

AUGUSTA UNIVERSITY
MEDICAL
PARTNERSHIP
UNIVERSITY OF GEORGIA

*Medical Partnership
Student & Resident
Research Symposium*



September 20, 2017

UGA Health Sciences Campus
Russell Hall

*Welcome to the seventh annual
AU/UGA Medical Partnership Research Symposium!*

This event is an opportunity to showcase the activities of our students during the summer between the first and second years of their medical studies. Students were encouraged to engage in a scholarly activity which could include laboratory science, clinical, or other research. Students more interested in a participatory clinical experience were encouraged to also engage in “inquisitive observation and reflection” in order to derive a more complete understanding of the health problems within the context of the greater community. This is also an opportunity for Internal Medicine residents from the Medical Partnership and Piedmont Athens Regional to present their research work.

The posters represent the results of the students’ and residents’ endeavors. We are grateful to all of the faculty members at AU, UGA, and other institutions, who have mentored the students, and to the community clinicians, both in Athens and elsewhere, who have shared their expertise and provided the clinical settings to learn both the art and science of doctoring.

Michelle G. Nuss MD

Michelle A. Nuss, MD
Campus Dean

Research Poster Abstracts

Poster No.	Student	Poster No.	Residency Programs
1	Yasmine Alkhalid	29	Brian Brewer, MD
2	Nicholas Austin	30	Heather Brody, MD
3	John Collar	31	Miguel Carmona Pires, MD
4	Benjamin Daniel	32	Seth Courson, DO
5	Zach Dattilo	33	Zachary Di Iulio, MD
6	Kenneth Hearn	34	Narayana Gowda, MD
7	Lacy Heberlig	35	Amit Koduri, MD
8	Kathleen Herring	36	Tenzing Phanthok, MD
9	Naser Ibrahim	37	Leah Reid, MD
10	Riley Jay	38	Aliya Safwan, MD
11	Jason Jeong	39	Meet Shah, MD
12	Chan Lee	40	Rida Younus, MD
13	Jiaqi Mi		
14	Silki Modi		
15	Nzota Nsona		
16	John Parker		
17	Arishna Patel		
18	Sanam Patel		
19	Tyler Quinet		
20	Kyle Royalty		
21	Matt Schwartz		
22	Michael Scott		
23	Navdeep Singh		
24	Sabina Sorondo		
25	Julia Stephens		
26	Harini Vakamudo		
27	Richard Yi		
13	Alisa Zezetko		
28	Jimmy Zhou		

The Meningioma Vascularity Index: A Volumetric Analysis of Flow Voids to Predict Successful Embolization

Yasmine Alkhalid^{1,2}, Carlito Lagman³, Vera Ong³, Thien Nguyen^{3,7}, John P. Sheppard^{3,7}, Prasanth Romiyo³, Daniel Azzam³, Giyarpuram N. Prashant³, Isaac Yang^{3,9}

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA; Departments of ³Neurosurgery, ⁴Radiation Oncology, ⁵Head and Neck Surgery, ⁶Pathology, and the ⁷UCLA Jonsson Comprehensive Cancer Center, Ronald Reagan UCLA Medical Center, Los Angeles, CA; Department of ⁸Neurosurgery and the ⁹Los Angeles Biomedical Research Institute (LA BioMed) at Harbor-UCLA Medical Center, Torrance, CA

BACKGROUND: Meningiomas that appear hypervascular on neuroimaging may be amenable to preoperative embolization. However, methods for measuring hypervascularity have not been described nor has the predictive value of hypervascularity been assessed.

OBJECTIVE: To investigate flow void volume as a predictor of successful embolization.

METHODS: We performed volumetric analysis of 51 intracranial meningiomas (21 preoperatively embolized) resected at our institution. Through the use of an image segmentation software and voxel-based segmentation method, we measured volumes of flow voids on T2-weighted magnetic resonance images. We named this the meningioma vascularity index (MVI). The primary outcome was a successful embolization procedure. We also analyzed operative time, intraoperative blood loss, Simpson grade, and the need for blood transfusion.

RESULTS: The MVI was correlated with successful embolization (rpb= 0.35, P = .01), intraoperative blood loss (r = 0.29, P = .04), and perioperative blood transfusion (rpb= 0.36, P = .009). An MVI greater than or equal to 2.5 cc was a significant predictor of successful embolization (odds ratio [OR] 4.00, 95% confidence interval [CI] 1.01-15.78) and subtotal resection (OR 7.64, 95% CI 1.74-33.58), and these remained significant after controlling for tumor volume (OR 12.85, 95% CI 1.47-112.31 and OR 7.64, 95% CI 1.74, 33.58, respectively).

CONCLUSION: We report a method of predicting successful embolization using volumetric analysis of flow voids on standard magnetic resonance imaging sequences. This information could help neurosurgeons and interventional radiologists better understand the likelihood of a successful embolization procedure and could also be useful when counseling patients.

Infektive Endokarditis at Piedmont Athens Regional: A Case Series

Nicholas Austin^{1,2}, Jonathan Murrow²⁻⁴

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA; ³Piedmont Athens Regional, Athens, GA; ⁴Department of Medicine, Medical College of Georgia, Augusta University, Augusta, GA

BACKGROUND: Infektive Endokarditis (IE) is a low incidence, high mortality disease which can be caused by a variety of micro-organisms and can affect natural or prosthetic valves. Given the complexity of diagnosing IE, and the necessity of a quick diagnosis, a robust description of risk factors, clinical manifestations, and outcomes is important. To date, such a description does not exist for IE treated at Piedmont Athens Regional (PAR) Hospital.

METHODS: In this 5-year chart review, 28 charts met inclusion criteria and relevant documents within them were reviewed. Excel 2016 and IBM's SPSS statistics software used to generate p-values. Unpaired, two-tailed student's T-test, Fischer's Exact Test, One Sample T-test, and One-sample Binomial Proportion Tests were selected as appropriate.

RESULTS/DISCUSSION: Patients were, on average, younger than expected. The most common findings were vague, a fever and heart murmur, and these occurred less frequently than in literature. TTE's and TEE's were typically performed in sequence and were performed promptly after admission. Vegetations were found on echo less often in PAR patients compared to the literature. Microbiology, surgical rates, and in-hospital mortality did not differ between PAR and the literature. Valve involvement was not significantly different between NVE and PVE groups. PVE patients had shorter symptom histories, although chest pain was also present more frequently in this group. They also had more risk factors, which could correlate with a higher index of suspicion among diagnosing physicians. Demographics, comorbidities, symptomology, and outcomes were consistent between NVE and PVE groups. In terms of overall outcomes, in-hospital mortality was only 3.57% and negative discharge status, which includes hospice transfer, was 7.14%.

CONCLUSION: Findings support an extremely high index of suspicion when evaluating possible IE, along with prompt diagnostic testing and cooperation among many specialties.

The Acceptable Hand

John Collar^{1,2}, James Clune³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA;

³Department of Plastic and Reconstructive Surgery, Yale School of Medicine, New Haven, CT

PURPOSE: Reconstruction of the traumatized hand can be difficult. Functionality is paramount when considering reconstructive goals. Often a cosmetically appealing hand is not the most useful. However, in some cases an aesthetic outcome may be achievable without sacrificing dexterity. Unfortunately, the most visually appealing hand after amputation has not been defined, thus making the job of maximizing both functional and aesthetic outcomes challenging.

METHODS: After review by the institutional review board, 303 participants were presented images of a normal hand that was digitally manipulated to simulate various single digit amputations. Participants ranked these images in order of most aesthetic (1) to least aesthetic (4). The images included amputations at the distal interphalangeal (DIP) joint, proximal interphalangeal (PIP) joint, metacarpophalangeal (MCP) joint, and ray amputation for each digit.

RESULTS: Amputation at the distal interphalangeal joint was the most favorable site of amputation in all digits. Ray amputation was the second most aesthetic, and overwhelmingly so in the middle and ring fingers.

CONCLUSIONS: The study demonstrates that every effort should be made to limit amputations of mangled digits to the distal joint if a functional finger can be expected. However, in more severe injuries, when a more proximal amputation is unavoidable, a cosmetic result can be achieved with a ray amputation rather than attempting to preserve the metacarpal phalangeal joint.

Preventable Pediatric Orthopedic Trauma: Are we making progress in reducing ATV and lawnmower injuries?

Benjamin Daniel^{1,2}, Jeff Martus³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, Georgia; ³Department of Pediatric Orthopedics, Vanderbilt University, Nashville, TN

Trauma is the primary cause of morbidity and mortality in children. Pediatric nonfatal injuries are also a considerable problem due to the potential for long-term disability. Of these injuries, a large portion is preventable. Two specific causes of preventable pediatric trauma are power lawn mowers and ATV's. Lawnmowers cause injuries ranging from burns to amputations, often stemming from reversing or running over unseen children. ATV's, on the other hand, are heavy vehicles capable of moving at fast speeds with frames that are inherently risky to children who are often not wearing helmets. In this study, the National Electronic Injury Surveillance System (NEISS) of the Consumer Product Safety Commission was queried to determine the trend of ATV and lawnmower annual injuries and injury rates in children and adolescents aged 1 month through 17 years from 1991 to 2016. The results were normalized for changes in the pediatric population size. Then an unpaired t-test was performed to compare two thirteen-year periods: 1991-2003 and 2004-2016. For lawnmower injuries, from 1991 to 2003 the average rate of injuries was 13.3 per 100,000 and this declined from 2004 to 2016 to 8.9 per 100,000 ($p < 0.0001$). In contrast, when compared over the same time periods, the average annual rate of pediatric ATV injuries rose from 50.9 per 100,000 to 60.5 per 100,000 ($p = 0.05$). Lawnmower injuries are still a common occurrence despite their decline, and steps should be taken to implement more safety measures such as dead man switches. ATV injuries have not responded as expected to legislation, and new efforts should be made to reach out and educate riders such as education programs through hunter safety groups.

The Reliability of Left Heart Diastolic Function Evaluation by Echocardiography

Zachary Dattilo^{1,2}, Jonathan Murrow²⁻⁴

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, Georgia; ³Department of Medicine, Medical College of Georgia, Augusta University, Augusta, GA; ⁴Piedmont Athens Regional, Athens GA

INTRODUCTION: Left ventricle filling pressure (LVFP) is an important factor in diagnosing heart failure, grading the degree of dysfunction, and determining a course of treatment. Echocardiographic (echo) evaluation offers a potential fast and noninvasive alternative to the gold standard cardiac catheterization. The goal of this study was to test the validity of the current algorithms used to estimate LVFP via echo in comparison to left heart catheterization.

METHODS: Using the current guidelines of the American Society of Echocardiology for estimating LV diastolic function, all patients were evaluated at a single hospital during a span of one year ($n=317$) who underwent LVFP evaluation by left heart catheterization and echo within a span of three days. The agreement between the two tests for the total population and subgroups was determined using Cohen's Kappa. Regression analysis and Pearson correlation was used to compare each echocardiograph parameter to left ventricular end diastolic pressure (LVEDP).

RESULTS: Significant correlation was found between LVEDP and average E/e' for the whole population ($n=317$, $r=0.254$, $p<0.05$) and for all but one subcategory of patients (preserved ejection fraction, $n=217$). Agreement between the two tests was determined to be slight ($K=0.066$), but not statistically significant ($p=0.102$). Agreement in all subgroups was found to be slight ($0.2>K>0$) and not statistically significant ($p>0.05$).

DISCUSSION: Based on this study, echocardiograph evaluation does not reliably estimate LVFP well enough to completely replace interventional evaluation. Further studies will be performed to evaluate the agreement of these tests under stricter qualifications. Such qualifications could include performing the two procedures within a smaller time window, excluding patients with certain conditions that may alter recorded echo parameters, and eliminating inter-rater variability by including only patients evaluated by one doctor/team.

Breastfeeding Duration and Bone Health in Young Adult Females

Kenneth F Hearn^{1,2}, Emma M Laing³, Richard D Lewis³, Norman Pollock^{4,5}

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA; ³Department of Foods and Nutrition, University of Georgia, Athens, GA; ⁴Georgia Prevention Institute, Department of Population Health Sciences, and ⁵Department of Pediatrics, Medical College of Georgia, Augusta University, Augusta, GA

INTRODUCTION: Data on the relationship between breastfeeding and bone health are scant and equivocal. This study investigated the relationships between breastfeeding duration and indices of bone strength in young adult females.

METHODS: Bone mass, density, and geometry at trabecular and cortical sites of the tibia were measured in 71 white females (aged 21 ± 0.4 years) by using peripheral quantitative computed tomography. Breastfeeding duration was self-reported by each participant's biological mother. Fat-free soft tissue (FFST) and fat mass were measured using dual-energy X-ray absorptiometry. Relationships between breastfeeding duration and bone parameters was determined using multiple linear regression models, including height, FFST, and fat mass as covariates.

RESULTS: 20% of the participants reported not having been breastfed; 32% were breastfed 1-6 months; 24% were breastfed 6-12 months; and 24% were breastfed 12 months or longer. At the trabecular site of the tibia, breastfeeding duration was a positive independent predictor of total volumetric bone mineral density ($\beta = 0.28$, $p = 0.045$). Although breastfeeding duration was positively correlated to bone strength index (BSI; $r = 0.28$, $p = 0.03$), it was not an independent predictor of BSI in the regression model. At the cortical site, breastfeeding duration was a positive independent predictor of bone mineral content ($\beta = 0.24$, $p = 0.02$), cross-sectional area ($\beta = 0.23$, $p = 0.02$), and cortical thickness ($\beta = 0.36$, $p < 0.01$). There were no associations between breastfeeding duration and the other bone parameters.

CONCLUSION: Our results suggest that a greater duration of breastfeeding may have long-term benefits on cortical and trabecular bone. Given that our findings should be considered hypothesis generating, further studies are needed to elucidate the role of breastfeeding on bone development.

Effects of Muscle Length on Muscle Endurance

Lacy Heberlig^{1,2}, Julia Stephens^{1,2}, Kevin McCully³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, Georgia; ³Department of Kinesiology, University of Georgia, Athens, GA

PURPOSE: To measure oxygen saturation and muscle endurance of the vastus lateralis and gastrocnemius at two muscle lengths. Increased muscle length was hypothesized to decrease the oxygen saturation during stimulation and decrease muscle endurance.

METHODS: Six able-bodied individuals were tested in each muscle. A nine-minute endurance index test was conducted (3 minutes each at 2Hz, 4Hz, and 6Hz) in both the relaxed (knee at full extension, foot at 60°) and stretched (knee extension of 90°, foot at 90° dorsiflexion) position of each muscle. Endurance was measured with a triaxial accelerometer. Oxygen saturation was measured with near infrared spectroscopy (NIRS).

RESULTS: The endurance index was lower at 6Hz in the stretched gastrocnemius muscle ($61.4 \pm 20.29\%$) compared to the relaxed position ($82.9 \pm 23.9\%$), $P = 0.02$. Oxygen saturation was lower at 6 Hz in the stretched position of both the gastrocnemius ($41.9 \pm 12.5\%$ vs $66.5 \pm 9.2\%$ $p < .01$) and the vastus lateralis muscles ($51.5 \pm 15.7\%$ vs. $67.4 \pm 3.9\%$ $p = .01$)

CONCLUSIONS: Consistent with previous studies, stretched muscles had lower oxygen saturations during electrical stimulation. Muscle length significantly affects the endurance index of the vastus lateralis and gastrocnemius. The lower muscle endurance with stretch in this study suggests that the endurance index was sensitive to oxygen levels.

Current and Future Use of Mobile Health in Low-Income, Rural Populations

Kathleen Herring^{1,2}, Jonathan Murrow²⁻⁴

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, Georgia; ³Piedmont Athens Regional, Athens, GA; ⁴Department of Medicine, Medical College of Georgia, Augusta University, Augusta, GA

INTRODUCTION: Mobile Health and its potential role in chronic disease management in low income settings remains an underexplored area. A patient population must be open to the idea of using mobile health for it to be an effective intervention. Barriers to mobile health interventions include low ownership and minimal usage. The purpose of this study was to explore the feasibility and openness of a low-income, rural patient population to mobile health interventions.

METHODS: A survey was created using Qualtrics software based on a survey that assessed mobile health use in a patient population with congenital heart disease as well as a survey that assessed the use of mobile health in a low-income population screened for cancer. During a two-week period in July 2017, a medical student administered the survey on an iPad to 30 patients with their consent at the Community Care Clinic in Athens, Georgia. The clinic accepts all patients regardless of their insurance status and provides check-ups as well as chronic disease management. **RESULTS:** 96.67% of patients owned a cell-phone while 70% owned a smartphone. 90% of the patients used their phone to send and receive text messages, 86.67% used their phone to send and receive email, and 40% of the patients had health applications on their phone. In terms of their health behaviors a mean of 4.1 ± 1.4 on a Likert scale (1-5) of agreement was reported for downloading a mobile health application when recommended by a doctor. A mean of 4.1 ± 1.1 on Likert scale (1-5) of interest for receiving text messages from their doctor. Further results are in progress.

SUMMARY: Cell phone ownership is substantial in a low-income, rural patient population and will not be a barrier for mobile health intervention. Furthermore, patients expressed interest in mobile health interventions if their doctor recommended a certain application or the cellphone granted them access to more communication between their doctor through text messages.

Analytical Methods to Compare Cortical Signature of Deep Brain Stimulation

Naser Ibrahim^{1,2}, Vineet Tiruvadi³, Helen Mayberg³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, Georgia; ³Department of Psychiatry, Emory University School of Medicine, Atlanta, GA

OVERVIEW: Subcallosal cingulate white matter (SCCwm) has been identified clinically as optimal deep brain stimulation (DBS) location for treatment resistant depression (TRD) patients. ON target and OFF target locations were stimulated, and resulting cortical signatures compared to quantify change in brain state with therapeutic stimulation.

METHODS: Changes in alpha power spectral density (PSD) were recorded using a 256-channel EEG before and during ON target and OFF target stimulation. The distribution of alpha PSD changes for ON target and OFF target stimulation were compared using surrogate data and nonparametric testing methods. This approach, along with a model divergence analysis, was used to compare brain states at Turn On (initial DBS treatment) and 6 months following chronic stimulation.

MAIN RESULTS: Brain state EEG recordings demonstrate that precise SCCwm DBS alpha PSD changes are derived from a different probability distribution than OFF target stimulation PSD changes. Chronic 6-month stimulation of SCCwm also produces alpha PSD changes from a unique probability distribution when compared to distributions from Turn On stimulation.

IMPORTANCE: This preliminary study has future implications of development of increasingly sophisticated methods of comparing cortical signatures which can be used to better quantitatively analyze parameters of therapeutic DBS

Current Clinical Understanding of Rocky Mountain Spotted Fever: A Literature Review

Riley Jay¹, Paige Armstrong²

¹Augusta University/University of Georgia Medical Partnership, Athens, Georgia; ²Epidemic Intelligence Service, Rickettsial Zoonoses Branch, Centers for Disease Control and Prevention, Atlanta GA

Rocky Mountain Spotted Fever is a rapidly progressive and lethal tickborne disease endemic to the United States. Lack of recognition of the disease and misconceptions about management of patients has led to preventable mortality. The purpose of our study was to synthesize and expand the current clinical understanding of RMSF in the US in a literature review. We performed a search of the literature from 1990 to the present to analyze clinical and laboratory data. We selected 35 articles, which amounted to 340 cases. With these articles, we extracted and analyzed data about demographics, mortality, clinical manifestations, geographic distribution, laboratory testing, atypical presentations, and chronic sequela. Our data showed that the classic triads relied on by physicians are not dependable due to the infrequency of specific manifestations. For example, headache was only found in 57%, while direct tick exposure was found in 51%. Furthermore, less than half of the cases (44%) received appropriate antirickettsial therapy within the recommended five-day timeframe. Also, two gaps in the literature were identified: atypical manifestations and chronic sequela. Messages about proper management of patients with RMSF during acute illness and recovery are therefore needed to improve clinical understandings and outcomes in patients with this disease.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

The Distribution of Industry Payments to Orthopedic Surgeons by Median-income Levels of Zip Codes

Hajun Jason Jeong^{1,2}, Rafael A Buerba³, Nelson F Soohoo³

¹Medical Scholars Program; ²Augusta University/University of Georgia Medical Partnership, Athens, Georgia; ³Department of Orthopaedics, University of California Los Angeles, Los Angeles, CA

BACKGROUND: The Physician Payment Sunshine Act, part of the Affordable Care Act of 2010, stipulated that any payments to physicians must be reported to the Center for Medicare and Medicaid Services (CMS), and be made publicly available on its website. Since then, many studies have documented the financial relationship between orthopedic surgeons and biomedical companies. Our study seeks to analyze the distribution of industry payments between poorer and more affluent areas. We hypothesize that there will be disparities in payments with differences in the median-income levels of zip codes.

METHODS: Our study population was limited to those orthopedic surgeons that received a payment from a biomedical company. These surgeons and their respective payments were obtained from the CMS open payments website. Using this payment data and their addresses, we combined payment information with median-income levels of zip codes that was made available by The University of Michigan. From here, we performed statistical analysis using IBM SPSS.

RESULTS: We divided the zip codes from the Population Studies Center into five different median-income classes, from quintile 1 to quintile 5. Our results indicated that while quintile 5 received the highest number of payments, both research and non-research, the other four quintiles did not have any significant differences in payment frequencies.

CONCLUSIONS: There was a lack of correlation between the frequency of industry payments and median-income level of zip codes. This suggests that there are not significant differences in payments to orthopedic surgeons by the industry, based on disparities in the income of populations they serve.

Development of Point-of-care Test Based on Quantum Dots for Detection of Antibody against Human Neurocysticercosis

Chan Lee^{1,2}, John Noh³, Seth E. O'Neal³, Armando E. Gonzalez³, Hector H. Garcia³, Sukwan Handali³

¹Medical Scholars Program; ²Augusta University/University of Georgia Medical Partnership, Athens, Georgia; ³Division of Parasitic Diseases and Malaria, Centers for Disease Control and Prevention, Atlanta, GA

Human cysticercosis is caused by the tapeworm *Taenia solium* present in many pig vectors in developing countries where zoonotic transmission occurs more frequently through ingestion of raw pork. Further along the disease process, neurocysticercosis (NCC) occurs when the parasitic oncospheres enter into circulation and manifest as larval cysts in the central nervous system. Because of this, NCC has become the leading cause of epilepsy and seizures in these regions. The diagnosis of NCC is currently dependent on the dual factor method of neuroimaging and serological assay; however, currently, the serological diagnosis of NCC is based on enzyme-linked immunoelectrotransfer blot assay (EITB). Although the process itself proves highly specific and highly sensitive, this format is incompatible for field use due to its limited portability and dependence of the assumption that such regions have the necessary labs and technicians to carry out such protocols. In this study, we were able to demonstrate the use of a mobile reader in order to determine antibody presence in patient serum samples using Qdots. We tested 112 positive sera with samples including single viable cyst ($n = 18$), two or more viable cysts ($n = 71$), and sub-arachnoid (racemose) cysts ($n = 23$) as well as a panel of serum samples ($n = 34$) obtained from patients with other infections and 118 normal human serum samples obtained from the United States and Egypt. In order to account for sensitivity and specificity according to degree of infection, our data analysis was separated into three sample categories to include single viable cysts, two or more viable cysts, and sub-arachnoid cysts. Using a cut-off point based on the category of two or more viable cysts, our assay showed 99% specificity and 89% sensitivity. From the present study, we demonstrate the feasibility of a mobile reader based point-of-care test to diagnose NCC.

Developing a Tumor Model With Pure Aerobic Glycolysis to Study and Test for Cancer Treatment

Jiaqi Mi^{1,2}, Alisa Zezetko^{1,2}, Shikha Rao³, Jack Arbiser, MD³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA;

³Department of Dermatology, Emory University School of Medicine, Atlanta, GA

Mitochondria act to convert oxygen and nutrients to ATP within the cell. In cells, mitochondria go through fusion and fission cycles. The fusion state leads to mitochondrial elongation, while the fission state leads to mitochondrial fragmentation. The fission state is often seen in malignant tumors and is hypothesized to be less susceptible to mitochondrial apoptosis. This explains the Warburg phenomenon that cancer cells prefer fermentation even in the presence of adequate oxygen. Mitofusins, Mfn1 and Mfn2, were shown to promote mitochondrial fusion; embryonic fibroblasts (MEFs) that lacked Mfn1 or Mfn2 expressed fragmented mitochondria. Our hypothesis is that by introducing RAS, an oncogene into embryonic fibroblasts lacking Mfn1 and Mfn2, a tumor model with solely aerobic glycolysis will be created, and treatment targeting the glycolysis process will be evaluated. In our study, Ras-transduced MEFs without Mfn1/Mfn2 were injected into immunocompromised mice, and then the tumor cells were cultured, extracted, and evaluated by western blot for the presence of mitofusins and Ras. Surprisingly, tumors arising in these animals expressed mitofusins 1 and 2. This suggests one of 2 possibilities. The first is that the injected tumor cells could have undergone genetic transfer from host cells, leading to introduction of Mfn1 and 2, leading to tumor growth. The second is that the injected tumor cells were inviable, and transferred oncogenic Ras to host cells, resulting in *in vivo* tumorigenesis. One way of distinguishing these 2 possibilities is to determine whether the nude mutation is present in the tumor cells, implying transformation of cells with the nude mutation to malignant tumors. Finally, the lack of tumors with Mfn 1 and 2 loss suggests that tumors require plasticity between respiration and glycolysis, and shows that tumors with solely aerobic glycolysis may not be able to survive *in vivo*.

Logistic Factors Affecting Enrollment in Prospective Clinical Studies

Silki Modi^{1,2}, Lauren Baumann³, Kibileri Williams³, Ferdynand Hebal³, Molly Reimann³, Fizan Abdullah³, Anthony Chin³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA;

³Department of Pediatric Surgery, Ann & Robert Lurie Children's Hospital of Chicago, Chicago, IL

PURPOSE: The challenges of recruiting pediatric patients into clinical studies are widely recognized. Social and environmental factors are known to influence the caregiver's desire to consent, including stress associated with diagnosis, perceived physician-patient relationship, and perceived degree of patient risk. Minimal research examines how logistical features of the recruitment encounter affect enrollment. This study aims to identify modifiable factors of the encounter influencing families' decisions to participate in clinical research.

METHODS: A qualitative checklist was created to evaluate logistical characteristics of recruitment encounters for clinical research studies at a Chicago children's hospital. Primary outcome was enrollment in one of three ongoing, minimal-risk studies: a radiation-free imaging study, an activity-monitoring study, and a patient self-report survey study. Logistical factors collected included demographics, timing of the encounter, family members present, providers present, and manner of introduction. Clinic recruitment and subsequent checklist completion were executed by research staff. Descriptive and bivariate analyses were performed.

RESULTS: Checklists were completed for 80 patient encounters for this pilot study. Enrollment across the three studies ranged from 76% to 93% (overall 82%). Median age of patients approached was 10 years (IQR=4-14). Factors found to positively affect enrollment included the study being introduced by a clinician prior to the research team approaching the patient, the surgeon being on the study IRB, insurance status, English as the primary language of the caregiver, and the patient being the only child in the room ($p < 0.05$). Factors not associated with enrollment included study, age, race, ethnicity, wait time, and type of visit.

CONCLUSIONS: This study identified several logistic factors influencing caregiver decisions to enroll their child in minimal-risk clinical studies. Some of these factors, such as ensuring a clinician introduces the study, may be easily modified. Researchers can thus maximize clinical study enrollment by structuring recruitment to address logistical factors.

Utility of Gray-matter Segmentation of Interictal 18F-FDG-PET in Identifying Focal Cortical Dysplasias

Nzota Nsona^{1,2}, Valeria Moncayo³, Hyunmi Kim⁴⁻⁶, Larry Olson⁴⁻⁶

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA; Departments of ³Radiology and Imaging Sciences, ⁴Neurology, and ⁵Pediatrics, Emory University, Atlanta, GA; ⁶Children's Healthcare of Atlanta, Egleston, GA

PURPOSE: Focal cortical dysplasia (FCD) is a cortical dyslamination disorder that includes cortical developmental and cytological abnormalities. FCDs are medically refractory epilepsy, and are responsive to surgical treatment. The identification of FCDs are key to successful surgery. Many cases of FCDs are missed on conventional radiology because they are small, and located in the depth of sulcus. In functional imaging of cerebral glucose metabolism, like seen in 18F-FDG-PET (18F-fluorodeoxyglucose-positron emission tomography), areas identified as FCD are larger than seizure onset zones. Since seizures originate in the cortex, we propose that gray-matter segmentation of functional neuroimaging could improve localization of seizure onset zones.

METHODS: We analyzed radiological images of thirty-four adults and pediatric patients with proven FCD based on pathological reports of cortical dysplasia, pre-surgical MRI-positive and interictal 18F-FDG-PET scan. MRI gray-matter segmentation was used to identify cortical regions in coregistered 18F-FDG-PET scans. We compared FCDs in nonsegmented and segmented gray matter of the coregistered 18F-FDG-PET. The volume of interest correspondence between the two modalities was recorded as the same subgyrus, gyrus, sublobe, lobe, hemisphere, or no correspondence.

RESULTS: With segmentation, 94% of cases had at least one area identified with MRI-positive and/or pathology-positive results at sublobar or higher levels. 83% of cases had subgyral concordance. Without segmentation 54% of cases showed sublobar or higher levels; 31% with subgyral concordance. Among the 10 MRI missed cases with proven positive pathology, 90% were identified by PET segmentation to the same subgyrus as pathology reports.

DISCUSSION: Segmentation of 18F-FDG-PET shows high correspondence to the localization of FCD, more than twice as non-segmented scans. This concludes that segmentation improves identification of subtle epileptogenic cortical regions missed with conventional radiological analysis. Further research is necessary to explore the size and features of FCD that are easily identified in segmented PET compare to conventional radiological analysis.

Patient-Centered Characterization of the Agitated Patient Population in the ED: A Pilot Mixed-Methods Study

John Parker^{1,2}, Lauren Crispino³, Alana Rosenberg³, David Landau⁴, Ambrose Wong³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA; ³Department of Emergency Medicine, Yale School of Medicine, New Haven, CT; ⁴Rowan University School of Osteopathic Medicine, Stratford, NJ

The agitated patient population in the emergency department (ED) frequently requires invasive and potentially harmful measures of chemical sedation and physical restraints to mitigate aggression and simultaneously leads to safety threats for ED staff members. Although models for understanding acute agitation have been developed for the inpatient and psychiatric settings, the ED-based agitated patient encounter is currently poorly understood. Our pilot mixed-methods study aimed to perform a patient-centered approach to the characterization of the agitated patient encounter through (1) direct observations of clinical care in the ED and (2) qualitative interviews with patients following their ED visits. We observed approximately 100 acutely agitated patients in the YNH Emergency Department. These observations were recorded in real time and this data was collected using a 200-item survey which utilized several commonly used scales of aggression and assessed a multitude of potentially precipitating factors of acute agitation. We also interviewed approximately 25 individuals who had a visit in the ED as an acutely agitated patient. Key interview guide domains included a description of healthcare encounters, precipitating factors, interaction with prehospital staff and law enforcement, impact of ED invasive aggression measures on seeking emergency care and patients' daily lives, and the interplay of drug/alcohol use, psychiatric illness and acute agitation. Our research will include the patient's perspective in identifying factors during an ED agitated patient encounter that increase risk for invasive interventions of chemical sedation and restraint use. Results of this study will lead to more robust characterization of ED acute agitation and generate a hypothesis for testing specific predictor variables for escalating acute agitation in the ED environment in a prospective manner. Our research program ultimately aims to identify targets for future provider-based educational and administrative interventions to improve staff and patient safety during episodes of patient aggression in the ED.

Homologous Polycomb-group proteins, EZH1 and EZH2, have Non-redundant Roles in Mediating H3K27m3 in Embryonic Stem Cells

Arishna Patel^{1,2}, Jamy Peng³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA;

³Department of Developmental Neurobiology, St. Jude Children's Research Hospital, Memphis, TN

Stem cells are self-renewing, specialized cells that can differentiate into multiple cell types for development and regeneration. Differentiation of stem cells is due to gene expression changes, which are achieved, in part, via chromatin modifications, including histone methylation, phosphorylation, and acetylation. Polycomb Repressive Complex 2 (PRC2) is a protein complex associated with chromatin modifications and is vital to development. Deregulated expression of PRC2 components has been linked with various cancers, such as melanoma and lymphoma, and also embryonic lethality. PRC2 complex contains an enzymatic subunit, either enhancer of zeste homolog 1 or 2 (EZH1 or EZH2), which promotes gene silencing by di- and tri-methylating lysine 27 of histone H3 (H3K27m2/3). Previous findings suggest that EZH1 and EZH2 have some non-overlapping, distinct roles in embryonic stem cell (ESC) development and differentiation, despite both having EED-dependent histone methyltransferase activity. Here, we report our investigation of characterizing previously lab-generated CRISPR/Cas9-mediated EZH2 ESC knockout lines by ChIP-qPCR and global H3K27m3 profiling. We find that the loss of EZH2 in ESCs indeed results in global and gene locus specific declination of H3K27m3, which is not fully rescued by EZH1. Our findings also suggest non-redundant roles of EZH1 and EZH2 in mediating H3K27m3 in ESCs.

Evaluation of Concussion Triage Tool

Sanam Patel^{1,2}, Chris Zalesky³, Timothy Moran³, David W. Wright³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA;

³Department of Emergency Medicine, Emory University, Atlanta, GA

BACKGROUND: Traumatic brain injury (TBI) is the number one cause of death in persons under 44 years of age and accounts for a total of 52,000 deaths in the US each year. Mild TBI or "concussion" accounts for 75-80% of TBI-related injuries. Recognition of concussion and education of patients following concussion allows for recovery and prevents long-term damage. "Screen – Inform – Prevent" (SIP) is a concussion screening process developed by a national multidisciplinary group to identify patients with high risk for concussion. This study served to describe current diagnosis and management patterns of clinicians for patients who screened positive for concussion at the Grady Memorial Hospital emergency department (ED) using the SIP screen protocol.

METHODS: All patients presenting to the Grady Memorial Hospital Emergency department were screened at triage with a 3-question concussion screen. If all 3 questions were positive then the patient was considered at high risk for a concussion. The Triage screening questions were:

1. Was the person injured?
2. Was there a blunt force to the head and/or did the head move back and forward with a lot of force?
3. Was there a change in mental status or in level of consciousness?

This study sought to describe the number of patients who received a concussion evaluation, corresponding ICD-10 code diagnosis, and concussion specific discharge instructions. Patients were screened and identified prospectively. The chart was reviewed for patients who screened positive over a 5-week evaluation period. Information collected included: specific injury characteristics, observed signs and symptoms, physical exam components, lab and imaging results, differential, final diagnoses and discharge instructions.

RESULTS: Of the 190 patients who screened positive for high-risk of concussion, a differential diagnosis that included concussion occurred in 44 patients and the final diagnosis for 43 patients. Concussion discharge instructions were provided for 27 patients who screened positive.

CONCLUSIONS: ED patients at high-risk for a concussion frequently were not evaluated for a concussion, did not receive a diagnosis, or concussion discharge instructions. Future directions for the concussion triage tool include evaluation of concussion management following implementation of a clinician alert and decision support tool for patients who screen positive for a concussion.

Effectiveness of Amnion Patch Tissue Grafts as Nerve Wraps for Revision Carpal/Cubital Tunnel Release in Recurrent Carpal/Cubital Tunnel Syndrome

Michael T Quinet^{1,2}, Kelley A Dixon³, Joseph M Savitz³, Michael S Shuler³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA; ³Athens Orthopedic Clinic, Athens, GA

PURPOSE: To assess the effectiveness of amnion tissue patches as nerve wraps in patients with recurrent carpal/cubital tunnel syndrome undergoing open revision release.

METHODS: Eighteen patients with recurrent carpal and/or cubital tunnel syndrome undergoing open carpal and/or cubital tunnel release surgery were enrolled. A prospective study involving repeat carpal tunnel and/or cubital tunnel release managed with a nerve wrap utilizing a Cygnus MAX™ amnion patch tissue graft. Nerve conduction studies/electromyography (NCS/EMG) as well as pain, functional tests, and outcomes measures were obtained pre-operatively and post-operatively. The participants were seen at 2 weeks, 6 weeks, 3 months and 6 months post operatively. At each of these visits, data was collected including two-point discrimination, analog pain scale, strength measurements, and patients' outcomes were measured (DASH and SF-36 questionnaire). NCS/EMG's were repeated at 3 months post-operatively.

RESULTS: Pain and two-point discrimination values decreased over time. The DASH survey indicates the disability of the arm and hand decreased over time. The SF-36 survey, which looks at whole body function and general health, showed an increase in whole body pain and a decrease in whole body function. One subject required repeat decompression after continued nerve compression.

CONCLUSIONS: Amnion patch tissue grafts may offer a biologic alternative for recurrent nerve decompression. The decrease in pain, two-point discrimination improvement, and improved DASH scores offer preliminary evidence for amnion patch graft's use in recurrent peripheral nerve compression. Additional investigation including a blinded randomized study would be helpful in elucidating the benefits of amnion patches in peripheral nerve decompression.

Evaluating Depression Care at Mercy Health Center

Kyle Royalty^{1,2}, Charlie Kelderhouse^{1,2}, Laurel Murrow^{2,4}

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA; ³Department of Medicine, Medical College of Georgia, Augusta University, Augusta, GA; ⁴Piedmont Athens Regional, Athens GA

BACKGROUND: Mercy Health Center (MHC) is a volunteer supported clinic providing free healthcare for uninsured patients of low socioeconomic status, a population especially at risk for depression. MHC originally referred for depression due to continuity concerns, but after this situation improved, MHC began to offer both pharmacologic therapy and counseling services for depression.

Objective: The objective of this study was to evaluate current depression care at MHC to determine where future improvements may be needed.

METHODS: Eligible patients had a diagnosis of depression and a counseling visit during 2016. After obtaining consent, in person or telephone structured interviews were conducted to elicit patient perception of counseling services, medication use, and any problems with or suggestions for their care. Structured interviews of staff and volunteer providers gathered information regarding experiences with depression care in and outside of MHC, familiarity with MHC's behavioral health program, and recommendations for improvement.

RESULTS: Twenty-eight patients interviewed (n=33 total) felt their concerns about depression were being addressed, and 22 of 24 patients who saw a counselor had a good experience. For those who did not, their problems pertained to dissatisfaction with young therapists, frustration with ending counseling, and medications (6 out of 16 patients on depression medication reported financial and scheduling difficulty). The majority of providers (n=17 total) were comfortable with recognizing and treating depression but were unaware of the current behavioral health program - and specifically the availability of on-site counseling.

CONCLUSION: In summary, the overall response to the new behavioral health program was positive for patients who have participated in it. Patient misunderstanding and volunteer providers' lack of awareness of the details of the program suggests MHC should consider a promotional campaign to educate both groups.

A Network Meta-analysis Comparing the Efficacy of Antibiotics Used to Treat Bacterial Skin and Soft Tissue Infections

Matt Schwartz^{1,2}, Loren Miller³, Sarah Mann³, Christiana Speciale³, Marianne Go-Wheeler³, Lisa Hean³, Bryn Launer³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA; ³Harbor-UCLA Medical Center, University of California, Los Angeles, Los Angeles CA

There are numerous available antibiotics to treat bacterial skin and soft tissue infections (SSTI); though, among experts and guidelines, there is no consensus on the best agent to treat these. We sought to compare the efficacy of different classes of antibiotics in treating bacterial SSTI. We reviewed published articles identified through PubMed and EMBASE, specifically comparative clinical trials that provided cure rates for bacterial SSTI patients as a primary outcome. Studies investigating non-antibiotic, topical, intranasal, or prophylactic treatments, studies limited to a specific type of bacterial SSTI (e.g. necrotizing fasciitis, animal bite, diabetic foot, etc.), and studies comparing the same class of antibiotic were excluded from review. Using a systematic review with specific key words, we reviewed titles and abstracts from PubMed and EMBASE from 1/1/66 to 7/18/17. Our search yielded 2,425 and 9,148 articles from PubMed and EMBASE, respectively. Of these, 88 manuscripts had adequate data for review. These manuscripts included treatment with 33 classes of antibiotics and enrolled >20,000 subjects. We employed a network meta-analysis protocol that made both direct and indirect comparisons between each drug class to detect any statistically significant differences in cure rate. Preliminary analyses support our hypothesis that there does not exist a superior antibiotic for treating bacterial SSTI.

The Role of Minimally Invasive Techniques in Functional Outcomes and Pain Relief of Lateral/Medial Epicondylitis: Platelet-Rich Plasma versus Tenex

Michael Scott^{1,2}, Allison Boden³, Poonam Dawaldi³, Michael Gottschalk³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA;

³Department of Orthopedics, Emory University School of Medicine, Atlanta, GA

INTRODUCTION: Epicondylitis is a common, debilitating disease of the elbow that impairs mobility, function, and quality of life. Currently, most patients seek non-surgical treatments prior to turning to surgery; however, many of these treatments have shown little long-term effects on pain and function. Orthobiologic platelet-rich plasma (PRP) injections and Tenex ultrasonic tenotomy are two novel non-surgical treatments that have shown promise in treating epicondylitis. The purpose of this study is to compare the effects of PRP injection versus Tenex ultrasonic tenotomy on pain and function in epicondylitis patients treated at the Emory Sports Medicine Center to determine which, if either, treatment is more effective.

METHODS: This study is being conducted as a retrospective review of patient reported outcome surveys of at least 59 patients treated at the Emory Sports Medicine Center from December 1, 2008 to May 1, 2017. Data collection includes age, gender, affected joint, date of procedure, prior treatments, satisfaction with procedure, and subjective assessment of pain and function based on data from patient reported questionnaires completed before and after treatment. Prior to analysis, patients will be split into two cohorts based on receipt of either PRP injection or Tenex ultrasonic tenotomy.

RESULTS AND DISCUSSION: Data collection is still ongoing; however, preliminary data suggests that platelet-rich plasma injections and Tenex ultrasonic tenotomy are effective in relieving pain and restoring function in epicondylitis patients. Following the completion of data collection, statistical analysis will be performed to compare pain and functional outcome scores for each cohort to determine which, if either, treatment is more effective.

Patient-Centered Decision Support for Minor Head Injury in the Emergency Department: A Pilot Study

Navdeep Singh^{1,2}, Erik Hess³, George Guo⁴, Edward Melnick⁴

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA; ³Department of Emergency Medicine, Mayo Clinic, Rochester, MN; ⁴Department of Emergency Medicine, Yale University School of Medicine, New Haven, CT

BACKGROUND: We previously developed a clinician- and patient-facing electronic tool to guide decisions about head CT use in emergency department (ED) patients with minor head injury, called Concussion or Brain Bleed. This app integrates a patient decision aid and clinical decision support (using the Canadian CT Head Rule, CCHR) at the bedside on a tablet computer to promote conversations around individualized risk and patients' specific concerns within the ED context.

OBJECTIVE: To describe the use of the Concussion or Brain Bleed app in a high-volume ED and to establish preliminary efficacy estimates on patient experience, clinician experience, healthcare utilization, and patient safety.

METHODS: We conducted a prospective pilot study of adult (age 18-65) patients presenting to the ED after minor head injury who were identified by participating clinicians as low risk by the CCHR. The primary outcome was patient knowledge regarding the injury, risks, and CT use. Secondary outcomes included patient satisfaction, clinician acceptability, head CT rate, and patient safety at 7 days.

RESULTS: Forty-one patients cared for by 29 different clinicians were enrolled. There was an increase in patient knowledge following the use of the app [questions correct out of 9: pre-encounter, 3.3 versus post-encounter, 4.7; mean difference (MD) 1.4, 95% confidence interval 0.8 to 2.]. The majority of patients (36, 87.8%) and clinicians (35, 85.4%) thought the information given through the app was helpful. Seven (17.1%) patients received a head CT in the ED. There were no patients with a missed clinically important brain injury at 7 days.

CONCLUSIONS: An app to help patients assess the utility of CT imaging after head injury in the ED increased patient knowledge, and nearly all clinicians reported the app to be "extremely helpful" to patients. The high degree of patient satisfaction and clinician acceptability support rigorous testing of the app in a larger multicenter trial.

Modern Outcomes in Patients with Objectively Diagnosed Neurogenic Thoracic Outlet Syndrome

Sabina Sorondo^{1,2}, Kapland Owens³, Kathryn Cline³, Ross Parkerson³, Isibore Arhuidese³, Jeffrey Edwards³, Thanh Tran³, Karl A Illig³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA;

³Division of Vascular Surgery, University of South Florida, Tampa, FL

Thoracic Outlet Syndrome (TOS) is defined as a problem resulting from compression of the neurovascular bundle located in the thoracic outlet. Neurogenic thoracic outlet syndrome (NTOS) is most common, making up 85-90% of all TOS cases, and is, unfortunately, associated with the greatest amount of diagnostic uncertainty, as there is no diagnostic test or clinical symptom or sign with enough accuracy to make the diagnosis certain. To address this matter, the Society of Vascular Surgery (SVS) recently created specific reporting standards for the workup, diagnosis, treatment, and results of NTOS. The purpose of the current study was to determine outcomes in patients with NTOS diagnosed and treated according to these criteria. The data was derived from a largely prospective master database maintained at the USF Thoracic Outlet Center since July, 2014. Treatment allocation was determined based on suspicion for NTOS using the SVS reporting standards criteria. Our primary outcome variable is self-reported outcomes at the 12-month visit, analyzed according to "Improved" versus "Not improved." Results were analyzed as means or medians of each group, and analyzed by means of t-tests, ANOVA, Chi-square, and multiple logistical regression analysis. Preliminary results show that 95% of patients (N=19) at 12 months post operation reported an "improved" outcome. In recent years, the diagnosis of NTOS has been standardized to an extent that was previously lacking. This paper serves to set the foundation for future directions in research, such as determining what clinical factors can be used to predict a good outcome, and defining more objective criteria to help predict who will benefit from surgery versus conservative treatment for NTOS.

Perceived Fatigue and Measured Fatigue in Older Adults

Julia Stephens^{1,2}, **Lacy Heberlig**^{1,2}, **Kevin McCully**³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA;

³Department of Kinesiology, University of Georgia, Athens, GA

BACKGROUND: Fatigue in older adults has been associated with higher rates of disease and mortality. Better understanding of age-related fatigue and its causes may be clinically useful in implementing effective, targeted treatment strategies.

PURPOSE: The purpose of this study was to compare muscle endurance in older adults with and without self-reported fatigue.

METHODS: Older participants were divided into groups based on presence of self-reported fatigue. Muscle endurance was measured using a surface mounted accelerometer during muscle contractions induced by twitch electrical stimulation. Young adults in their 20s served as a control group.

RESULTS: The older group with self-reported fatigue had the lowest endurance index at each of the three different frequencies (2Hz, 4Hz, and 6Hz) of twitch electrical stimulation with the largest difference at the 6Hz frequency ($0.61 + 0.18$ vs. $0.89 + 0.11$, $p = 0.020$). Young individuals in the control group with previous knee injuries ($n=2$) had a reduced endurance index at the 6Hz frequency ($0.58 + 0.08$ vs. $0.91 + 0.06$).

CONCLUSION: Older adults without self-reported fatigue had similar muscle endurance to young controls. Several of the older participants were excluded from the results, due to a variety of conditions, such as: tremors, arthritis, and prior back injuries did not allow accurate data collection using the accelerometer. Muscle endurance was reduced in older adults with self-reported fatigue when compared with both the control and the aged group with no self-reported fatigue. A future study looking at the effects of a training program targeting muscle endurance on perceived fatigue and muscle endurance may be needed to determine the effectiveness of the use of an exercise program in the treatment of fatigue. An incidental finding of reduced muscle endurance in young individuals with previous knee injuries was found. These young individuals with knee injuries were excluded from the results.

Effects of Lutein Supplementation on Behavioral and Endocrine Markers of Stress and Anxiety

Harini Vakamudi^{1,2}, Philip V Holmes^{2,3}

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA;

³Department of Psychology, University of Georgia, Athens

Oxidative stress has been implicated in the pathogenesis of a variety of disease states via the induction of sustained inflammation. While the extant literature has explored the association between oxidative stress and suboptimal physical health, research suggests oxidative stress is also associated with neuroinflammation and poor mental health. Lutein is a carotenoid with well-established antioxidant capabilities, particularly in retinal tissue. As retinal tissue and neural tissue share a common embryologic origin, we hypothesized a relationship between macular optical pigment density (MPOD), lutein intake, and measures of physical and psychological health. Forty-four healthy adults from the Athens-Clarke County area contributed baseline data on MPOD, daily lutein intake, and self-perceived health status. MPOD was measured via heterochromatic flicker photometry (HFP), while daily lutein intake, physical health, and mood were assessed by questionnaire. Data will be recollected at 6- and 12-months following a period of double-blind, placebo-controlled oral lutein supplementation. Statistical analysis failed to confirm a relationship between MPOD and scores on the Lutein Intake Questionnaire ($r=0.01$; $p=0.93$), Brief Symptom Inventory ($r=-0.03$; $p=0.85$), Psychological Stress Measure 9 ($r=-0.04$; $p=0.78$), or Suboptimal Health Status Questionnaire ($r=-0.01$; $p=0.96$). These findings suggest the role of additional sociodemographic variables not accounted for in our study which may mediate the relationship between MPOD, neuroinflammation, and health status. Additionally, the lack of association between MPOD and lutein intake scores suggests the role of self-report bias error, which will be alleviated in follow-up data by the controlled administration of oral lutein supplementation.

Diabetic Retinopathy Screening: Are We Doing It Right?

Richard Yi^{1,2}, Tejumade Adelore³, Zola Nlandu³, Kofi Osei^{2,3}, Catherine Apaloo^{2,3}

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA;

³Internal Medicine, Piedmont Athens Regional, Athens, GA.

INTRODUCTION: Diabetic retinopathy is an important cause of avoidable vision loss in adults. Early recognition of diabetic retinopathy is essential for the reduction of vision loss in this patient group. The 2017 American Diabetes Association (ADA) Standards of Care stipulates that adults with type 1 and type 2 diabetes should have an initial dilated eye exam by an ophthalmologist or optometrist within five years and at the time of diagnosis respectively. This should be followed by annual eye exam if there is no evidence of retinopathy after the initial exam. At Piedmont Athens Regional Community Care Clinic (PARCCC), we sought to evaluate our adherence to current ADA guidelines for diabetic retinopathy screening.

METHODS: We conducted a retrospective chart review of patients with diabetes seen at PARCCC between May 2016 to May 2017. Accordingly, 200 charts met our inclusion criteria. These were patients with diabetes age 25 or older. The exclusion criteria consisted of patients with diabetes who were not seen at least twice by a physician at PARCCC. A data abstraction tool was used to collect history on ophthalmology referrals, fundoscopies, and hemoglobin A1c levels. Categorical data was analyzed in percentage and proportions. Chi-square test was used to test for association.

RESULTS: The data shows the clinic's referral rate is 21.2%. Referral rates based on insurance status were 24.6% and 12.0% for insured and uninsured patients respectively but was not statistically significant $p = 0.062$. Out of those referred, 52% (11/21) were seen by an ophthalmologist. Regarding patients referred, documentation informing providers of the results of their patients' eye exams were noted in 5% of charts. Of those referred to an ophthalmologist, 1 out of 3 were diagnosed with diabetic retinopathy by the ophthalmologist.

CONCLUSION: At PARCCC a major barrier for diabetic retinopathy screening includes insurance status and lack of appropriate referrals by providers.

Developing a Tumor Model With Pure Aerobic Glycolysis to Study and Test for Cancer Treatment

Jiaqi Mi^{1,2}, Alisa Zezetko^{1,2}, Shikha Rao³, Jack Arbiser, MD³

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA;

³Department of Dermatology, Emory University School of Medicine, Atlanta, GA

Mitochondria act to convert oxygen and nutrients to ATP within the cell. In cells, mitochondria go through fusion and fission cycles. The fusion state leads to mitochondrial elongation, while the fission state leads to mitochondrial fragmentation. The fission state is often seen in malignant tumors and is hypothesized to be less susceptible to mitochondrial apoptosis. It explains the Warburg phenomenon that cancer cells prefer fermentation even in the presence of adequate oxygen. Mitofusins, Mfn1 and Mfn2, were shown to promote mitochondrial fusion; embryonic fibroblasts (MEFs) that lacked Mfn1 or Mfn2 expressed fragmented mitochondria. Our Hypothesis is that by introducing RAS, an oncogene into embryonic fibroblasts lacking Mfn1 and Mfn2, a tumor model with solely aerobic glycolysis will be created, and treatment targeting the glycolysis process will be evaluated. In our study, Ras-transduced MEFs without Mfn1/Mfn2 were injected into immunocompromised mice, and then the tumor cells were cultured extracted and evaluated by western blot for the presence of mitofusins and Ras. Surprisingly, tumors arising in these animals expressed mitofusins 1 and 2. This suggests one of 2 possibilities. The first is that the injected tumor cells could have undergone genetic transfer from host cells, leading to introduction of Mfn1 and 2, leading to tumor growth. The second is that the injected tumor cells were inviable, and transferred oncogenic Ras to host cells, resulting in *in vivo* tumorigenesis. One way of distinguishing these 2 possibilities is to determine whether the nude mutation is present in the tumor cells, implying transformation of cells with the nude mutation to malignant tumors. Finally, the lack of tumors with Mfn 1 and 2 loss suggests that tumors require plasticity between respiration and glycolysis, and that shows that tumors with solely aerobic glycolysis may not be able to survive *in vivo*.

Inflammation and Epigenome in Schizophrenia

Jimmy Zhou^{1,2}, Suresh Ambati³, Richard Meagher³, Brad Phillips^{4,6}, Brian Miller⁵, Michelle Nuss^{2,5}

¹Medical Scholars Program, ²Augusta University/University of Georgia Medical Partnership, Athens, GA; ³Department of Genetics, University of Georgia, Athens, GA; ⁴Department of Clinical and Administrative Pharmacy, University of Georgia, Athens, GA; ⁵Department of Psychiatry, Medical College of Georgia, Augusta University, Augusta, GA; ⁶Clinical and Translational Research Unit, University of Georgia, Athens, GA

Schizophrenia is associated with immune system dysfunction and inflammation leading to higher rates of cardiovascular disease and premature death. Expression of immune-related genes serve as important risk factors for this disorder. Treatments combining anti-inflammatory agents and antipsychotics have shown symptomatic improvement with schizophrenia in several trials. Schizophrenia is also associated with epigenetic alterations in the blood and brain that may influence immune system dysfunction. The purpose of this study is to investigate the relationship between epigenetic changes and inflammation in patients with schizophrenia.

Blood samples were collected from 20 patients diagnosed with schizophrenia or schizoaffective disorder (i.e., based on Diagnostic and Statistical Manual of Mental Disorders), who were taking antipsychotics (risperidone or paliperidone) and 20 healthy volunteers. CD4+ and CD8+ T cells were isolated from peripheral blood and are being evaluated for DNA cytosine methylation. Expression of high-sensitivity C-reactive protein and cytokines will be used to assess inflammation. A two-sided Student's T-test will quantify the statistical significance of differences in DNA methylation levels between subjects and healthy controls.

The results from this study will advance knowledge of the relationship between schizophrenia and epigenetic changes with inflammation. These findings may point to a better understanding of the disease pathophysiology leading to novel therapies for schizophrenia.

Intussusception as an Etiology for Left Lower Quadrant Pain in an Adult

Brian Brewer MD¹, Achilia Morrow MD^{1,2}

¹Augusta University/University of Georgia Medical Partnership Internal Medicine Residency Program, Athens, GA; ²Augusta University/University of Georgia Medical Partnership

Intussusception is most commonly a pediatric presentation in which a distal bowel portion draws into a proximal segment of the bowel. Rarer in adult cases, this anatomical aberrancy is strongly associated with malignancy in the non-pediatric population. This is a case of a 44-year old male with a history of diabetes mellitus type two as well as hypertension who presented to the ambulatory resident clinic for establishment of care. He had complaints of hematochezia as well as mucus per rectum. He noted left lower quadrant pain. It was intermittent and sharp in nature. He noted intermittent constipation. He was afebrile and hemodynamically stable. The decision was made to order a non-contrasted CT of the abdomen due to a history of stage three chronic kidney disease.

Non-contrasted CT of the abdomen revealed a prominent fatty tumor at the level of the splenic flexure with colonic-to-colonic intussusception. Concern was for intermittent bowel obstruction. He was given the option of referral to general surgery versus admission. He initially underwent colonoscopy which revealed a large tumor in the transverse colon unamenable to endoscopic removal. He subsequently underwent extended right hemicolectomy with ileocolic anastomosis. Operative pathology revealed a pedunculated and ulcerated lipoma with dimensions of 6.5 cm x 5 cm x 4 cm. He was seen on follow-up with resolution of symptoms.

Rarer in the adult population versus the pediatric population, there is a stronger association with underlying pathology versus spontaneous intussusception. The majority of underlying etiologies involve malignancy. This is a case of adult-onset intussusception secondary to lipoma. This case serves as an expanded differential for intra-abdominal pathology in an adult presenting with left lower quadrant pain and hematochezia.

B12 Deficiency due to Pernicious Anemia as an Etiology for Pancytopenia

Heather Brody MD¹, Cynthia Shepherd^{1,2}

¹Augusta University/University of Georgia Medical Partnership Internal Medicine Residency Program, Athens, GA; ²St. Mary's Health Care System, Athens, GA

Anemia is an extremely common finding in patients. It is commonly described by mean corpuscular volume (MCV). A macrocytic anemia, or megaloblastic anemia, refers to anemia with MCV > 100 fL. Pernicious anemia is a type of autoimmune disease that results in vitamin B12 deficiency. Antibodies against Intrinsic Factor (IF), an important protein in B12 absorption from the gut, or against the cells that create IF, prevent absorption of vitamin B12. A severe case of B12 deficiency may lead to overall bone marrow suppression and pancytopenia as well as other neurological manifestations.

Pancytopenia due to vitamin B12 deficiency due to pernicious anemia is a rare manifestation of an uncommon underlying pathology. Pancytopenia can result from severe vitamin B12 deficiency which we initially were suspicious for due to the elevated MCV. Vitamin B12 is required for the creation of thymidine, a nucleic acid component, which can affect many processes, especially rapidly dividing cells including all of the bone marrow cell lineages. Pernicious anemia is a rare but very treatable etiology of B12 deficiency that can be fatal if left untreated. It occurs in people ages 40-70 years, more commonly in Caucasians with female predisposition. It occurs in 10-20/100,000 people per year and is associated with a predisposition for certain malignancies including gastrointestinal cancers, head and neck cancers, and acute myeloid leukemia as well as bone marrow pathologies like myelodysplastic syndrome.

Although recognized as a cause of anemia, clinician should maintain a high level of suspicion for vitamin B12 deficiency in patients with pancytopenia as well, especially when the MCV is elevated. If vitamin B12 deficiency is noted in that setting, it is reasonable to investigate for pernicious anemia. If, as an etiology of vitamin B12 deficiency, pernicious anemia is missed, this very treatable disease process can be fatal.

A Mysterious culprit for Multiple Cranial Neuropathies

Miguel Carmona Pires¹, Zahraa Rabeeah¹

¹Piedmont Athens Regional Internal Medicine Residency Program, Athens, GA

Affiliated with the AU/UGA Medical Partnership

INTRODUCTION: Primary CNS lymphoma is an uncommon variant of extra nodal non-Hodgkin lymphoma with a rapidly fatal course when untreated, making its early detection and treatment paramount. Median survival is estimated at 44 months following initiation of chemotherapy.

This case report discusses the diagnosis and management of a 36-year-old male presenting with double vision, headache, dysarthria, unilateral non-pupil sparing 3rd CN and bilateral peripheral 7th cranial nerve palsies, found to have on CSF flow cytometry a monoclonal CD5/20 positive cell population, all in the setting of an initial negative Brain MRI.

CASE: A 36-year-old male with HIV on emtricitabine-tenofovir-dolutegravir and ITP on rituximab, prednisone and IVIG presented with diplopia, right sided ptosis, facial weakness, headache and dysarthria of 1-week duration. On admission, his vital signs were: T 36.9°C, HR 71, RR 18, BP 148/87. Physical exam showed complete right sided ptosis, non-pupil sparing right 3rd cranial nerve palsy and bilateral peripheral 7th cranial nerve palsies. Blood was drawn for CBC, BMP, Toxoplasma, Cryptococcus, CD4 count and viral load. MRI brain was normal, lumbar puncture: opening pressure 15mmHg, protein 170, glucose 49, WBC 100/64, 98% lymphocytes, RBC 208/0, negative gram stain. Intravenous acyclovir was empirically started. At that time, CSF was sent for bacterial/fungal culture, cryptococcal antigen, VDRL, Herpes Simplex, Varicella Zoster, West Nile and Epstein Barr PCR, all of which were negative. CD4 count 336 and a viral load of 120. Flow cytometry of CSF found 54% monoclonal B cell population expressing CD5/10/19/20. Subsequently, CNS lymphoma was diagnosed, intrathecal chemotherapy was started. Repeat MRI showed conspicuous periventricular abnormality possibly from treatment-related white matter changes.

DISCUSSION: Our patient presented with multiple cranial nerve palsies and was found to have lymphomatous meningitis stemming from Leptomeningeal lymphoma with systemic involvement. 58% of these patients present with cranial neuropathies. The patient's history of prior cycles of rituximab, prednisone and IVIG diminished the diagnostic accuracy of brain MRI. Despite this encountered clinical barrier, patient was diagnosed within 4 days of admission and started on chemotherapy 5 days after presentation, contributing to increased survival and improved prognosis.

Eptifibatide-Induced Severe Thrombocytopenia in a Patient with a New Drug Eluting Stent following STEMI and VF Arrest

Seth Courson¹, Heather Brody¹, Clay Chappell^{1,2}, Neal Marrano²

¹Augusta University/University of Georgia Medical Partnership Internal Medicine Residency Program, Athens, GA; ²St. Mary's Health Care System, Athens, GA

BACKGROUND: ST segment elevation myocardial infarction (STEMI) is a life-threatening emergency treated through percutaneous coronary intervention (PCI). A stent is placed to open a coronary artery; sometimes GIIb/IIIa inhibitors are used as a pharmacologic adjunct to PCI. A side effect of GIIb/IIIa inhibitors is thrombocytopenia.

PRESENTATION: The patient was a 47 year old Caucasian male who presented with chest pain. EKG was consistent with a STEMI. He was taken emergently to the cardiac catheterization lab. He received prasugrel, nitroglycerin, atropine, eptifibatide, midazolam, fentanyl, and heparin. He was also loaded with ASA prior to the procedure. A DES was placed in the RCA to treat a 100% occlusion. On arrival, the patient's platelet count was 218k/mm³. Post-PCI day one, his routine labs revealed a platelet count of 1k/mm³. A repeat platelet measurement confirmed a platelet count of 1k/mm³. He developed spontaneous epistaxis and petechiae on the trunk and extremities. Antiplatelet therapy was held and the patient was transfused one unit of platelets. His platelet count post-PCI day two was 8k/mm³, and he received another platelet transfusion. Low dose aspirin was initiated on post-PCI day three when the platelet count was 29k/mm³. Dual antiplatelet therapy was initiated on day four when the platelets had recovered to 30 k/mm³. His sudden thrombocytopenia was attributed to a complication of eptifibatide.

DISCUSSION: Thrombocytopenia is an adverse side effect that occurs in the administration of eptifibatide in around 1-3% of patients. Eptifibatide, a GP IIb/IIIa inhibitor, is used in patients with coronary artery disease as well as those undergoing stent placement. GPIIb/IIIa inhibitors can be associated with drug-induced immune thrombocytopenia. This may occur within minutes after exposure and can be profound.

CONCLUSION: Eptifibatide-induced thrombocytopenia is a serious side effect that may occur. It is an alarming complication because new stents are at higher risk for thrombosis. Treatment includes cessation of the offending agent, monitoring for bleeding, platelet transfusion as indicated, and waiting for the platelets to recover before initiating normal dual anti-platelet therapy. Antiplatelet therapy was successfully restarted after achieving a platelet count of 30 k/mm³.

Uterine Leiomyosarcoma Metastatic to the Heart

Zachary Di Iulio¹, Akhil Reddy¹, John Layher^{1,2}

¹Augusta University/University of Georgia Medical Partnership Internal Medicine Residency Program, Athens, GA; ²St. Mary's Health Care System, Athens, GA

PATIENT/CC: 52 year old AA female presenting with 1 week of worsening flank pain and dysuria

CASE DESCRIPTION: Patient presented with history of several days of worsening right flank pain and dark urine. Patient had been seen by urology several weeks prior with complaint of the same and was found to have a mass obstructing the ureter for which the patient had a stent placed. Urology was consulted to evaluate for replacement of stent. To address patient's shortness of breath on exertion and orthopnea, echocardiogram was performed which showed large mass in the right ventricle and atrium. For further characterization, follow up cardiac MRI was obtained which showed multiple hemorrhagic cardiac masses in the right ventricle, and mass in the lateral wall myocardium at the base.

RESULTS: Surgical intervention was not recommended, but CT surgery did recommend biopsy of the mass. Patient refused this. Oncology recommended no treatment as prognosis for the patient was poor and it was felt that intervention would be futile. Patient was recommended for hospice care but refused and passed away 3 months later. Though there was no biopsy obtained, it is assumed that the patient likely had metastatic leiomyosarcoma which she had history of. While this is rare, it would be more likely than a primary tumor of the heart.

DISCUSSION: In the evaluation of cardiac masses, initial evaluation needs to include possible other primary tumors other than the heart due to how rare primary cardiac tumors are. In this case, her history of leiomyosarcoma of the uterus is the most likely primary tumor with metastatic disease to the heart. This, in and of itself is rare and only a handful of cases have been reported of metastatic leiomyosarcoma from the uterus to the heart.

Progressive Cardiomyopathy in a Patient with Fabry Disease on Agalsidase Beta

Narayana Gowda¹, Achilia Morrow^{1,2}

¹Augusta University/University of Georgia Medical Partnership Internal Medicine Residency Program, Athens, GA; ²Augusta University/University of Georgia Medical Partnership, Athens, GA

Fabry disease is a rare progressive lysosomal storage disorder with x-linked inheritance that affects 1 in 17,000 to 1 in 170,000 Caucasian males. The disease can progress rapidly with cardiac, renal and neurologic sequelae despite enzyme replacement therapy.

A 27-year-old male with end stage kidney disease (ESKD) on hemodialysis (HD) presented to an emergency department with dyspnea and was admitted for respiratory failure. Two years prior he had been diagnosed with biopsy-proven Fabry disease as the cause of his ESKD. He had been started on agalsidase beta for enzyme replacement and had been adherant with all of his home medications and attended all HD sessions as scheduled. Examination revealed bilateral basilar crackles and laboratory data was notable for beta-natriuretic peptide level of 9,659 pg/mL. Chest radiograph revealed bilateral pulmonary edema. An echocardiogram showed the myocardium to have a speckled appearance suggestive of infiltrative cardiomyopathy and left ventricular ejection fraction of 30-35%. This was consistent with cardiac manifestations of Fabry disease. Of note, the patient had an echocardiogram performed two years prior which revealed normal cardiac structure and a left ventricular ejection fraction of 50-55%. The patient was treated for acute decompensated heart failure with emergent dialysis for removal of more than 4 liters of fluid. His dry weight was adjusted over time with subsequent HD sessions in response to his poor cardiac output and non-ischemic cardiomyopathy. This patient's significant echocardiographic changes two years following diagnosis highlight the progressive nature of Fabry disease despite treatment. For this reason, patients with cardiac involvement should undergo electrocardiogram every 6-12 months and annual echocardiography for the first 2-3 years after initiation of therapy to monitor for disease progression. In patients with Fabry disease with both ESKD and cardiac manifestations, close monitoring and frequent adjustment of dry weight during hemodialysis is vital to prevent acute decompensation of heart failure. These measures can help prevent potentially fatal complications and hospitalizations in patients with this rare progressive disease.

Undercover Jejunal Bleeding Tumor

Amit Koduri¹, Pete Yunyongying²

¹Augusta University/University of Georgia Medical Partnership Internal Medicine Residency Program, Athens, GA; ²Augusta University/University of Georgia Medical Partnership, Athens, GA

A 50-year-old man was evaluated in the emergency department for 2 episodes of melena, dizziness, and 5 episodes of emesis which began earlier that morning. On physical exam, blood pressure was 124/62 mm Hg supine and 114/75 mm Hg standing, and pulse was 60/min supine and 61/min standing. Laboratory studies show a hemoglobin level of 5.4 mg/dl. The patient was admitted to the hospital and stabilized with fluid resuscitation and erythrocyte transfusions. A tagged red blood cell scan was negative. Esophagogastroduodenoscopy found red blood in the second part of the duodenum. Push enteroscopy found a 6 mm non-bleeding jejunal ulcer with pigmented material, which was biopsied and successfully treated with submucosal epinephrine injection and hemostatic clips. Mucosal biopsy showed reactive changes secondary to adjacent ulcer. After recurrent bleeds and a few more negative endoscopies, a superior mesenteric angiogram revealed a tuft of dilated vessels with active contrast extravasation, consistent with a bleeding hypervascular mass, which was successfully treated with super-selective coil embolization. He was observed inpatient for 48 hours and discharged again. A follow up outpatient computed tomography angiography of the mesenteric arteries with intravenous contrast showed a 5.0 cm peripherally enhancing, centrally hypodense mass with a single coarse calcification, found later by surgical oncology to be a gastrointestinal stromal tumor. This case illustrates how an early multidetector computed tomography angiography can be used to detect gastrointestinal neoplasias of the small bowel that evade endoscopic detection.

Clindamycin-induced lupus erythematosus

Tenzing Phanthok¹, Mark Visitacion^{1,2}

¹Augusta University/University of Georgia Medical Partnership Internal Medicine Residency Program, Athens, GA; ²St. Mary's Health Care System, Athens, GA

Drug-induced lupus erythematosus (DILE) was first implicated in association with sulfadiazine in 1945. It is defined by the development of lupus-like symptoms with temporal exposure of the offending drug and resolution of symptoms with cessation of offending agent. Serologic findings consist of positive antinuclear antibody (ANA) as well as anti-histone antibodies. 71-year-old caucasian female with significant cardiac history and recent hospitalization for an epidural MRSA abscess with discitis requiring surgical intervention and long term intravenous Daptomycin, presented to the hospital in atrial fibrillation with rapid ventricular rate. Labs were remarkable for leukocytosis 11.8 k/mm³ without bandemia, normocytic anemia with Hgb of 9.6 gm/dL, elevated creatinine 1.77 mg/dl, elevated ESR 53 mm/hr, and CRP 0.15 mg/dL. MRI without contrast revealed L4-L5 diskitis and osteomyelitis. Patient was discharged on oral Doxycycline. On her 3-month follow up in the infectious disease clinic, the patient continued to have persistent drainage from an open wound on her back. Labs showed an elevated ESR of 43 mm/hr and repeat MRI negative for acute infection. Doxycycline was replaced by clindamycin. Two months later, patient developed arthralgia in her lower extremities. She was referred to rheumatology who found positive ANA antibodies and positive anti-histone antibody. The offending agent was identified as clindamycin and discontinuation led to symptom resolution soon after.

In the United States, 10% of the 500,000 cases of lupus erythematosus diagnosed each year may be DILE, with patients being predominantly elderly white females. The most commonly associated drugs are hydralazine, procainamide, quinidine, minocycline, and isoniazid. clindamycin induced lupus erythematosus has not been previously reported. Although, death from DILE is extremely rare, complications including renal impairment may result in poor prognosis. Treatment includes discontinuation of the causative agent and may take days to weeks for symptoms to resolve.

Drug-induced pancreatitis by Trulicity, a GLP-1 agonist

Leah Reid¹

¹Piedmont Athens Regional Internal Medicine Residency Program, Athens, GA
Affiliated with the AU/UGA Medical Partnership

INTRODUCTION: Trulicity (dulaglutide) is a glucagon-like peptide-1 (GLP-1) agonist. Its mechanism of action is activation the GLP-1 receptor, which is coupled to adenyl cyclase in pancreatic beta cells, thereby increasing intracellular cyclic AMP leading to glucose-dependent insulin release. Pancreatitis has been reported with the use of Trulicity during clinical trials. Management requires discontinuation of Trulicity promptly when pancreatitis is suspected.

CASE PRESENTATION: A 46-year-old female with type 2 diabetes mellitus who was started on Trulicity 5 weeks prior to her presentation to emergency department for evaluation of abdominal pain. She received two initial weekly doses at 0.75 mg and then increased dose to 1.5 mg x 3 weeks. Her last dose taken on the day prior to presentation. Her abdominal pain was constant, non-radiating, located in the right upper quadrant and epigastrium was described as sharp in nature. Associated nausea but no vomiting. She last drank alcohol 2 weeks prior to presentation. Her vitals were T 36.7°C, HR 98/min, BP 169/95 mmHg. BMI was 45.2. Physical examination was significant for abdominal tenderness in epigastric and right upper quadrant. There was no rebound or guarding. Blood investigations revealed an elevated lipase of 483 and glucose of 156 g/dL. CMP and lipid panel were within normal limits. Right upper quadrant ultrasound showed sludge in gallbladder with no gallstones visualized. CT abdomen did not show peripancreatic stranding or signs of acute pancreatitis. Her Trulicity was discontinued and she was managed with intravenous fluids, anti-emetics and intravenous analgesia. Her symptoms resolved and she was able to tolerate a graduated diet. She was discharged with a liapse of 24 on day 4 of admission.

DISCUSSION: This patient presented with acute pancreatitis based on clinical symptoms and markedly elevated lipase with recent initiation of Trulicity as the likely precipitant. The incidence of pancreatitis caused by Trulicity is low and literature review reveals conflicting reports regarding an increased risk of pancreatitis, despite adverse event reporting to the FDA.

CONCLUSION: Acute pancreatitis is an uncommon side effect of Trulicity. The risks of pancreatitis with GLP-1 agonists, particularly dulaglutide warrants further investigation.

Rash during spring in Georgia

Aliya Safwan¹, Akeem Adebayo¹

¹Piedmont Athens Regional Internal Medicine Residency Program, Athens, GA
Affiliated with the AU/UGA Medical Partnership

Rocky Mountain spotted fever is tick-borne illness that is prevalent in Georgia. However, given its infrequent occurrence and variable appearance of skin rash it has always been a diagnostic challenge. An 81-year-old man presented to his PCP with fever, weakness, and confusion. Blood work was done which revealed thrombocytopenia. Three days later the patient developed a diffuse maculopapular rash and a high-grade fever. His weakness and confusion also worsened and so he presented to ED. In the ED the patient was noted to be febrile, moderately confused with a petechial rash on his lower extremities and a maculopapular rash on upper parts of his body. Patient was thrombocytopenic (Plt count-80,000/mL) and had renal insufficiency with elevated creatinine 2.5(Baseline 1.0). The patient was initially started on supportive management with fluids, antiemetics and antipyretics. On second hospital day his condition deteriorated with worsening of his rash. Blood and urine cultures did not show any growth. RMSF, Ehrlichiosis antibodies, ANA, RF, C3 and C4 levels were sent. The patient was also empirically started on IV doxycycline for a empiric coverage of tick-borne illness and IV steroids for presumed vasculitis. Skin biopsy was also obtained.

Over the next few days significant clinical improvement was noted. Our patient returned to his baseline functional status quickly after initiation of doxycycline. The patient was discharged home on oral doxycycline and two days after his discharge his RMSF antibodies came back positive and skin biopsy showed findings consistent with RMSF. All of the other testing mentioned above came back negative. He completed a 14-day course of doxycycline.

This case illustrates that diagnosis of RMSF cannot be confirmed in its early phase so empiric treatment should be initiated as soon as possible. Response to doxycycline treatment is also a clue that patient has tick-borne illness. This case also highlights the importance of keeping tick-borne illnesses in our differential diagnosis of an abrupt rash during spring season in Georgia.

A Rare Case of Extra-Medullary Plasmacytoma with Cardiac and Pulmonary Metastases

Meet S. Shah¹, Sarfraz Khan², Kristian Skinner², Emma Johnstone², Pete Yunyongying³

¹Augusta University/University of Georgia Medical Partnership Internal Medicine Program, Athens, GA; ²Department of Cardiology, Lancashire Teaching Hospitals NHS Foundation Trust, U.K.; ³Augusta University/University of Georgia Medical Partnership, Athens, GA

CASE DESCRIPTION: A 72-year-old patient with a known history of extra-medullary plasmacytoma (EMP), treated with radiation therapy, presented to Cardiology with increased dyspnea and reduced exercise tolerance. An ECG showed RV strain. Transthoracic echocardiogram revealed one mass in the right atrium and one mass in the right ventricle. Differential diagnoses included thrombus, myxoma, and malignancy. Trans-esophageal echocardiogram found an additional mass in the right ventricle with confirmation of the two prior masses. Positron-emission tomography/computed tomography (PET/CT) was not diagnostic. An endocardial biopsy could not be arranged due to limited resources. Cardiac MRI showed dilatation of the right ventricle with a large mass characteristic of a myelomatous lesion. Diagnosis was heart failure secondary to masses which was treated with diuretics. At an outpatient follow-up, therapy was escalated to include corticosteroids and additional imaging showed extension into the right atrium, indicating progression of the disease. The patient was admitted a month later with worsening symptoms. A chest X-ray showed a small pleural effusion. A diagnostic thoracentesis showed plasmacytosis, confirming the diagnosis of pleural and cardiac metastases of extra-medullary plasmacytoma. The patient was started on botezomib (Velcade™). The patient had no exacerbation of cardiac symptoms. Repeat transthoracic echocardiogram showed a significant reduction in size of the masses. After a prolonged stay in the hospital, the patient died from sepsis of unknown origin.

Crackles in the Prostate

Rida Younus¹, Achilia Morrow^{1,2}

¹Augusta University/University of Georgia Medical Partnership Internal Medicine Program, Athens, GA;

²Augusta University/University of Georgia Medical Partnership, Athens, GA

Emphysematous prostatitis is a very rare sequela of complicated urinary tract infection and is commonly found in patients with immunosuppression, diabetes mellitus with poor glycemic control, liver cirrhosis, alcoholism, or recent urethral instrumentation. Acute bacterial prostatitis is rarely caused by gas-forming bacteria. We report a case of emphysematous prostatitis without abscess in a non-diabetic patient which was successfully treated with antibiotics.

A 78-year-old man, with a known history of prostate cancer status post brachytherapy with radiation 13 years prior, presented to the Emergency Department with a several day history of severe dysuria, fever, chills, dizziness and altered mental status. Of note, four years prior to this event, patient underwent dilation of his urethra and about a month ago started to have a slow urine stream. Patient denied any history of urinary tract infections. Physical examination revealed prostatic crepitation, along with a tender, boggy prostate on digital rectal examination. Subsequent laboratory studies were notable for pyuria on urinalysis, leukocytosis with WBC 20,000 and elevated C-reactive protein. Blood cultures grew *Propionibacterium acnes*. Therefore, the diagnosis was a complicated UTI and IV Ceftriaxone 2g IV QD was initiated. Infectious disease was also consulted and antibiotics were narrowed to IV Penicillin 5 million units Q6. Subsequent CT of the abdomen with contrast revealed air in the bladder lumen as well as in the prostatic urethra. This was concerning for acute emphysematous bacterial prostatitis. Urology was consulted and he underwent a transurethral resection of prostate with biopsy, a cystoscopy and dilation of urethral stenosis. Biopsy results were negative for malignancy and showed eosinophilia and foci of gangrenous necrosis. Patient was discharged on IV Penicillin 5 million units Q6 for 6 weeks. On follow-up in the Infectious disease clinic, his symptoms resolved.

Emphysematous prostatitis is a rare entity with only a few cases reported in literature, with occurrences exclusively in diabetics or immunocompromised individuals. Diagnosis is a challenge in the setting of nonspecific symptoms. Most patients are treated for a complicated UTI. Imaging of the prostate should be performed with CT or transrectal ultrasound in all patients with suspected diagnosis. Gas-forming bacteria are the usual culprits with the most common consisting of *Klebsiella pneumoniae*, *Candida albicans* and *Pseudomonas aeruginosa*. Mortality from emphysematous prostatitis is high and, therefore, immediate drainage/surgical resection is eminent. *P. acnes* is not a usual source of genitourinary infection, however, there is a link with prostate cancer patients. This case illustrates the rare occurring emphysematous prostatitis and the value of a detailed physical examination.

Notes

Notes

Sponsored by

AUGUSTA UNIVERSITY

MEDICAL
PARTNERSHIP

UNIVERSITY OF GEORGIA