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*Medical Partnership
Student Research Symposium*



September 26, 2016

UGA Health Sciences Campus
Russell Hall

*Welcome to the sixth 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 year 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.

The posters represent the results of the students’ 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 with the students and provided the clinical settings in which to learn both the art and science of doctoring.

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Utilization of the emergency department by homeless individuals living with HIV/AIDS

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People living with HIV/AIDS visit the emergency department (ED) significantly more often than their HIV-uninfected counterparts. HIV-infected individuals with a comorbid mental illness or substance use disorder may have a greater frequency of ED visits. The goal of this study was to investigate ED use by homeless individuals living with HIV/AIDS and a mental illness or a substance use disorder. We examined ED use by 79 individuals enrolled in a clinical trial evaluating a patient-centered medical home for homeless individuals living with HIV/AIDS. Primary outcomes were frequency of visits and type of ED visit. In the 12 months prior to study enrollment, there were 198 visits made by 45/79 (57%) subjects. The primary reasons for ED visits included substance use (17%), other reasons (14%), extremity symptoms (13%), and chest pain (11%). Statistical analysis is ongoing and will include any correlations with demographic information, severity of mental illness or substance use disorder, and perceived health. The population was found to have a slightly higher frequency of ED visits than previously reported, which may reflect the comorbid mental illness and substance use in this population or the additional health issues that arise from homelessness. Future statistical analysis should aid in this evaluation.

Freggie and Friends: An Assessment of the Use of Characters to Improve Willingness to Try Fruits and Vegetables among Young Children

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Thirty-two percent of American children ages 2 to 19 are overweight or obese. Further study is needed to understand the food preferences of children in this age group and what can be done to overcome aversions to fruits and vegetables. The purpose of the Freggie and Friends Program is to increase willingness to try fruits and vegetables (FV) among low-income children. One way to decrease food neophobia is to introduce FV to young children via recipe tasting in an entertaining way. Our program, therefore, uses characters (Freggie and Friends) to introduce FV recipes to young children. Recipe tasting with young children may increase recipe acceptance and willingness to try novel foods. The study design is a small scale pilot study to conduct taste tests of FV recipes with low-income children participating in the Summer Food Service Programs (SFSP) in Clarke County, GA. Researchers created recipe tasting stations at two different SFSP sites. At Site 1, characters promoting Freggie (a fun frog character named for loving fruits + veggies) and Friends (FV characters) were present at the recipe tasting station to promote recipes. At Site 2, researchers presented the taste test at the tasting station without characters being present. Taste tests were conducted once per week for a period of four weeks and results were collected via observational methods, The Taste Test Tool, and a Taste and Rate Questionnaire. Preliminary data demonstrated that introducing fruits and vegetables with Freggie and Friends increased willingness to try FV among young children. Data also suggested that young children had limited knowledge and exposure to specific FV prior to recipe tastings. Children had a higher acceptance of fruit recipes than vegetables and were therefore more likely to try those recipes again at home and school. Our findings demonstrated that entertainment education is a promising approach to improve the food preferences of young children and increase their willingness to try FV.

Appraising statin medications role in mitochondrial function using near infrared spectroscopy

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Introduction: Peripheral Arterial Disease (PAD) is a multifaceted disease with inactivity being a major contributor. Statins are first line therapy for the treatment of PAD. Common side effects of statins are impairment of skeletal muscle mitochondria function. Dysfunction could have a deleterious effect on those with PAD. The purpose of this study is to elucidate the influence of statin therapy on PAD pathophysiology in regards to mitochondrial function. **Methods:** Aged adults taking statins (n=3; 66% male; μ = 62 years; SD= 17) were recruited to investigate the potential influence of therapy on mitochondria. NIRS was used to evaluate both mitochondrial capacity and vascular oxygen delivery of the gastrocnemius. Participants were tested on two occasions: once initially, and again following a 2-week statin holiday. Mitochondrial capacity was assessed with brief arterial occlusions and fit to an exponential curve to obtain a time constant. The time course of reperfusion hyperemia after a long period of ischemia was used to assess oxygen delivery. The time constant is inversely proportional to mitochondrial health, while the reperfusion rate demonstrates vascular function. Findings were compared to healthy and PAD cohorts. **Results:** Mitochondrial function before and after the statin holiday were, μ =53.2 (SD= 13.64) and μ =42.54 (SD=14.27) respectively $p < 0.40$. Values were compared to Healthy controls (μ =38.0, SD=10), and those with PAD μ =80.6 (SD=31.3). Reperfusion rates before and after statin intervention were μ =15.68 (SD 11.19) and 20.47 (SD=17.37) respectively $p < 0.71$. Control reperfusion rate was μ =12.7 (SD=4.4); PAD was μ =72.5 (SD=46.7). **Conclusion:** Mitochondria function suggested improvement following the statin holiday. Statin therapy could be contributing to the impaired skeletal muscle adaptation seen in those with PAD. Due to the low population number in this study, further research into this complicated disease and therapeutic interaction is encouraged.

Hypertension control in the Athens Regional Medical Center Community Care Clinic

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Hypertension affects roughly one-third of the adult U.S. population, and when it occurs greatly increases the risk for cardiovascular disease such as heart attack and stroke. Approximately half of the adult hypertensive population has their blood pressure under control. Our objective was to determine the rate of blood pressure control among patients with hypertension in the Athens Regional Medical Center Community Care Clinic (ARMC-CCC) and to identify areas of improvement for hypertension care in the clinic. We conducted a retrospective chart review on all eligible hypertensive patients (n=159) (54.1% female, 45.9% male; mean age 56.6 ± 12.8) who visited the ARMC-CCC from 1 July 2015 to 1 May 2016, collecting data on demographics, antihypertensive medication prescription, blood pressure readings, relevant coexisting conditions, lab values, and lifestyle recommendations. Anonymized data was analyzed with statistical software. We found that the prevalence of hypertension was 48.7% among patients over 25 at the ARMC-CCC seen in our time range, and there was a 58.5% rate of blood pressure control among those patients with hypertension. Patients with coronary artery disease were three times more likely to have uncontrolled blood pressure ($p = 0.019$); Patients with congestive heart failure were five times more likely to have uncontrolled blood pressure ($p = 0.001$). We determined that the rate of blood pressure control among hypertensive patients at the ARMC-CCC is above the national average. Coronary artery disease and congestive heart failure were found to correlate with lower blood pressure control among hypertensive patients. An intervention to improve quality of care could include adapting recommendations on the treatment of hypertension among patients with coronary artery disease or congestive heart failure.

Predictors of readmission for heart failure

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Currently there are over 5 million Americans with Congestive Heart Failure and this number continues to rise. Nationally 30-day hospital readmission rates for heart failure (HF) are incredibly high with about 25% of Medicare patients readmitted by 30 days. The purpose of this study was to show that HF patients embody a unique demographic group amongst patients admitted to the internal medicine service at Athens Regional in regards to age, gender, race, insurance status, and zip code in order to identify patients at high risk of readmission before discharge. We performed a chart review of ARMC's medical records isolating patients with HF diagnosis codes during a 90-day period. We compared demographic variables to a cohort of patients with non-heart failure diagnosis codes during the same period. This created a demographic overview of HF patients, which was compared to patients that were readmitted within 30 days of discharge to determine if they were enriched for a particular demographic. 1,993 total cases were reviewed with 173 HF admissions, and 40 HF readmissions. The HF readmission group was appreciably enriched for older age (avg. 71.4 years), African American race (30%), and Medicare and Medicaid insurance (85%). Interestingly, lack of insurance was highest in the non HF cohort and least in the readmission group (10.9% vs. 2.5%). Higher readmission rates were seen from zip codes with lower per capita income, suggesting additional need in lower income communities.

Cardiac rehabilitation as a predictor for readmission in heart failure patients

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Purpose: Approximately 24% of heart failure patients are readmitted to the hospital within 30 days. Physical activity has been shown to reduce this outcome without increasing the occurrence of cardiovascular-related adverse events. The purpose of this study was to investigate Cardiac Rehab as a means of physical activity as it relates to hospital readmission among heart failure patients. **Methods:** We conducted a chart review of 56 heart failure patients of Athens Cardiology Group (ACG) who have been admitted for heart-failure-related causes within the past year. 28 of the patients were enrolled in Cardiac Rehab (CR). Readmission rates for both groups were calculated based on readmission within 30 days of discharge for related causes. The CR group was measured both before and during the program. A physical activity survey was given to 8 of the patients in each group for both a quantitative and qualitative measurement of activity. **Results:** Readmission rates for CR patients in the program were statistically significantly lower than the ACG group ($p=0.0105$; 0 ± 0 vs. 0.0993 ± 0.2142) as well as CR patients before enrolling ($p=0.0027$; 0 ± 0 vs. 0.0538 ± 0.0939). Rates for CR patients before the program and ACG alone were not statistically significant ($p=0.1540$; 0.0538 ± 0.0939 vs. 0.0993 ± 0.2142). While qualitative physical activity scores for ACG were statistically significantly lower than the CR score ($p=0.0039$; 0.1875 ± 1.7307 vs. 2.9375 ± 1.8213), quantitative physical activity scores were not ($p=0.0512$; 6.7500 ± 10.8496 hrs vs. 24.4588 ± 27.0057 hrs). **Conclusions:** Results suggest that CR reduces the likelihood of patient readmission for heart-failure-related causes within 30 days. Results also suggest that patients in the program have a higher level of self-reported qualitative physical activity while it cannot be concluded from this study whether or not hours of physical activity differ between the two groups.

Comparison of surgical outcomes for ulnar nerve compression at the elbow

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Compression neuropathy of the ulnar nerve at the elbow is the second most common entrapment neuropathy of the upper extremity. Surgical treatment options include simple decompression, decompression with medial epicondylectomy, anterior transposition to a subcutaneous position, and anterior transposition to a submuscular or subfascial position. However, the literature is unable to elucidate the superiority of one procedure over another. The purpose of this study is to use a retrospective chart review to compare two techniques, medial epicondylectomy versus ulnar anterior transposition, to evaluate the outcomes regarding potential for neurological deficits, localized tenderness, and recurrence. Patients who underwent medial epicondylectomy (n=32) were classified into mild (3.1%), moderate (15.6%) and severe (81.3%) categories. For the medial epicondylectomy group, complete resolution of symptoms occurred <6 weeks (12.5%), 6 weeks – 3 months (3.13%), and >3 months (18.75%). Incomplete resolution was documented as improved (65.6%), unchanged (0%), or worse (0%). Scar discomfort was documented as lasting >4 weeks (9.4%) and unresolved (0%). The recurrence rate (3.1%) and need for a second surgery (3.1%) were also recorded. Patients who underwent subcutaneous anterior transposition (n=33) were classified into mild (3.0%), moderate (48.5%), and severe (48.5%) categories. For the subcutaneous anterior transposition group, complete resolution of symptoms occurred <6 weeks (12.1%), 6 weeks – 3 months (12.1%), and >3 months (21.2%). Incomplete resolution was documented as improved (36.4%), unchanged (12.1%), or worse (6.1%). Scar discomfort was documented as lasting >4 weeks (33.3%) and unresolved (24.2%). The recurrence rate (15.2%) and need for a second surgery (39.4%) were also recorded. We concluded that medial epicondylectomy provides less tenderness at the site, less recurrence, and better neurological improvement.

Friedreich's Ataxia and mitochondrial training

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Purpose: The aim of this study was to examine exercise training adaptations in skeletal muscle of a person with Friedreich's Ataxia (FRDA). Friedreich's Ataxia is a congenital, autosomal recessive disease that results from a mutation in the gene for a mitochondrial protein known as Frataxin. **Methods:** A case study was done on a 36-year-old female with FRDA. Four weeks of endurance training was performed using twitch electrical stimulation of the non-dominant forearm. Stimulation frequency was increased in stages from 2Hz to 4Hz to 6 Hz. Training was 30 minutes per day, 3 times per week. Before and after training muscle mitochondrial capacity was measured using near infrared spectroscopy. Muscle specific endurance was measured using twitch stimulations and an accelerometer on the muscle. **Results:** Training sessions started with 4,200 contractions and progressed to 9,420 contractions. Muscle-specific endurance percentage increased after training (pre-training to 83.3% at 2 Hz, 56.2% at 4Hz and post-training 97.1% at 2 Hz and 73.3% at 4Hz). Mitochondrial capacity measured as a rate constant was unchanged after training (pre = 0.95 min⁻¹ compared to 0.99 min⁻¹ post-training). **Conclusions:** The participant with FRDA showed evidence of training adaptations as indicated by increases in training volume and muscle endurance. Mitochondrial capacity did not change, but additional training time and or training intensity might be needed. This study, along with our recently submitted paper characterizing endurance and mitochondrial capacity in people with FRDA, support the use of the mitochondrial test and the endurance test as outcome measures for clinical trials for people with FRDA.

A comparison of communication with healthcare providers in Athens, Georgia and Beni, Bolivia

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Tangible benefits of effective patient-provider communication include more accurate diagnosis, adherence to plan of care, and overall psychological health of the patient (Ha & Longnecker 2010). Cultural barriers can impede effective communication but it is less clear if cultural barriers to communication are different in the US than in other countries. By comparing the patient perspectives of individuals in Georgia and Bolivia, this project examined universal challenges of communicating with biomedical providers. In order to examine communication barriers in different contexts, we designed a semi-structured interview to conduct with a convenience sample of participants in Georgia, US (n = 7) and Beni, Bolivia (n= 8) (60% male, avg age =40). Interview responses were analyzed for emerging themes in each location and compared across locations. Participants in both locations identified problems accessing health care and a desire to have information about treatment from their health care providers. In contrast, two themes differed across the sites. First, participants in Georgia have a greater breadth of expectations of providers than do Tsimane' participants. Georgians reported two primary difficulties: structural and perceived preemptively dismissed concerns. Tsimane' participants reported difficulties accessing healthcare. Second, each group had a more complex etiological explanatory model for the more common diseases in the region. Although the two study groups have different cultural features, languages, and socioeconomic circumstances, Georgians and the Tsimane' both reported challenges accessing health care. However, differences across the study groups also suggest that US providers in Georgia may meet a greater variety of communication expectations from their patients than those in Beni, Bolivia.

Novel methods to study human astrocytes in vitro

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Astrocytes are a major component of various brain functions. The Ras/MapK pathway in astrocytes plays several important roles, most of which are not well understood. For instance, this pathway in Costello Syndrome is overactivated, leading to a pathologic impairment of cognitive and social function. Here, we aim to utilize transgenic technology and pluripotent stem cells (iPSCs) from Costello Syndrome patients (with mutant HRAS) to derive astrocytes for comparing cellular morphology and function to control cells. To regulate Ras/MapK signaling, our focus is to develop tools in these human astrocytes by introducing an ectopic plasmid encoding an optogenetic system, specifically to express a previously reported membrane-bound Phytochrome B that recruits a Ras activator to the membrane in the presence of 650nm light. We used human embryonic kidney (HEK) cells to troubleshoot transgenic expression of the optogenetic constructs using Lipofectamine 2000. Preliminary data suggest using Lipofectamine2000 is very effective in HEK cells but not so much in astrocytes; mice or human. However, even without use of the transgenic system, Costello syndrome astrocytes appeared larger and more complex when compared to wildtype controls. The morphology complexity phenotype was observed in a three-dimensional organoid system. Further troubleshooting is required to find more effective methods of transfecting human astrocytes with optogenetic constructs and more work needs to be done to analyze the differences between Costello Syndrome and wildtype astrocytes. Once better understood, therapies targeting the Ras/MapK pathway in astrocytes can be used to treat not only Costello Syndrome patients but also patients with genetic syndromes due to other RASopathies.

The effects of inorganic and organic fertilizers on the West Nile virus vector, *Culex quiquefasciatus*

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Vector-borne pathogens pose a significant public health concern as human populations increase and organisms are pushed out of their natural habitats into closer contact with humans. Specifically, mosquitoes pose a prominent threat worldwide as they are vectors for numerous diseases and provide the means for transmission over large areas. In urban United States cities, the mosquito, *Culex quiquefasciatus*, is the main vector of West Nile Virus (WNV). WNV is an arbovirus which can cause a deadly neurologic illness and has contributed to numerous deaths. Additionally, anthropogenic effects such as nutrient run-off from fertilizer usage can alter ecosystems dynamics. With increasing fertilizer usage, pooling of nutrient dense runoff provides potential larval habitats. Our larval study aimed to determine the effects of organic and inorganic fertilizer on important *C. quiquefasciatus* life history traits including: emergence time and wing length. Our preliminary study manipulated the environment of *C. quiquefasciatus* larva in microcosms with stream water with or without inorganic or organic fertilizer to determine nutrient effects on *C. quiquefasciatus* emergence time and wing length. We found that *C. quiquefasciatus* raised in stream water alone or with high organic fertilizer were larger than mosquitoes raised in inorganic fertilizer. Additionally, mosquitoes emerged earlier when raised in stream water alone and high organic fertilizer. Studies have shown that larger mosquitoes on average are more fecund than smaller mosquitoes. Thus, our preliminary study suggests inorganic and organic fertilizer has the potential to alter the population size of *C. quiquefasciatus* through changes in life history strategies. Larger field studies are necessary to confirm fertilizer's ability to alter mosquito populations and possibly contribute to changes in WNV and other vector-borne disease spread.

Case based curricula: Assessing the opportunity for pre-test probability in evaluating a clinical problem

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As part of the diagnostic process, clinicians build a differential for their patient's clinical problem (CP). Each disease in the differential has a certain pre-test probability. We define pre-test probability (PTP) as the probability of a disease (i.e., prevalence) before the application of the results of a physical finding or test result. This allows the use of a systematic approach to diagnosing an illness. The purpose of this study is to evaluate the application of PTP into a medical school's case-based learning (CBL) curriculum. We surveyed the cases in the AU/UGA Medical Partnership's preclinical CBL and compiled a list of CPs tied to the patient's chief complaint. We conducted a literature search for evidence that could inform the pre-test probabilities of the differential diagnoses each case. Resources included PubMed, UpToDate, Essentials of Evidence +, and bibliographies of several textbooks. Articles were chosen based on three metrics: primary research or systematic review of the CP, description of data collection, and the article reported disease frequencies. A positive finding was set as at least two citations addressing the patient's CP. We did not critically appraise the articles for two reasons: 1) time constraints and 2) the appraisal of evidence is to be performed by med students for their learning. Over the course of 72 weeks (M1 and M2 years) and 111 cases, citations were found for 109 of the 111 cases (98.1%); that is, citations were found for 71 of the 72 weeks (98.6%) of CBL. This strengthens the claim that there is a wealth of information supporting the use of PTP for CPs in clinical practice. For all of the first year and all-but-one of the second year cases, evidence was found supporting the use of evidence based medicine practices for presenting clinical problems. This should be encouraging for the AU/UGA Medical Partnership, in that their case-writing goals are being met. It should also be exciting for other medical schools pursuing the implementation of CBL into their curriculum. These findings also demonstrate that evidence is abundant, contrary to common belief.

Dermatologic care amongst primary care providers in a volunteer-run free clinic

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Purpose: Mercy Health Center (MHC) is a volunteer-run clinic that provides free medical care to low-income, uninsured patients. A previous study revealed that MHC's dermatology clinic had a lengthy wait time of 212 days. A skin lesion reference chart and treatment guidelines were compiled to aid primary care providers (PCPs) in treatment and referral decisions. At MHC's request, we initiated a follow-up study to determine current wait times, assess the previous intervention's effectiveness, and identify ways to improve dermatologic care.

Methods: Twenty-six PCPs at MHC were invited via email to participate in an in-person standardized interview. Providers' care of skin conditions was assessed by self-perception of dermatology knowledge (scale 1-10), referral practices, and awareness of available dermatology resources at MHC. Their ideas for improvement were requested. Mean dermatology wait list time was recalculated. **Results:** Fifteen PCPs participated in the interviews. Mean comfort level was 7.6 (range 5.9-8.4) for diagnosing and 7.4 (range 5.8-8.6) for treating common skin conditions. Only 17% of PCPs had seen the skin lesion reference chart, and none had seen the treatment guidelines. After reviewing these, 93% rated the chart and 87% the guidelines as somewhat to very useful. Providers recommended improving resource accessibility and organization and adding a wound care guide. The new mean wait time was 122 days. **Conclusion:** PCPs at MHC expressed a relatively high comfort level in diagnosing and treating common dermatological problems, with the exception of treating psoriasis. Currently available resources are not fully utilized. Thus, the decreased wait time is unlikely due to the original intervention. To meet stated needs of PCPs, the skin lesion reference chart and treatment guidelines were revised. A wound care treatment algorithm was developed. MHC will incorporate treatment guidelines into the electronic medical record system through standardized order sets.

School Based Health Centers to Advance Health Equity: A Community Guide Systematic Review

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Context: Children from low-income and racial or ethnic minority populations in the U.S. are less likely to have a conventional source of medical care and more likely to develop chronic health problems than are more-affluent and non-Hispanic white children. They are more often chronically stressed, tired, and hungry, and more likely to have impaired vision and hearing—obstacles to lifetime educational achievement and predictors of adult morbidity and premature mortality. If school-based health centers (SBHCs) can overcome educational obstacles and increase receipt of needed medical services in disadvantaged populations, they can advance health equity. **Evidence acquisition:** A systematic literature search was conducted for papers published through July 2014. Using Community Guide systematic review methods, reviewers identified, abstracted, and summarized available evidence of the effectiveness of SBHCs on educational and health-related outcomes. Analyses were conducted in 2014–2015. **Evidence synthesis:** Most of the 46 studies included in the review evaluated onsite clinics serving urban, low-income, and racial or ethnic minority high school students. The presence and use of SBHCs were associated with improved educational (i.e., grade point average, grade promotion, suspension, and non-completion rates) and health-related outcomes (i.e., vaccination and other preventive services, asthma morbidity, emergency department use and hospital admissions, contraceptive use among females, prenatal care, birth weight, illegal substance use, and alcohol consumption). More services and more hours of availability were associated with greater reductions in emergency department overuse. **Conclusions:** Because SBHCs improve educational and health-related outcomes in disadvantaged students, they can be effective in advancing health equity. (AmJ Prev Med 2016;51(1):114–126) Published by Elsevier Inc. on behalf of American Journal of Preventive Medicine

Let's take the stairs, an effort to prevent and manage diabetes**Adolphia A. Lauture¹, Jennifer L. Gay, PhD²**¹Medical Scholars Program, AU/UGA Medical Partnership, Athens, Georgia;²Department of Health Promotion and Behavior, College of Public Health, University of Georgia, Athens, Georgia

Introduction: The purpose of this pilot study was to see the effects of short episodes of vigorous-intensity exercise on regulating blood glucose in patients at risk for type 2 diabetes. **Methods:** Eight overweight or obese individuals (88% female, 54.88 years old +/- 5.13 years), with an Hb A1c in the range of 5.7-6.4% participated in the study. The study design was a randomized crossover design with two exercise protocols. The 2x8 protocol consisted of two minutes of stair climbing every hour for eight hours. The 4x4 protocol consisted of four minutes of stair climbing every two hours for eight hours (16 minutes total stair climbing for both protocols). Blood glucose was measured via interstitial fluid with a continuous glucose monitor placed on the abdomen. To examine the differences in mean blood glucose area under the curve (AUC), separate repeated measures ANOVAs were employed. **Results:** There was a significant difference in the mean twelve hour blood glucose area under the curve, where the 4x4 (222.48, 9.90) was greater than the sedentary (205.04, 5.22) and 2x8 day (202.77, 7.34; p0.015). There was no significant difference in the compared mean blood glucose area under the curve for the two hour postprandial breakfast, lunch and dinner. There were also no significant differences in the estimated kilocalories of energy expenditure during the sedentary, 2x8, or 4x4 protocol days. **Discussion:** The mean twelve hour blood glucose area under the curve was highest on the 4x4 protocol. The participants were sitting or sleeping when not performing exercise on the 2x8 and 4x4 protocol days. During periods of activity the body utilizes glucose for energy and also undergoes glycogenolysis, which may explain the slightly higher glucose area under the curve for protocol 4X4. The next study would look at the effect of stair climbing on mean blood glucose area under the curve in addition to normal daily activities.

Meta-analysis of resting-state functional networks in autism spectrum disorder**Zhijia Liang¹, Hanbo Chen², Jinglei Lv², Yu Zhao², Wei Zhang², and Tiangming Liu²**¹Medical Scholars Program, AU/UGA Medical Partnership, Athens, Georgia;²Department of Computer Science, University of Georgia, Athens, Georgia

Current perspectives and evidence from recent decades describes neural activity as a network phenomenon. As opposed to focal regions participating solely in binary input-output mediation, the whole brain behaves as a highly-connected and distributed set of functional networks. Advances in imaging methods and computational techniques now allow for increasingly complex characterization and analysis of such networks in terms of function, distribution, and behavior. Graph theoretical analysis has also been used extensively to quantify and describe neural network parameters. Recent works conducted at the University of Georgia (UGA) Cortical Architecture Imaging and Discovery (CAID) laboratory revealed the existence of 144 group-wise common resting-state functional networks in both healthy controls (HC) and autism spectrum disorder (ASD) patients. Of the resting-state networks (RSNs) identified, 16 exhibited significant deviation from normal templates, with 4 showing significantly higher functional connectivity in ASD patients and 12 showing significantly higher functional connectivity in HC. These networks, their spatial distribution, normal function, and potential contribution to the underlying neuropathology and clinical manifestations of ASD due to their altered connectivity patterns are described here.

Effect of thioredoxin interacting protein in retinal inflammation in high fat diet models

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Introduction: Current evidence suggests that diet-induced obesity can contribute to both diabetic retinopathy (DR) in diabetic patients and in non-diabetic patients with the components of the metabolic syndrome. While the link between diabetes and DR is well-established, little is known about the association between obesity and DR. Objective: Investigate the mechanism of high fat diet (HFD) in retinal inflammation. We explored this relationship by measuring the expression of thioredoxin interacting protein (TXNIP) and inflammasome activation in isolated primary Muller cells, the main glial cells in the retina. **Methods:** Isolated primary Muller cells from TXNIP knockout (TKO) and wild type (WT), were cultured and subsequently exposed to either palmitate or hypoxia (1%) oxygen. Cells in "Pal" groups were stimulated with PAL-BSA (400 μ M), while cells in the control group were stimulated with BSA concurrently. Cells in the hypoxia group were stimulated in (1%) oxygen while control group remained in normoxic conditions. NLRP3-inflammasome activation was evaluated with ELISA and western blot for the following: NLRP3, Caspase-1, IL-1 β , and IL-18. **Results:** Palmitate significantly upregulated NLRP3 expression in PMC isolated from WT mice, which was associated with an increase in IL1 β . Knocking out TXNIP nullified the effect of palmitate on inducing NLRP3-inflammasome activation. Interestingly, similar findings were obtained with our hypoxic model. We found that exposing Muller cells to hypoxia led to an elevation in IL1 β expression in cells isolated from WT mice but has no effect on TKO cells. **Conclusion:** This study further elucidates the mechanism of the metabolic syndrome, namely obesity, on DR. Additionally, given that glycemic control has a threshold benefit in the management of DR, this study may begin to open up alternate therapeutic routes for the management and/or delay of DR.

Hypertension control in the Athens Regional Medical Center Community Care Clinic

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Hypertension affects roughly one-third of the adult U.S. population, and when it occurs greatly increases the risk for cardiovascular disease such as heart attack and stroke. Approximately half of the adult hypertensive population has their blood pressure under control. Our objective was to determine the rate of blood pressure control among patients with hypertension in the Athens Regional Medical Center Community Care Clinic (ARMC-CCC) and to identify areas of improvement for hypertension care in the clinic. We conducted a retrospective chart review on all eligible hypertensive patients (n=159) (54.1% female, 45.9% male; mean age 56.6 \pm 12.8) who visited the ARMC-CCC from 1 July 2015 to 1 May 2016, collecting data on demographics, antihypertensive medication prescription, blood pressure readings, relevant coexisting conditions, lab values, and lifestyle recommendations. Anonymized data was analyzed with statistical software. We found that the prevalence of hypertension was 48.7% among patients over 25 at the ARMC-CCC seen in our time range, and there was a 58.5% rate of blood pressure control among those patients with hypertension. Patients with coronary artery disease were three times more likely to have uncontrolled blood pressure ($p = 0.019$); Patients with congestive heart failure were five times more likely to have uncontrolled blood pressure ($p = 0.001$). We determined that the rate of blood pressure control among hypertensive patients at the ARMC-CCC is above the national average. Coronary artery disease and congestive heart failure were found to correlate with lower blood pressure control among hypertensive patients. An intervention to improve quality of care could include adapting recommendations on the treatment of hypertension among patients with coronary artery disease or congestive heart failure.

Which mammary papillomas warrant excision? The application of morphologic stratification in predicting risks of associated cancer in 374 core biopsied papillomas with surgical follow-up

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Many previously published reports have suggested that mammary papillomas identified by core-needle biopsy, even those without associated atypia, carry a significant risk of concurrent adjacent carcinoma. We proposed that by studying the largest cohort of papilloma patients to date and by applying careful exclusion criteria, we might be able to identify a majority subset of patients for whom lumpectomy has very low cancer yield. Retrospective review utilizing the Northside Hospital computer data base showed 374 cases of breast papilloma on core biopsy followed up with lumpectomy within 18 months. Excluded were core biopsies with a diagnosis of papilloma with carcinoma in situ, infiltrating carcinoma, atypical hyperplasia, or radial scar formation outside the papilloma. The papillomas were divided into: papilloma with epithelial atypia; papilloma without atypia but with sclerosis; and papilloma without atypia or sclerosis. All core biopsies and corresponding lumpectomies were then reviewed in a blinded fashion and the results were tabulated. Of the 1,390 papilloma core biopsies, 374 cases satisfied the exclusion criteria: 65 atypical papillomas; 159 papillomas without atypia but with sclerosis; and 150 papillomas without atypia or sclerosis. Not surprisingly, the 65 lumpectomies performed for atypical papilloma yielded 21 cases (32%) with atypical hyperplasia or nonspecific cytologic atypia, 13 cases (20%) with in situ carcinoma, and 3 cases (5%) with invasive carcinoma. The 159 lumpectomies performed for papilloma without atypia but with sclerosis yielded 11 cases (6.9%) with atypical hyperplasia or cytologic atypia, one case (0.6%) with in situ carcinoma, and zero cases with invasive carcinoma. The 150 lumpectomies performed for papilloma without atypia or sclerosis yielded 11 cases (7.3%) with atypical hyperplasia or cytologic atypia, one case (0.7%) with in situ carcinoma, and zero cases with invasive carcinoma. As reported in the existing literature, the upgrade rate for atypical papillomas is sufficient to warrant lumpectomy. However, the findings in many previous studies with smaller patient populations suggested that the upgrade rate to malignancy at lumpectomy was also unacceptably high for patients with nonatypical papillomas. Our study shows that morphologic stratification may identify a majority subset of patients (83% in our series) with low risk for harboring carcinoma at lumpectomy. These patients may then be considered for follow-up observation rather than surgery.

Assessing mitochondrial capacity in aged adults using near-infrared spectroscopy

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Introduction: Peripheral arterial disease (PAD) is a common manifestation of atherosclerosis with an incidence of approximately 12% in US adults. The classic symptom is claudication, or pain with walking, that results from localized ischemia. Two mechanisms that are not fully understood are the extent of which mitochondrial dysfunction and lower limb ischemia contribute to the symptoms of PAD. Near-infrared spectroscopy (NIRS) presents an effective method of assessing these mechanisms and could have diagnostic and therapeutic value in a clinical setting.

Methods: Aged adult participants (N=11, mean age=60.9 years, SD=12.3) were recruited to serve as the healthy control group in a study investigating NIRS-guided exercise therapy for individuals with PAD. All controls participated in a one-day testing session. NIRS was used to evaluate both mitochondrial capacity and vascular oxygen delivery of the gastrocnemius muscle. Mitochondrial capacity was assessed with brief arterial occlusions and fit to an exponential curve to obtain a time constant. The time course of reperfusion hyperemia after a long period (up to 5 minutes) of ischemia was used to assess oxygen delivery. **Results:** Mitochondrial capacity for healthy controls ($\mu=38.0$, $SD=10.2$) differed significantly from individuals with PAD, both pre-exercise intervention ($\mu=80.6$, $SD=31.3$, $p<.001$) and post-exercise intervention ($\mu=50.9$, $SD=19.7$, $p=.025$). Reperfusion rate in healthy controls ($\mu=12.7$, $SD=4.4$) differed significantly from the PAD group, both pre-exercise intervention ($\mu=72.5$, $SD=46.7$, $p<.001$) and post-exercise intervention ($\mu=65.8$, $SD=51.5$, $p<.001$). **Conclusion:** Our findings support that individuals with PAD have significant mitochondrial impairment in comparison to their healthy peers. This impairment is present both pre and post exercise intervention but significantly improves post intervention. Further exploration of these mechanisms has important clinical applications in the detection and treatment of PAD.

Evaluation of Global Health Security Agenda and United States funding goals

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In 2014, the US created the Global Health Security Agenda (GHSA). The GHSA contains action packages focusing on improving global capacity to prevent, detect, and respond to public health threats. This abstract will analyze how US backed programs match up with widespread areas of most need. The GHSA has completed evaluations (JEEs) in nine countries (n=9), which I have analyzed in order to identify gaps in capacity between developed and developing countries. We also conducted qualitative interviews with representatives (n=14) from MENA region countries to identify perceived healthcare gaps. Finally, we compared the US funded areas of development to the identified areas of greatest need. Through interviews we found that communications, education, and peripheral response are the areas perceived to need the most improvement (noted 86%, 79%, and 64% respectively). In analyzing JEEs, we found gaps in response programs, where the capacity of developing countries is less than 60% of that in developed countries. However, US funded projects tend to focus on prevention and detection where capacity may be as high as 88%. Our findings show that while there is some limited overlap between the US funded projects and the areas of most need, and that is in the area of response. The US is not addressing the areas where the largest gaps in capacity lie. Using this data as a starting point the, US should look at rate of return analyses to determine if we using GHSA funding most effectively.

Developing a strategic plan for RTS,S malaria vaccine rollout: A case competition proposal from the World Health Organization perspective

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Background: Malaria is a vector-borne disease spread by female Anopheles mosquitos. Caused by Plasmodium parasitic protozoa, malaria accounts for a significant amount of disease burden in the African region (AFRO). In 2015, there were 214 million new cases of malaria, about 90% of cases occurring in Africa and a significant amount of cases occurring in children. The majority of cases in the African region and worldwide are due to Plasmodium falciparum. Present malaria control efforts include insecticide-treated bed nets (ITN), indoor residual spraying (IRS), and antimalarial drug therapy. These methods vary in efficacy but have been threatened by growing insecticide and drug resistance. A vaccine presents a potential alternative against these growing problems. RTS,S has been shown to be effective, particularly in children. In 2015, the European Medicines Agency gave the vaccine a positive assessment and the World Health Organization (WHO) has expressed interest in moving forward with the vaccine. Targeted at P. falciparum, RTS,S has the potential to help reduce malaria burden and move toward elimination.

As Global Health fellows in the Duke Program on Global Policy and Governance, we were tasked with proposing a rollout strategy for the RTS,S vaccine assuming it would be approved by 2020. The strategy is from the perspective of WHO, a member state-based organization providing technical advice for matters of global health concern.

Utility of gray-matter segmentation of ¹⁸F-FDG-PET in identifying focal cortical dysplasias

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Focal cortical dysplasias (FCDs) are the most common cause of medically refractory epilepsy in pediatric patients and the second/third most common etiology in adults. Patients with FCDs are frequently refractory to antiepileptic medications. Surgical treatment can be highly effective, but many FCDs are subtle and difficult to identify on neuroimaging. FCDs are known to frequently show abnormal glucose metabolism on ¹⁸F-FDG-PET. This study compares the identification of FCDs with and without segmentation of gray matter portions of the coregistered ¹⁸F-FDG-PET. A sample of 31 adult and pediatric patients with a total of 34 MRI-positive and/or pathology-positive areas of cortical dysplasia were included in the study. MRI gray-matter segmentation was used to identify cortical regions in coregistered ¹⁸F-FDG-PET scans. Voxel coordinates of abnormal ¹⁸F-FDG-PET metabolism were compared to those in MRI-positive findings or surgical resection sites in pathology-positive results. Level of correspondence between modalities was recorded as the same subgyrus (highest correspondence), gyrus, sublobe, lobe, hemisphere, or no correspondence. With segmentation 82% (28/34) of cases had at least one area identified as concordant with MRI-positive and/or pathology-positive results at subgyral levels. Without segmentation only 38% (13/34) of cases showed subgyral concordance. In fact, viewing of ¹⁸F-FDG-PET without segmentation failed to identify up to 5 cases of dysplasia at any anatomical level. Segmented ¹⁸F-FDG-PET scans yielded high correspondence with MRI-positive and/or pathology-positive results, more than doubling detection rate of hypometabolic subgyri with FCDs compared to non-segmented ¹⁸F-FDG-PET. Segmentation of gray matter portions of ¹⁸F-FDG-PET can facilitate the identification of small, subtle epileptogenic cortical regions often obscured by normally hypometabolic white matter.

NUT midline carcinoma presenting in an infant as a pericardial mass with staging by FDG PET/CT

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NUT midline carcinoma (NMC) is a rare type of poorly differentiated epithelioid cancer, unique in that is defined genetically rather than by histological tissue of origin. It arises from any kind of tissue in the midline of the body and presents as a mass with metastasis. Patients usually have a poor clinical response to aggressive therapy. Fewer than 100 cases of NMC have been reported in literature, and even less reports concerning how this cancer can be detected and monitored by imaging modalities. In this case study, an infant presenting with pneumonia was found to have a pericardial mass, which was resected and pathologically determined to be NMC. Subsequent staging positron emission tomography (PET) showed residual mediastinal tumor and midline abdominal metastases that did not respond to following treatment. PET appears to be the imaging modality of choice in complete staging and evaluation of NMC treatment response. Because NMC is likely underdiagnosed, especially in older patients, future research should focus on utilizing PET alongside other imaging techniques to properly diagnose NMC in its early stages in order to optimize treatment of this aggressive cancer.

Androgenic to estrogenic switch in human adult prostatic tissue: Opportunities for personalized care for patients with BPH

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Benign prostatic hyperplasia (BPH) is a global health problem affecting more than 90% of men over the age of 80. Progressive enlargement of the prostate gland, the only solid organ that grows during adulthood, has been linked to bladder outlet obstruction and irritative lower urinary tract symptoms that can impact an individual's quality of life and in severe cases, lead to irreversible bladder dysfunction and renal failure due to inadequate emptying of urine. Despite their widespread use and clinical effectiveness, 25-30% of patients are resistant to the therapeutic effect of 5-alpha reductase inhibitors, medications that target the gene responsible for development and growth of prostate. We have found the 30% of adult men do not express 5-alpha reductase 2 due to epigenetic changes associated with the gene that are mediated via inflammatory mediators like Tumor Necrosis Factor-alpha (TNF α). The purpose of this study was to elucidate the alternative pathways when 5-alpha reductase 2 is silenced. This study focused on SRD5A2 and aromatase, enzymes that contribute to prostate development and growth. Prostate stroma cells were cultured and treated with varying concentrations of TNF α . RNA was extracted via RNA Shredder and RNeasy kit. The resulting RNA was analyzed using a one step qPCR to determine relative gene expression between the samples. Data was compared to a control using the $\Delta\Delta CT$ method. The initial results indicated that treatment with TNF can yield a 2-fold decrease in SRD5A2 expression in stroma cells while resulting in an decrease expression of aromatase. This suggests that in human adult prostates, TNF may contribute to SRD5A2 expression and prostatic growth in patients. Overall, a better understanding of epigenetic changes that affect SRD5A2 and aromatase expression in the prostate will have broad implication for offering personalized care for patients suffering from BPH.

Impact of structured interdisciplinary bedside rounding on quality outcomes and provider satisfaction at an acute care community hospital

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Fragmented "silo" work and communication breakdown have been cited as contributing factors to poor healthcare quality and root cause of over 60% reported sentinel events, respectively. Structured interdisciplinary bedside rounding (SIBR) is a process designed to streamline interprofessional collaboration via team-based patient-centered communication at the bedside. SIBR has been associated with positive outcomes so far, but further investigation is warranted to evaluate the transferability of benefits to community hospital settings. The purpose of this study was to evaluate the effects of SIBR on hospital quality outcomes and provider satisfaction at a 167-bed acute care community hospital. Quality data was obtained from April 2015 – March 2016 for eight hospitalist physicians and stratified by %SIBR-participation. Provider satisfaction surveys were administered in June-July 2016 and stratified by %SIBR-participation and unit. ANCOVA and ANOVA were used to determine differences for unstandardized and standardized variables, respectively. Tukey-Kramer multiple comparison procedure was used to for post-hoc pairwise comparisons, and two-sample t-test was used to examine differences in survey responses based on unit. Only one hospital variable, average daily charge, showed a significant trend between SIBR participation levels, however post-hoc pairwise analysis did not show differences. Non-physician provider surveys showed significant differences between high- vs. low-SIBR groups with regard to teamwork, collaboration, knowing the plan of care, obtaining information from the physician, and overall communication. We did not find an effect of SIBR on length of stay or in-hospital mortality as in previous studies. Small sample size, multiple SIBR-participation levels, and inconsistent application of SIBR may have limited our ability to detect these effects. Non-physician provider satisfaction findings for teamwork, collaboration and related communication variables are consistent with previous work in this area, and to our knowledge, this is the first report to include non-nurse team members in surveys related to interdisciplinary bedside rounding.

Utilization of veno-arterial extracorporeal membrane oxygenation in the management of cardiogenic shock

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Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) is one of several treatment options for patients with cardiogenic shock. Unlike alternative treatments—such as ventricular assist devices (VADs)—VA-ECMO can be inserted quickly and at the patient's bedside. However it remains unclear whether VA-ECMO is the most effective treatment option for cardiogenic shock. The purpose of this study is to compare short-term and long-term outcomes of patients who received ECMO in the management of their cardiogenic shock to those who did not. A retrospective chart review is being performed by extracting data from over 140 patient charts for statistical analysis. Some of the outcome measures include duration of ECMO support, time to destination therapy, ICU survival, length of stay in the hospital, mean follow up, and mean survival. No results have yet been produced, as this is still an ongoing study. We expect enough data for statistical analysis comparing VA-ECMO to other treatment options in the setting of cardiogenic shock. By doing so, this study could provide evidence to support a treatment protocol in managing these patients.

Implantable hemodynamic monitors and their effects on diuretic regimens and eGFR

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Introduction and Purpose: The CardioMEMs (CMEMs) device is an implantable pulmonary artery pressure monitor used in the management of patients with New York Heart Association Class III heart failure. The CHAMPION Trial, conducted throughout the US, showed that patients implanted with the device had less readmissions than those patients who did not have the device. Analyses of the data have suggested that the efficacy of the device is due to more rigorous diuretic regimens to improve hemodynamic congestion. The purpose of this project was to test whether or not this hemodynamic optimization was being achieved at the expense of renal function. **Methods:** A chart review was conducted on patients in the Athens area that have an implanted CMEMs device (n=7, 86% male, mean age of 75 years) to collect serum creatinine levels and determine the eGFR within +/- 30 days of implantation via the Cockcroft-Gault equation. Systolic, mean, and diastolic pulmonary artery pressures were graphed versus time along with eGFR. The trends in these graphs were then described and analyzed. **Results and Discussion:** 5 of the 7 implanted patients saw an overall downward trend in their eGFR vs. time plots. This is significant because while all patients saw a reduction in their mean pulmonary artery pressures, this reduction could be happening at the expense of their renal function. In the future statistical analyses will be conducted to determine if the overall decline in eGFR was significant and if it can be attributed to more rigorous diuretic regimens.

Evaluation of bilateral femoral reactive periostitis

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Reactive periostitis is a documented phenomenon typically presenting unilaterally and affecting the bones of the hands and feet. This case was significant for acute reactive periostitis of the bilateral femurs. Although uncommon there are some cases of bilateral involvement and they were reviewed and applied to this case during evaluation. This was a case of a 49 year old male with no significant past medical history due to low access of care. He underwent I and D two weeks prior to admission and was placed on antibiotic therapy. He was found to be in hypertensive urgency as well as had an A1C of 14 at that time.

One day post discharge at outside facility he was noted to have profound bilateral leg pain from his proximal thigh to his infra-patellar region. He denied any focal neurological deficits. Upon admission spinal MRI was unrevealing for an acute process or focal impingement. He was found to have bilateral periostitis of the femur on LE MRI. Rheumatology service was consulted secondary to his pain as well as positive speckled ANA. Follow up autoimmune workup was unrevealing. He was eventually discharged on NSAID and steroid taper with acute outpatient follow up.

Acute periostitis has a defined differential. Differential included acute metabolic, fluid shift pathology, or post infective process. Syphilis titer was negative. He did not have evidence of polyarteritis nodosum based on diagnostic criteria. He had negative blood cultures lowering risk for smoldering osteomyelitis. Based on clinical review there are case studies showing correction of hyperglycemia that can result in a reactive process. Confounding the workup was the bilateral nature of the symptoms as well as long bone distribution in the femurs. The treatment modality revolved around po steroid taper as well as NSAID therapy. He was followed up on in the outpatient setting with improvement of his symptoms as well as improvement in his functional status.

Cocaine and Coma

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Cocaine is consumed by 5.3 million people in the United States and is responsible for over 500,000 emergency room visits annually. It may precipitate severe health complications including seizures, stroke, heart attack, and cardiac arrhythmia leading to anoxic brain injury and death. The patient was ultimately found to have myxedema coma but his initial hospital course was complicate by a positive urine toxicology screen for cocaine. The patient is a 60-year-old African American male with a history of polysubstance abuse, poor medication compliance, and hypothyroidism. He presented with gross altered mental status, progressing to coma. Initially symptoms were attributed to cocaine abuse and likely anoxic injury though imaging was not necessarily consistent with that diagnosis. Ultimately he was found to have an elevated TSH with a low free T4. He was given levothyroxine, IV, and awoke, was extubated, and returned home with his family. Myxedema coma is a rare presentation of hypothyroidism, and was the patient's final diagnosis. His patient's case diagnosis was delayed secondary to the anchoring bias caused by the initial finding of a positive toxicology screen for cocaine. Self-monitoring for this bias is extremely important for preventing anchoring bias in medical providers.

Multiple Sclerosis (MS) is characterized by autoimmune demyelination of the central nervous system presenting as isolated focal neurologic deficits that either relapse and remit or progress with gradual accumulation of deficits.

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A 54-year-old male presented to the emergency department with a chief complaint of facial droop for three weeks duration that had recurred on several occasions over 3 years. Each resolved over the course of several weeks. He also had right sided tinnitus he believed began after the onset of symptoms. Medical history was significant for uncontrolled hypertension, hyperlipidemia, and diabetes. Examination showed right-sided facial nerve palsy that included the forehead, resembling a Bell's Palsy. There were no other pertinent findings on examination. Labs showed no abnormalities other than uncontrolled blood glucose levels. A head CT without contrast showed no acute hemorrhage, but revealed evidence of moderate small vessel disease and an old left cerebellar infarct. Carotid Doppler ultrasound, transthoracic and transesophageal echocardiogram were negative for a source of embolic stroke. Brain MRI showed multifocal densities of increased T2 signal in the periventricular white matter, non-specific but consistent with small vessel disease versus MS and evidence of a past stroke in the cerebellum. A second exam of the patient revealed spasticity of the right ankle with ambulating and a positive Hoffman's sign resulting in clonus of the thumb. Lastly, a lumbar puncture was performed and revealed greater than 4 oligoclonal bands, IgG synthesis rate elevated to 15.72, and CSF IgG of 5.5 (elevated). These results, along with the patient's multifocal neurologic signs led to a diagnosis of Chronic Progressive MS.

This case illustrates MS that presented as a facial nerve palsy resembling Bell's Palsy. Facial nerve palsies are present in 3-5% of MS patients. If there are neurologic deficits other than facial nerve palsy, Bell's Palsy is an unlikely diagnosis. A distinguishing feature between MS and Bell's palsy is recurrence; recurrence of deficits is a hallmark of MS, whereas it only occurs 7% of the time in Bell's Palsy. Another consideration is whether a presentation resembling Bell's Palsy should be investigated with brain MRI to look for higher morbidity and mortality diseases such as an acute stroke or MS. This case suggest if a facial nerve palsy seems to be an isolated recurring deficit, a thorough exam must be performed to search for other neurologic deficits and brain MRI considered to look for higher morbidity disease like MS.

All that wheezes is not asthma; all that wheezes is obstruction

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Wheezing is a continuous high-pitched sound produced by narrowing of an airway during inspiration or expiration. Diagnostically it is challenging because it is prone to misdiagnosis as Asthma and consequently mismanaged with empiric treatments. Thus, it is necessary to keep in mind that wheezing is a result of an obstruction and requires a more systemic approach when it comes to management. A 22-year-old competitive female equestrian is referred to our clinic for a clinical history comprising of unresolving productive cough, wheezing, and dyspnea. She has been wheezing for years on exertion but has excellent aerobic capacity. Her past medical history is significant for a recurrence of bronchitis/asthma exacerbation, which usually resolves after 7 to 10 days of treatment with short/long term inhalers and antibiotics. Physical examination of the patient reveals a healthy female with expiratory wheezing bilaterally. She was placed on inhaled short-acting beta agonists as well as inhaled corticosteroids. However, on follow up, her symptoms failed to resolve. Pulmonary Function test was then performed. Flow-volume curve depicted a plateau in the inspiratory and expiratory phase. Concern for a fixed upper airway obstruction led to a CT scan. CT scan showed that the extrathoracic fixed airflow obstruction was due to a congenital double aortic arch (DAA) impinging and causing stenosis of the upper trachea. Double aortic arch (DAA) is a congenital defect in the embryonic aortic arch during development, resulting in the encircling of the trachea and/or esophagus by the aortic arch and its segments. In the United States, vascular rings account for 1% of cardiac malformations. About 50% of them present as DAA. Although, the true prevalence of DAA in adults is unknown, a comprehensive literature review identified at least 25 cases in adults, often misdiagnosed as uncontrollable Asthma. Misdiagnosis of DAA as Asthma in our patient strongly indicates the diagnostic role of spirometry with a flow-volume curve in especially those patients complaining of wheezing, who remain unresponsive to pharmacologic agents.

Rocky Mountain Spotted Fever**Tenzing Phanthok MD¹, Heather Brody MD¹, Miguel Jurado MD²**¹AU/UGA Medical Partnership Internal Medicine Residency Program, Athens, GA;²St. Mary's Health Care System, Athens, GA

Background: Rocky Mountain Spotted Fever is a tick-borne disease found in the eastern and south-central United States caused by *Rickettsia* spp, a gram negative coccobacillic obligate intracellular bacteria. The presentation is dependent upon the strain, the feeding status of the primary vector-the bacteria present in a starved or winterized tick is not virulent until the tick has had a blood meal or has been warmed to 37C for one to two days, inoculum dose-the more inoculum generally the worse the clinical course, and host factors including competence of the patient's immune system. The primary mechanism of injury is widespread lymphohistiocytic vasculitis though the mechanism for the vasculitis is unknown. The incidence of the disease is 63 per million persons. Mortality is 0.3% but up to 7% with delayed antibiotic therapy. Risk factors for mortality include male gender, black race, chronic alcohol abuse, and G6PD deficiency. **Case Presentation:** The patient is a 19 year old healthy male. He initially presented to the emergency department with general malaise and a right sided tender inguinal lymphadenopathy. After his sexual history revealed inconsistent condom use, he was assessed for sexually transmitted infections. Gonorrhea and chlamydia probes were assessed and negative. The patient's initial chemistries were revealing for an elevated C-reactive protein, 3.95 mg/dl, and elevated indirect bilirubin, 3.6 mg/dl. His white blood cell were 5.6 K/mm³ with a bandemia of 20%. A pelvic CT revealed lymphadenopathy of the external iliac and right inguinal regions. He was diagnosed with lymphogranuloma venereum. On his clinic visit, he was noted to have a career in the lumber industry with occasional tick bite exposure. Serology was sent for *Rickettsia*, HIV, Syphilis, Lyme disease, Ehrlichia, and viral hepatitis. Titers for *Rickettsia* IgM were 1:64, a positive result. Blood cultures were negative. The patient's treatment was Doxycycline for 21 days. He recovered well. **Discussion:** A young patient can be difficult to assess because the risk factors are unique. Many people, in particular young adults, have either unsafe sexual practices or the stigma of likely unsafe sexual practices in the eyes of healthcare workers. While sexually transmitted infections are common in populations age 15 to 24, above 3000 cases of Chlamydia per 100,000 persons-more than six times the total incidence of all combined populations, they are not the only infectious processes that may cause significant morbidity in this population. An active lifestyle, especially in areas of the country endemic with ticks or mosquitos, also predisposes these populations to a different set of infectious processes. **Conclusion:** An active career and high risk sexual behavior can be common in young patient. Full assessment of infectious risk factors should be undertaken prior to treatment and empiric diagnosis of infectious disease.

Social Determinants of Patient Adherence at the Community Internal Medicine of Athens Clinic**Kristi St. Clair¹, Kyunti James-Thorpe¹, Seth Jelinek MD², Achilia Morrow MD², and Pete Yunyongying MD²**¹Foothills AHEC Pathway to Medical School, Gainesville, GA; ²Community Internal Medicine of Athens, Athens GA

Introduction: Patient non-adherence can be deadly. Social determinants can present barriers to patient adherence. If a physician is familiar with their patients' barriers, they can provide more appropriate health care plans that could enable patient adherence. The purpose of this study is to identify the most significant social determinants at the Community Internal Medicine of Athens Clinic. **Methods:** All of the CIMA clinics' patients were contacted and asked to answer an 11 question multiple choice survey. 97 surveys were completed. The survey asked about several social determinants including access to care, economic stability and trust in providers. **Results:** 54 out of 97 patients had significant difficulty affording their medications. Economic instability can be a barrier in purchasing needed medications. 21% of patients are not comfortable telling their doctor about economic instability. The physician can make health care plans that follow what the patient can afford. 41% of patients have minimal family support during an illness. Patients can better adhere with health care plans with their families' help. 39% of the patients previously used the emergency room or an urgent care center as their primary care center. Access to primary care can prevent ailments earlier in patients. **Conclusion:** Lack of economic stability, trust in providers, family support, and access to care are barriers at Community Internal Medicine of Athens clinic based on the results.

