confirmed excellent functional outcomes, a low ACL revision rate, and no growth disturbances. Patients returned to their preoperative activity level after reconstruction. This modified technique offers a safe and effective ACL reconstruction option in the skeletally immature patient.

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INVESTIGATION OF ROTATOR CUFF FATTY INFILTRATION IN A RABBIT INJURY MODEL. Ashley Klein*, Katherine Mistretta[1], Jim Lai[2], Ana Valenica[2], and Mohit Gilotra[2], [2]Department of Orthopaedics, [1]University of Maryland School of Medicine, Baltimore, MD.

Fatty infiltration (FI) of the rotator cuff muscle is often observed in patients with sizable and chronic rotator cuff tears (CRTs). This FI is thought to be irreversible and significantly compromises muscle plasticity and contraction strength, which leads to a poor surgical outcome and increase risk of re-tear. It is hypothesized that these adipocytes are derived from pluripotent stem cells, pre-existing adipocytes, or trans-differentiation of myoblasts. Current models use young animals which do not correlate with healing rates in elderly patients. CRTs in small rodents, as opposed to rabbits, lack sufficient muscle retraction to allow for a significant and consistent amount of FI in the absence of a neurotomy. We compared the tenogenic and neurogenic impact on FI by utilizing a rabbit model of CRT. Groups include aged/young supraspinatus/infraspinatus tenotomy,

young supraspinatus neurotomy, young tenotomy/neurotomy combo, aged repair tear, or sham control. Groups were euthanized at either 6, 12, or 18 weeks (repair) and outcomes included micro-CT of the shoulder, neuromuscular junction (NMJ) morphology, and histological analysis. There was no difference between young and aged animals across all outcome measures. Histological analysis of the muscles in all groups showed FI, which localized primarily to the perifascicular space. Fibrosis was determined by an increased area of collagen compared to control. Fibrosis was found in all experimental groups except for tenotomy 6 weeks and aged repair tear. The tenotomy groups and control do not show any significant difference in their NMJ morphology. This suggests that there is no subclinical neurologic injury in the tenotomy groups; thus, nerve injury may not be a requirement for FI. Although the neurotomy and combo groups show increased FI, transecting the nerve renders muscle function testing and NMJ morphology analysis useless. Additionally, aged rabbits are harder to work with due to medical problems, cost, and difficulty with procurement with no significant difference in outcomes compared to younger rabbits. The results of our study point to a young rabbit tenotomy as the most useful model to study CRTs.

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WOUND SURFACE AREA AS A RISK FACTOR FOR FLAP COMPLICATIONS AMONG PATIENTS WITH OPEN FRACTURES. Phelan Shea*, Sheila Sprague[1], Mohit Bhandari[2], Brad Petrisor[3], Kyle Jeray[4], and Raymond Pensy[5], [1]Department of Health Research Methods, Evidence and Impact, McMaster University and [2]Division of Orthopaedic Surgery, Department of Surgery and [3]Division of Orthopaedic Surgery, Department of Surgery, McMaster University School of Medicine, Hamilton, Ontario, Canada, [4]Department of Orthopaedics, Greenville Health System, Greenville, SC, and [5]Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, MD.

Soft tissue complications often dictate the success of limb salvage and the overall outcome of open fractures. Based on prior work at our institution, we hypothesize that wounds greater than 200cm2 are associated with a greater likelihood of both flap-related reoperation and wound complications among open fracture patients requiring soft tissue reconstruction with a rotational flap or free tissue transfer. To explore the association between wound size and the success of flap coverage, we conducted a secondary analysis on patients from the FLOW trial. All patients that required a rotational or free tissue flap for their open fracture were included in the analysis. Our primary outcome was flap-related reoperation within 12 months of injury, and the indications were restricted to surgeries for deep infection, wound dehiscence, or necrosis. Our secondary outcome was wound complication, which included events treated operatively or non-operatively (wound dehiscence, death of flap, necrosis, failure to close, expansion of wound, failed granulation, and infection). The primary predictor variable of interest was wound size, reported in square centimeters. Logistic regression was used to assess the association between wound size and the outcomes, adjusting for relevant covariates. Of 112 patients included in the analysis, the mean age was 44.2 years and the majority were male (78.6%). The median wound size was 29 cm2 (IQR: 9.25 – 120 cm2), with 22 patients (19.6%) of the sample having a wound greater than 200 cm2. 50.0% of the sample had free flaps, 48.2% had rotational flaps, and 1.4% were unrecorded. 17.0% of the patients required a flap-related reoperation. A wound size of greater than 200cm2 was not associated with reoperation in an unadjusted model ($p=0.64$) or when adjusting for Gustilo type ($p=0.69$). Patients with a wound size of greater than 200 cm2 were three times more likely to experience wound complications (Odds Ratio: 3.28, 95% CI 1.27-12.2, $p=0.02$) when adjusting for diabetes, wound

contamination, OR skin prep, OTA classification, wound closure in OR, and fracture severity. The findings of this study demonstrate that wound surface area is an integral risk factor for complications following soft tissue flap treatment, but found no association between wound surface area and flap-related reoperation rates. These data suggest surgeons can counsel patients that increasing wound size does not necessarily increase the risk of flap related reoperations, however, patients with larger wounds must be prepared for increased risk of wound complications.

P.47 4:15 p.m.

CORRELATING PERI-ICTAL MOOD SCORES WITH HIPPOCAMPAL VOLUMES IN PATIENTS WITH EPILEPSY. Shuna Gao*, Kaitlin Jeffries[1], Erin Lanzo[1], Kathryn Grimes[1], Scott Thompson[2], and Jennifer Hopp[3], [2]Department of Physiology and [3]Division of Epilepsy, Department of Neurology, [1]University of Maryland School of Medicine, Baltimore, MD.

Depression is the most common comorbid psychiatric disorder in patients with epilepsy and is often reported to significantly impact quality of life. The relationship between epilepsy and mood disorders is well known; however, few studies have explored the effect of seizures on mood during the peri-ictal period, the hours or days immediately preceding or following a seizure. We hypothesize that mood will improve following an epileptic seizure, similar to how electroconvulsive therapy induces seizure to treat depression. Depression has been found more frequently in patients with temporal lobe epilepsy (TLE), a subset of focal epilepsy with seizures often involving the hippocampus. Since the hippocampus is critical for mood regulation, we hypothesize that patients with TLE will have greater improvements in mood than patients with generalized onset epilepsy. TLE has also been associated with reductions in hippocampal volume. As such, we hypothesize that patients with epilepsy and small hippocampal volumes will have small or no improvements in mood following a seizure compared to those with normal volumes. Additionally, we hypothesize that comparing right and left hippocampal volume may suggest correlation between localization, seizure type, and subsequent mood changes. We enrolled patients admitted to the Epilepsy Monitoring Unit for 24/7 video EEG monitoring. 3 validated mood questionnaires were administered upon enrollment and again at 4 different time points following a seizure. Hippocampal volumes were measured from clinical MRIs using the Freesurfer program. 113 patients have been enrolled so far. Patients with focal onset seizures have shown the greatest improvement in depression and anxiety following a seizure. Hippocampal volumes of 8 patients have been analyzed. In TLE patients, hippocampal volume loss is associated with higher levels of anxiety and less improvement in mood following seizures compared to patients with larger hippocampi. Analysis of additional patients will continue to further power the study. Selection of an alternative processing software is also ongoing to facilitate improved quantification of hippocampal volumes.

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.48 4:15 p.m.

QUALITY OF CARE FOR PATIENTS WITH TRANSIENT ISCHEMIC ATTACKS AT THE UNIVERSITY OF MARYLAND MEDICAL CENTER: ARE WE DOING BETTER? Jessica Park*, Carolyn Cronin, and Michael Phipps, Division of Stroke, Department of Neurology University of Maryland School of Medicine, Baltimore, MD.

Transient ischemic attack (TIA) is a temporary blockage of blood flow to part of the brain. It does not cause permanent deficit, and therefore is frequently not considered a serious situation. However, a significant portion of TIA patients go on to have ischemic stroke in the near future and should therefore be evaluated and treated the same as patients with minor stroke and continued deficits. For this reason, the American Heart Association and American Stroke Association

established guidelines for rapid TIA evaluation and treatment. The literature offers limited data about how well these guidelines are followed, and we feel it is important to review any gap in our care between what is recommended and what is being implemented. The preliminary research on TIA evaluation at the University of Maryland Medical Center (UMMC), a comprehensive stroke center with full-time vascular neurology service, found that 13% of TIA patients had defective care with opportunities for improvement from June 2011 to June 2013. Since the finding, stroke/TIA discharge template has been created to provide more guideline-concordant TIA care at UMMC. For this project, I performed a retrospective chart review of TIA patients from January 2016 to June 2017. The results showed that 6% of TIA patients received defective care with missed opportunities, which reflects a marked reduction in lack of adherence to the guidelines by more than half. However, this difference was not statistically significant ($p=0.186$). The areas of non-compliance with the guidelines were carotid vessel imaging and obtaining LDL value in consideration for statin therapy. One patient was a consult in which primary team recommended but did not order carotid vessel imaging. Two patients did not get LDL measured although they were still recommended to take statin. The greatest improvement in TIA care was observed in prescribing statin at discharge ($p=0.064$). We conclude that implementing stroke/TIA discharge template at UMMC enhanced the quality of care for patients with TIA, but there are still opportunities for improvement in terms of ordering lipid panel and carotid vessel imaging.

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.