



2016 Appalachian Student Research Forum

April 6 ~ 7, 2016

D. P. Culp Center at ETSU • Johnson City, TN

coordinated by

The Office of Research
and Sponsored Programs



EAST TENNESSEE STATE UNIVERSITY



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Schedule of Events

The D. P. Culp Center at ETSU • Johnson City, TN

Wednesday, April 6, 2016

Oral Presentations

Lunch Break 12 - 1 "on your own"

Medical Residents, Clinical Fellows Medical Students and Pharmacy Students	E. TN Room, 1 - 2:30	
Doctoral Candidates, Social and Behavioral Sciences	Forum Room, 10:15 – 2:45	
Doctoral & Master's Candidates, Biomedical & Health Sciences	Meeting Room 1, 10:15 – 2:45	
Master's Candidates, Society, Behavior and Learning	Meeting Room 2, 9 – 4:15	
Master's Candidates, Natural Sciences	Meeting Room 3 10:15 – 2:45	
12:00 pm – 4:30 pm	Poster Check-in and Set-up	Ballroom

Thursday, April 7, 2016

8:00 am – 3:00 pm	Poster Viewing	Ballroom
8:30 am – 12:00 pm	Poster Judging	Ballroom
8:00 am – 12:00 pm	Vendor Exhibition	Ballroom, Dining Rms
12:00 pm – 1:00 pm	LUNCH	MarketPlace (with ticket)
1:00 pm – 2:00 pm	Keynote Address	Culp Auditorium

***“NASA's Science on Small Satellites
and Design Concepts for a Deep Space Habitat”***

Dr. Paul Bookout

Avionics Box Procurement Manager
Flight Programs and Partnerships Office, NASA

2:15 pm – 3:00 pm	Awards Ceremony	Culp Auditorium
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Keynote Presentation



Dr. Paul Bookout

Avionics Box Procurement Manager
Flight Programs and Partnerships Office



Dr. Paul Bookout is the Avionics Box Procurement Manager in the Flight Programs and Partnerships Office at NASA's Marshall Space Flight Center in Huntsville, Alabama. The Marshall Center is one of NASA's largest field installations, managing a broad spectrum of human spaceflight, science and technology development missions.

Named to his current position in February 2015, Dr. Bookout is responsible for procurement of the Avionics Box controller for dispensing secondary payloads on the first SLS mission. The management of this task includes integration and project analysis to understand the overall multi-phase mission requirements.

Dr. Bookout has held several positions in various NASA offices for over a decade, including Manager of Space Act Agreements and Manager on the Deep Space Habitat Project. He began his career with NASA in 1990 as an Aerospace Research Engineer, Payload Dynamics and Loads Branch. While at NASA, Dr. Bookout has received numerous awards and industry honors in recognition of his work, and has published many papers and technical reports to support and highlight his work.

His education includes a Bachelor of Science in Mechanical Engineering in August 1986, from Tennessee Technological University; a Master of Science in Mechanical Engineering in June 1988, also from Tennessee Technological University; a Master of Science in Engineering Science and Mechanics in December 1994, from the University of Tennessee, Knoxville; and a Doctor of Philosophy in Mechanical/Aerospace Engineering in May 2008, from the University of Alabama in Huntsville;

A native of Etowah, Tennessee, Dr. Bookout and his family live in Huntsville, Alabama.

NASA's Science on Small Satellites and Design Concepts for a Deep Space Habitat

NASA is performing science in space using smaller satellites called CubSats. The first launch of NASA's new rocket will enable thirteen small satellites to go further into space than before to perform different types of science from monitoring the rocket to biological experiments. These satellite missions will be discussed along with how NASA will be deploying them and the overall mission goal of the first launch of NASA's new rocket. One of the main reasons for NASA's new rocket is to provide the capability to expand human presence into space. For these extended missions in deep space, a new habitat will have to be built. The design of a habitat for deep space will have new challenges to protect the crew, store food, and etc from the harsh conditions beyond the Low Earth Orbit. The design will also have to provide an environment for the mental and emotional stability of the crew for long durations in space. Low fidelity mockups of deep space habitat concepts were developed and evaluated for human factor criteria. The development of the mockups will be discussed along with the reasons why that design was not chosen.

ASRF Task Force

Dr. Mike Ramsey, Task Force Chair
Exercise and Sports Science

Dr. Karin Bartoszuk
School of Graduate Studies

Dr. Ranjan Chakraborty
Health Sciences

Ms. Dinah DeFord
McNair Program

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Dr. Aruna Kilaru
Biological Sciences

Dr. John King
Communication

Dr. Dharendra Kumar
Biological Sciences

Dr. Cecilia McIntosh
School of Graduate Studies
and Biological Sciences

Dr. Kerry Proctor-Williams
Audiology and Speech-Language Pathology

Ms. Carole Thomason
Research and Sponsored Programs

Judges

We express our appreciation to the following faculty and staff members who are giving their time and efforts to serve as Judges for the poster and oral competitions.

Oral Presentations

Alok Agrawal
Beth Bailey
Kate Beatty
Stacy Brown
Mohammed Elgazzar
Deb Knisley
Michael Kruppa
Mildred Maisonet
Hua Mei
Matt Palmatier
Megan Quinn
Robert Schoborg
Dane Scott
Jason Steadman
Jill Stinson
Craig Wassinger
Valentin Yakubenko
Lev Yampolski

Posters

Alok Agrawal
Arsham Alamian
Katie Baker
Karin Bartoszuk
Kate Beatty
Eric Beaumont
Patrick Bradshaw
Marianne Brannon
Russ Brown
Michelle Chandley
Ivy Click
Mohammed Elgazzar
Susan Epps
Octavia Flanagan

Jim Fox
Sean Fox
Rosemary Geiken
Lee Glenn
Nick Hagemeyer
Nathan Hale
Gary Henson
Don Hoover
Thomas Jones
Steve Karsai
Aruna Kilaru
Scott Kirkby
Deb Knisley
Michael Kruppa
Matthew McBee
Tricia Metts
Darrell Moore
Kerry Proctor-Williams
Megan Quinn
Diego Rodriguez Gil
Antonio Rusinol
Phillip Scheuerman
Robert Schoborg
Dane Scott
Eric Sellers
Abbas Shilabin
Sanjay Singh
Deb Slawson
Jill Stinson
Douglas Thewke
Moin Uddin
Qian Xie
Valentin Yakubenko
Lev Yampolsky

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Department of Pharmacy Practice

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Department of Community & Behavioral
Health

Special Thanks

The Appalachian Student Research Forum Task Force would like to recognize and offer special thanks to these outstanding sponsors:

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Exhibitors



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Oral Presentation Abstracts

Master's and Doctoral Candidates

✧ Biomedical and Health Sciences ✧

Mtg Rm 1 10:15 ASSOCIATION BETWEEN MULTIPLE MODIFIABLE RISK FACTORS OF CARDIOVASCULAR DISEASE AND HYPERTENSION IN A RURAL POPULATION IN UNITED STATES

Ali Alamin¹, Pooja Subedi², Hadii Mohammed Mamudu¹, Timir Paul³, Liang Wang², Sreenivas P. Veeranki⁴, Hemang Panchal³, Arsham Alamian², and Matthew Budoff⁵.

¹ Department of Health Services Management and Policy. , College of Public Health East Tennessee State University, Johnson City, TN;

² Department of Biostatistics and Epidemiology. College of Public Health. East Tennessee State University, Johnson City, TN;

³ Department of Internal Medicine. Quillen College of Medicine. East Tennessee State University, Johnson City, TN⁷

⁴ Department of Preventive Medicine and Community Health. University of Texas Medical Branch;

⁵ Los Angeles Biomedical Research Institute, Torrance, CA.

Hypertension is one of the major risk factors for cardiovascular diseases (CVD) affecting one-third of the United States' population. This study examined association between multiple modifiable risk factors for CVD and hypertension in rural Appalachia. The objectives of the research is to: Examine the prevalence and modifiable risk factors for hypertension, describe the burden of hypertension in asymptomatic Appalachian population, identify the disparities in hypertension burden in the United States, and to explain the importance of adopting multiple risk factors approach to addressing cardiovascular diseases in the United States. Between January 2011 and December 2012, 1629 asymptomatic individuals from central Appalachia participated in screening for subclinical atherosclerosis and were asked to report their hypertension status (yes/no). Additionally, data on 2 non-modifiable risk factors (sex, age) and 5 modifiable risk factors (obesity, diabetes, hypercholesterolemia, smoking, and sedentary lifestyle) were collected. Multivariable logistic regression analyses were conducted to assess association between hypertension and risk factors. The research showed the following results: Of the 1629 participants, about half (49.8%) had hypertension. Among hypertensives, 31.4% were obese and 62.3% had hypercholesterolemia. After adjusting for sex and age, obesity and diabetes were associated with increased odds of having hypertension by more than two-folds ([OR=2.02, CI=1.57-2.60] and [OR=2.30, CI=1.66-3.18], respectively) and hypercholesterolemia and sedentary lifestyle were associated with higher odds for hypertension ([OR=1.26, CI=1.02-1.56] and [OR=1.38, CI=1.12-1.70], respectively), compared to referent groups. Compared to those without hypertension, having 2, 3, and 4-5 modifiable risk factors were associated with increased odds of having hypertension by about two-folds [OR=1.72, CI=1.21-2.44], two and half folds [OR=2.55, 1.74-3.74], and six folds [OR=5.96, 3.42-10.41], respectively. In conclusion: The study suggests that odds of having hypertension increases with higher number of modifiable risk factors for CVD. Hence, implementing an integrated CVD program for treating and controlling modifiable risk factors of hypertension would likely decrease the future risk of CVD.

**Mtg Rm 1 SYSTEMIC TYPE-2 CANNABINOID RECEPTOR DELETION
10:30 ALTERS ATHEROSCLEROTIC LESION CALCIFICATION
IN LDLR-NULL MICE**

Makenzie L. Fulmer, Emilee Engelhaupt, and Dr. Douglas Thewke.
Department of Biomedical Sciences, Quillen College of Medicine, East
Tennessee State University, Johnson City, TN.

Introduction: Calcification of atherosclerotic lesions is associated with vulnerability to rupture and increased risk of myocardial infarction. The mechanism of lesion calcification is unclear, but has been shown to be a cell-mediated process involving complex signaling pathways similar to those controlling osteogenesis and bone remodeling. The type-2 cannabinoid receptor (CB2) modulates processes involved in bone remodeling and our prior studies determined that CB2 alters the composition of early atherosclerotic lesions in hyperlipidemic *Ldlr*^{-/-} mice; however, the function of CB2 in lesion calcification is unknown. Therefore, we tested the hypothesis that CB2 modulates lesion calcification by evaluating the effects of systemic CB2 gene deletion on lesion calcification and aortic expression of osteogenic markers in *Ldlr*^{-/-} mice. The effects of administration of CB2-specific agonist JWH-015 and antagonist/inverse agonist SR144528 on calcification of lesions in *Ldlr*^{-/-} mice were also studied. Results: Groups (n=8) of 8-week old CB2^{+/+}*Ldlr*^{-/-} (WT) and CB2^{-/-} *Ldlr*^{-/-} (CB2^{-/-}) mice were fed a high fat diet (HFD) for up to 24 weeks to induce advanced atherosclerosis. At 20 weeks of HFD-feeding, select groups (n=8) of WT and CB2^{-/-} mice received intraperitoneal injections of either JWH-015, SR144528, or vehicle 3x/week for 4 weeks. Standard blood plasma analysis showed no difference in HFD-induced hyperlipidemia between WT and CB2^{-/-} mice; however, treatment with SR144528 reduced serum triglyceride levels in WT mice but not in CB2^{-/-} mice (p<0.001). Morphometric analysis of von Kossa stained cross sections showed calcium deposition in aortic root lesions to be ~2.3 fold greater in CB2^{-/-} mice compared to WT mice after 20 weeks of HFD (p<0.05). Western blot analysis showed expression of Runt-related transcription factor 2 (*Runx2*), a master regulator of osteoblastogenesis, to be ~2.5 fold higher in aortas of WT mice compared to CB2^{-/-} mice after 20 weeks of HFD (p<0.05). Preliminary studies showed activity of tartrate-resistant acid phosphatase (TRAP), an osteoclast marker enzyme, to be ~2.2 fold higher in advanced aortic root lesions of HFD-fed WT mice compared to CB2^{-/-} mice. Conclusion: These results suggest that systemic CB2 deficiency increases atherosclerotic calcification, in part, by modulating the formation and/or activity of osteoblast- and osteoclast-like cells within lesions. Information from this and future investigations could translate into CB2-targeted therapies for reducing atherosclerotic lesion calcification.

**Mtg Rm 1 ELUCIDATING THE ROLE OF N-ACYLETHANOLAMINE/
10:45 ANANDAMIDE METABOLISM IN THE MOSS
PHYSCOMITRELLA PATENS**

Dr. Imdadul Haq, Suhas Shinde, and Dr. Aruna Kilaru. Department of
Biological Sciences, College of Arts and Sciences, East Tennessee State
University, Johnson City, TN.

In plants, saturated and unsaturated N-Acylethanolamines (NAEs) with acyl chains 12C to 18C are reported for their differential levels in various tissues and species. While NAEs were shown to play a vital role in mammalian neurological and physiological functions, its metabolism and functional implications in plants however, remains incomplete. Recently, anandamide (NAE 20:4), an essential fatty acid neurotransmitter in mammalian system, was identified in moss *Physcomitrella patens*, in addition to other types of NAEs. Bryophytes display high tolerance to abiotic stress and thus presence of anandamide in moss, but not in higher plants, suggests that NAE 20:4 might have contributed to their survival in harsh environmental conditions. Therefore, we hypothesize the anandamide metabolic pathway might play a role in mediating stress responses in *P. patens*. To this extent, using previously identified NAE-metabolic genes in mouse and/or *Arabidopsis* as templates, we identified moss orthologs for enzymes that likely participate in anandamide metabolism. We identified members of metallo-hydrolase superfamily and a/B-hydrolase4, and five putative fatty acid amide hydrolases, which may hydrolyze N-acylphosphatidylethanolamine and NAE, respectively. Electronic fluorescent pictograph analyses of these orthologs in moss revealed

differential developmental stage-specific expression patterns in gametophyte and sporophyte stages. We are currently examining expression pattern for these putative NAE-metabolic pathway genes, along with anandamide levels, in different tissues and developmental stages of moss subjected to water stress in the presence of anandamide. These transcript and metabolite levels in moss subjected to stress are expected to offer better understanding of the role of anandamide in mediating stress responses and further allow us to identify candidate genes that might participate in NAE metabolism. Our studies are aimed at functional validation of candidate genes and generating moss transgenic lines with altered NAE metabolite profile. Our long-term goal is to conduct comprehensive analyses of NAE metabolite mutants to determine their role in growth and development, and mediating stress responses in plants.

Mtg Rm 1 11:15 PREOPERATIVE HEMOGLOBIN A1C SCREENING TO MINIMIZE THE RISK OF SURGICAL SITE INFECTIONS IN DIABETIC TOTAL JOINT ARTHROPLASTY PATIENTS
Morgan Scott May and Dr. Sandy Diffenderfer. College of Nursing, East Tennessee State University, Johnson City, TN.

Surgical site infections (SSIs) are detrimental to patients and problematic for healthcare organizations. Despite published evidence-based practices (EBP) to prevent SSIs, patients continue to suffer from this type of infection. Regulatory bodies' and accrediting organizations' guidelines hold healthcare organizations accountable for infection rates, however, implementation of the guidelines are the responsibility of facility leaders. Diabetes is a known risk factor for postoperative complications. Uncontrolled diabetes can be detected through measurement of the patient's Hemoglobin A1C. The American Diabetes Association recommends that elective surgery be postponed when the patient's Hemoglobin A1C value is greater than 7%. The increased risk of development of an SSI for diabetic patients who plan to undergo a Total Joint Arthroplasty (TJA) signifies the importance of optimal health status for this patient population prior to surgery. This can be accomplished through the use of an EBP that includes obtaining patients' preoperative Hemoglobin A1C values and postponing the surgery until the value reaches an optimal level. The host facility's baseline SSI rate in diabetic TJA patients was 1.0 per 100 procedures compared to a rate of 0.3 per 100 procedures in non-diabetic TJA patients. The objectives included: a) Increase patient safety through use of evidence-based practices by measuring Hemoglobin A1C prior to surgery and delaying surgery until it is under 7%; b) 2% change in diabetic TJA SSI rate from host facility baseline data; c) Implement and monitor compliance with protocol through use de-identified aggregate data. The aim of this project was to plan, implement, and test a process change in an effort to decrease SSI rates in diabetic patients who undergo an elective TJA at the host facility. The pilot protocol stated that patient's surgery would be postponed when the patient's preoperative Hemoglobin A1C value was greater than 7%. Gaps in the literature were noted related to the exact relationship of patients' Hemoglobin A1C and the development of an SSI. There is a lack of agreement on the Hemoglobin A1C value that constitutes an increased risk for SSI development. While researchers agree that uncontrolled diabetes is a risk factor for development of an SSI the precise Hemoglobin A1C value is unclear. This author's project is a pilot quality improvement project. Quality improvement projects focused on making positive changes in healthcare often use the Plan-Do-Study-Act (PDSA) model. The purpose of PDSA is to establish a functional relationship between changes in processes and outcomes. The project sample was 60 diabetic patients TJA patients who had surgery between October 1, 2015 and December 31, 2015. Forty-five of the 60 patients' data have been analyzed; there were no SSIs during the study period compared to the baseline rate of 1.0. The average patients' Hemoglobin A1C value was 6. Two diabetic TJA patients did not follow the protocol related to a preoperative Hemoglobin A1C value. No patients who followed the protocol as designed proceeded with surgery when the preoperative Hemoglobin A1C was greater than 7. Although the sample size of this quality improvement project was small, the implementation of an EBP protocol resulted in an improvement in SSI rates in diabetic TJA patients.

Mtg Rm 1 11:30 FACTORS INFLUENCING HEARING HEALTHCARE AND HEARING AID ACCESS IN SOUTHERN APPALACHIA

Katie McCreery and Dr. Marc Fagelson. Department of Audiology and Speech-Language Pathology, College of Clinical and Rehabilitative Health Sciences, East Tennessee State University, Johnson City, TN.

Although hearing loss is among the most common chronic conditions in the U.S., many individuals never speak to a healthcare provider about it. Thus, evaluation and rehabilitation services remain underutilized. Even mild hearing loss may result in decreased quality of life, social isolation, and decreased self-sufficiency. The purpose of this study was to assess factors that influence hearing healthcare access and hearing aid acquisition by individuals in Southern Appalachia. The identification of barriers to hearing healthcare access may help audiologists tailor care to this group's specific needs. The Hearing Handicap Inventory for Adults (HHIA), a questionnaire assessing self-perceived hearing handicap (a major determinant in help-seeking behaviors in people with hearing loss), was administered along with a researcher-designed survey. The researcher-designed survey was comprised of two forms. Form A asked questions specific to unaided individuals, with half pertaining to individuals with normal hearing, and the other half pertaining to individuals with unaided hearing loss. Form B asked questions specific to hearing aid users. Both forms collected demographic information. Survey participants were recruited from the Remote Area Medical (RAM) clinic held in Bristol, TN on May 1-3, 2015. HHIA and surveys were obtained from 127 individuals. Two major barriers to hearing healthcare were identified: financial barriers and transportation-related barriers. 62% of respondents reported a household income of \$20,000 or less, with an average household size of 2.6 members. Because hearing aids must often be purchased out of pocket, individuals in this income bracket may not be able to afford assistive devices. Some individuals in Southern Appalachia live far from the urban centers where audiologists tend to be located. Although the unaided individuals surveyed indicated they could travel some distance for hearing healthcare services, more than half indicated that they would be unable to travel more than an hour. In contrast, more than half of the aided group indicated that they were required to travel more than an hour for services. Since rural areas often lack public transportation, costs associated with traveling a long distance using personal transportation may present a barrier to hearing healthcare access. These barriers may be at least partially remediated by financial aid programs, telehealth services, and self-help/support group initiatives. The Bristol RAM clinic, in partnership with ETSU's audiology department, attempts to overcome these barriers by providing free hearing screenings and low-cost amplification options to individuals with hearing loss living in rural areas.

Mtg Rm 1 11:45. ENGINEERED C-REACTIVE PROTEIN WITH IMPROVED PROTECTIVE ACTION AGAINST PNEUMOCOCCAL INFECTION

Donald N. Ngwa, Toh B. Gang, Sanjay K. Singh and Alok Agrawal. Department of Biomedical Sciences, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

The anti-pneumococcal function of native C-reactive protein (CRP) involves the binding of CRP to phosphocholine molecules present on *Streptococcus pneumoniae* and subsequent activation of the complement system. However, when pneumococci recruit complement inhibitory protein factor H on their surface, they escape the attack of complement. We have reported previously that CRP, in a non-native conformation, expresses the ability to bind immobilized factor H. Accordingly, we hypothesized that such non-native CRP would bind to factor H on pneumococci in vivo, mask its complement inhibitory activity, and therefore should be able to protect against complement-resistant pneumococci. We performed site-directed mutagenesis of CRP and identified a mutant which bound to factor H-coated pneumococci but not to factor H in fluid phase. Mutant CRP was found to be free in the mouse serum and blood and its rate of clearance was similar to that of native CRP. As reported previously, native CRP protected mice from lethal pneumococcal infection when injected into mice 30 minutes prior to the administration of pneumococci, but did not offer any protection when injected at 24 hours after the administration of pneumococci. In contrast, that was not the case with mutant CRP; mutant CRP protected mice from infection more

effectively than native CRP, by increasing the survival and decreasing bacteremia. We conclude that, while native CRP is protective only against early-stage infection, mutant CRP capable of binding to factor H may protect against both early-stage and late-stage infections and thus is superior to native CRP in fighting against the disease.

Mtg Rm 1 1:00 THE ASSOCIATION OF RESPIRATORY DISEASES WITH COLON CANCER SCREENING: RESULTS FROM THE 2014 NATIONAL HEALTH INTERVIEW SURVEY

Osarueme J. Osazee and KeSheng Wang. Department of Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN.

Purpose: The aim of this study was to measure the prevalence of colorectal cancer (CRC) screening and to ascertain the relationship between certain respiratory diseases and CRC screening in the United States using the 2014 National Health Interview Survey (NHIS) data. Method: The NHIS data is a national data. This 2014 NHIS data was a cross-sectional study. The total sample size is 23427, and the respiratory infections in this analysis included: chronic obstructive pulmonary disease (COPD), asthma, chronic bronchitis and sinusitis. Statistical method used were weighted univariate and multiple logistic regression. Statistical software used was SAS ver. 9.4 for the estimation of 95% Confidence intervals (CIs), and Odds ratios (ORs). Results: The overall prevalence was 17.3% (18% and 16% for males and females, respectively). The prevalence of CRC screening in adults with COPD, chronic bronchitis, sinusitis emphysema was greater than those without these conditions (24.3% vs 17%, 21.2 vs 17.1, 20.6% vs 16.8, 26.4 vs 17.1). By using univariate analysis, sex, race, COPD, chronic bronchitis, emphysema, sinusitis, and smoking status were associated with CRC screening ($P < 0.05$). After adjusting for potential factors using multiple logistic regression analysis, females were less likely than male to have done a CRC screening (OR = 0.87, 95% CI = 0.78 – 0.94 $P = 0.0015$), whereas emphysema (OR = 1.71, 95% CI = 1.34 – 2.20, $P = <0.0001$) and sinusitis (OR = 1.20, 95% CI = 1.06 – 1.37, $P = 0.0059$) were more likely to be associated with CRC screening. However, there was no statistical relationship between COPD, chronic bronchitis, and CRC screening due to the strong associations of COPD and chronic bronchitis with other variables. Conclusion: Significant relationship was found between CRC screening and respiratory diseases. More studies need to be done to provide more information as regarding causality and association.

Mtg Rm 1 1:15 EVOLUTION OF HOST-DEFENSE FUNCTION OF C-REACTIVE PROTEIN FROM HORSESHOE CRAB TO HUMANS

Asmita Pathak¹, Sanjay K. Singh¹, Avinash Thirumalai¹, Peter B. Armstrong² and Alok Agrawal¹.

¹ Department of Biomedical Sciences, Quillen College of Medicine, East Tennessee State University, Johnson City, TN

² Department of Molecular and Cellular Biology, University of California, Davis, CA.

C-reactive protein (CRP) has been conserved throughout evolution. Human native CRP exhibits calcium-dependent binding specificity for phosphocholine. Human CRP in its non-native structure expresses the capability to bind to deposited and conformationally-altered proteins and which can be achieved by several means including treatment of CRP with acidic pH. The ligand-binding property of human CRP in its non-native structure has implications for toxic and inflammatory conditions and favors the conservation of CRP throughout evolution. It is not known, however, whether CRP from invertebrates exhibits structure-based ligand-binding properties similar to that of human CRP. The aim of this study was to investigate the ligand-binding properties of CRP from the American horseshoe crab *Limulus polyphemus*. We used oxidized low-density lipoprotein (ox-LDL) immobilized on microtiter plates as a model for deposited and conformationally-altered proteins. We found that *Limulus* CRP binds to ox-LDL at physiological pH, in contrast to human CRP which requires acidic pH to do so. The binding of *Limulus* CRP to ox-LDL occurred even in the absence of calcium, suggesting that the binding was not mediated through exposed

phosphocholine molecules, if any, on ox-LDL. We conclude that the host-defense function of CRP evolved with the development of the immune system to expose a ligand-binding specificity only when needed, that is, an inflammatory microenvironment would have to be sensed by CRP and that CRP would change its structure to execute its function. Limulus CRP also provides us with a tool to investigate the structure-function relationships of human CRP in animal models of inflammation.

Mtg Rm 1 1:30 IDENTIFICATION AND FUNCTIONAL ANALYSIS OF AVOCADO DGAT1 AND DGAT2 EXPRESSED IN YEAST

M. M. Rahman¹, J. Shockey², and A. Kilaru³.

¹ Department of Biomedical Sciences, Quillen College of Medicine, East Tennessee State University, Johnson City, TN;

² U.S. Department of Agriculture, Agricultural Research Services, New Orleans, LA;

³ Department of Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

The avocado mesocarp contains up to 60-70% oil by dry weight where triacylglycerol (TAG) is the major constituent. This neutral lipid, TAG is utilized by plants for the carbon and energy source when stores in seed tissue. There is significant human nutritional demand for vegetable oil, but its use in production of renewable biomaterials and fuels has intensified the need to increase oil production. In plants, the final and committed step in TAG biosynthesis is catalyzed by diacylglycerol acyltransferases (DGAT) and/or a phospholipid: diacylglycerol acyltransferases (PDAT). Both DGAT and PDAT contribute to seed TAG biosynthesis in an independent or overlapping manner, depending on the species. However, the regulation of TAG biosynthesis is not well-studied in nonseed tissues such as mesocarp of avocado. Based on the transcriptome data of *Persea americana* it is hypothesized that both DGAT and PDAT are likely to catalyze the conversion of diacylglycerol to TAG. In this study, putative DGAT1 and DGAT2 were identified and comprehensive in silico analyses were conducted to determine the respective start codons, full-length coding sequences, transmembrane domains, predicted protein structures and phylogenetic relationships with other known DGATs. These data reveal that the putative DGATs of a basal angiosperm species retain features that are conserved not only among angiosperms but also other eukaryotes. For further functional analysis, the avocado DGATs were expressed in H1246, a TAG-deficient yeast strain and lipotoxicity rescue assays were conducted. The complementation of this yeast strain confirmed enzyme activity and supported the possible role of both avocado DGATs in TAG biosynthesis. Future studies will be focused on determining the substrate specificity of DGAT and its role, relative to PDATs in TAG biosynthesis in avocado mesocarp.

Mtg Rm 1 2:00 BIOCHEMICAL CHARACTERIZATION OF FATTY ACID AMIDE HYDROLASE IN *PHYSCOMITRELLA PATENS*

Swati¹ and Aruna Kilaru². Departments of ¹ Biomedical Sciences, Quillen College of Medicine, and ² Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

N-acylethanolamines (NAEs) are fatty acid ethanolamides that mediate stress responses in plants and animals. NAEs such as NAE 20:4 (anandamide) have only been reported in mammals and they regulate processes like neuroprotection and pain perception. Interestingly, we discovered the unique occurrence of anandamide in moss, *Physcomitrella patens*, a stress tolerant early land plant. Since NAEs including anandamide are degraded by fatty acid amide hydrolase (FAAH), it is hypothesized that a functional homolog of FAAH occurs in *P. patens*. I specifically propose to biochemically characterize FAAH enzyme that degrades anandamide. For this, Arabidopsis FAAH (AtFAAH) homolog was identified in moss database using BLASTP. The predicted protein structure of putative moss FAAH (PpFAAH) closely resembled to that of AtFAAH with conserved amidase signature sequence and catalytic triad residues:

Lys205, Ser281, Ser305. Transcript levels of PpFAAH increased five-fold when moss was grown on excess NAE containing media. PpFAAH cDNA was PCR amplified and cloned into pET23a expression vector and transformed into RIL E. coli cells and confirmed by colony PCR. Heterologously expressed protein will be purified by Ni²⁺ affinity column chromatography and confirmed by western blot using anti-His-tag antibody. For biochemical characterization, enzyme will be presented with ¹⁴C NAE 20:4 substrate and rate of product free fatty acid formed will be quantified by extracting lipids from reaction mixture and separating by thin layer chromatography followed by radiometric scanning. E. coli cells expressing AtFAAH enzyme will be used as control. A complete characterization of the PpFAAH enzyme will be carried out to determine the kinetics, optimal temperature and pH conditions. Characterization of the enzyme that hydrolyzes anandamide in moss is expected to lead us to develop NAE metabolite mutants that will subsequently allow us to study the physiological role of anandamide in early land plants.

Mtg Rm 1 2:15 THE NOVEL ROLE OF ATR IN SUPPRESSING THE IONOMYCIN-INDUCED NECROTIC CELL DEATH RESPONSE

Hui Wang, Benjamin A. Hilton, Phillip R. Musich and Yue Zou.
Department of Biomedical Sciences, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Ataxia telangiectasia and Rad3-related (ATR) protein is well known for its regulatory role in DNA damage responses (DDR) as a checkpoint kinase that phosphorylates hundreds of protein substrates. It has been shown that inhibition of ATR suppresses carcinogenesis. Necrosis is one form of cell death and traditionally has been regarded as a passive and uncontrolled cell death resulting from infection or cell injury. Recently, more and more evidence has emerged to support the concept that necrosis also may occur in a programmed manner and that Ca²⁺ can be a mediator and signaling molecule for necrosis. However, much still remains unknown about how necrosis is regulated in cells. We therefore investigated the biochemistry and molecular biology methods such as western blot, co-immunoprecipitation and trypan blue cell viability analysis et al. to examine the novel cellular function role of ATR in suppressing the ionomycin-induced necrotic cell death and its molecular signaling pathway in human cancer cells. The recent results of the work show that ATR in contrast to its hallmark regulatory role in DDR, ATR also plays a role in non-DNA damage stress responses by suppressing the ionomycin-induced necrotic cell death. Ionomycin as a Ca²⁺ ionophore raises the intracellular level of Ca²⁺, induces ATR binding to poly (ADP-ribose) polymerase 1 (PARP1) and hyper-activates PARP1's poly (ADP-ribosyl)ation activity. This ongoing studies will help to define the molecular mechanisms of the anti-necrotic cell death activities of ATR relevant to human diseases.

Mtg Rm 1 2:30 SEXUAL ASSAULT NURSE EXAMINERS AS PART OF A UNIVERSITY RESPONSE TO SEXUAL ASSAULT

Curtis Wininger and Dr. Patricia Vanhook. College of Nursing, East Tennessee State University, Johnson City, TN.

Sexual assault is a public health concern, especially on campuses at institutes of higher educations (IHEs). Replicated surveys have shown that 20-25% of women experience either an attempted or completed sexual assault during their time in college. Only 4-8% of those incidents are reported to campus officials or police. Title IX of the Education Amendments of 1972 and the Clery Act require IHEs protect students from sexual assault by conducting judicial review hearings and maintaining transparency of the campus crime climate. East Tennessee State University (ETSU) has maintained a proactive stance by implementing efforts to increase sexual assault reporting. The role of sexual assault nurse examiners (SANEs) on college campuses has been largely unexplored. These specially trained nurses are the world-leading experts in sexual assault medical-forensic examination and treatment. They independently perform physical exams, administer sexually transmitted infection and pregnancy prophylaxis, and collect forensic evidence used by prosecutors in courts of law. Sexual assault care is a core component of student health care. ETSU College of Nursing is increasing students' accessibility to SANE services by implementing a SANE program on campus within the student health clinic. This uninterrupted service is available at no cost to students. As one of the first campus-based SANE programs in the nation, the addition of this

service is expected to increase sexual assault reporting and care delivery at East Tennessee State University. This program was implemented as a doctor of nursing practice project. It has gained endorsement from ETSU Student Affairs, Student Government Association, College of Nursing, Public Safety, and the LGBT group HEROES, as well as District Attorneys General Tony Clark and Barry Staubus. Establishment of an on campus SANE program is a bold initiative that clearly exemplifies ETSU's commitment to delivery of high quality care to its student body.

Master's Candidates

✧ Society, Behavior and Learning ✧

Mtg Rm 2 9:00 ASSOCIATION BETWEEN PHYSICAL INACTIVITY, ALCOHOL CONSUMPTION AND CURRENT TOBACCO SMOKING AMONG ADULTS IN THE UNITED STATES

Jocelyn Aibangbee¹, Daniel Owusu¹, Dr. Megan Quinn¹, Dr. Kesheng Wang¹, Dr. Sreenivas Veeranki², and Dr. Hadii Mamudu³.

¹ Department of Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN;

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Smoking accounts for over 480,000 annual deaths in the U.S. While smoking is associated with health risk behaviors among adolescents, studies involving cigarette smoking and health risk behavior among adults are sparse. The aim of this study was to evaluate the relationship between physical inactivity, alcohol consumption, and current cigarette smoking among adults in the U.S. Study data were obtained from 486,756 non-pregnant adults, aged 18+ years who participated in the 2013 Behavioral Risk Factor Surveillance System (BRFSS). BRFSS is designed to measure behavioral risk factors among noninstitutionalized adults residing the U.S. Trained interviewers conducted interviews of participants from randomly selected households using landline telephone, and mobile phone for participants who use cellular phones and residing in private residence or college housing. Information on cigarette smoking was collected by the question: "Do you now smoke cigarettes every day, some days, or not at all?" We categorized "every day" and "some days" responses as currently smoking, and "not at all" response as currently not smoking. Exercise status was determined by the question: "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?" (Yes/No). Alcohol consumption (Yes/No) was defined as any alcohol consumption in the past 30 days. The outcome variable was current cigarette smoking (Yes/No), and the main independent variables were alcohol consumption (Yes/No) and physical inactivity (Yes/No) in the past 30 days. PROC SURVEYFREQ procedure was used to estimate weighted prevalence of smoking, and PROC SURVEY LOGISTIC procedure was used to obtain adjusted odds ratios and their 95% confidence. All analyses were conducted in SAS version 9.4 (SAS Institute, Cary, NC, USA). Overall, 17.5% (CI=17.3 - 17.9) of adults were current smokers, 53.9% (CI=53.5 - 54.2) drank alcohol and 26.1% (CI=25.8 - 26.3) were physically inactive. Adjusting for the covariates, physical inactivity (OR=1.63, CI=1.57 - 1.70), alcohol consumption (OR=1.43, CI=1.38 - 1.48), and lack of health coverage (OR=1.66, CI=1.59 - 1.74) were associated with increased current cigarette smoking. Compared to non-Hispanic Whites, there was significant reduction in cigarette smoking in non-Hispanic Blacks (OR=0.69, CI=0.64 -

0.75), and Hispanics (OR=0.30, CI=0.26 - 0.33). There were significant age-sex and race-sex interaction effects on odds of current smoking. The study results suggest that cigarette smoking may be associated with other health risk behaviors; hence, there is need to consider such behaviors in tobacco use intervention programs.

Mtg Rm 2 9:15 GENDER DIFFERENCE IN THE ASSOCIATIONS OF EARLY SMOKING ONSET AND PAST YEAR TOBACCO USE WITH THE PREVALENCE OF BRONCHITIS IN US ADULTS: RESULTS FROM THE 2013 NATIONAL SURVEY ON DRUG USE AND HEALTH DATA

Muyiwa Ategbale and Dr. Kesheng Wang. Department of Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN.

Little is known about the effect of early tobacco use prior to 18 years on the prevalence of bronchitis in the US adults. This study estimated the association of early tobacco use with prevalence of bronchitis among US adults, and tested whether such association differs by gender. A total of 1,264 adults with bronchitis and 35,598 controls were selected from the 2013 National Survey on Drug use and Health (NSDUH) data. Weighted univariate and multiple logistic regression analyses were used to estimate the odds ratio (OR) with 95% confidence interval (CI). The overall prevalence of bronchitis was 3.8%. The prevalence increased with age (3.0%, 3.8% and 5.0% for age groups 18-34, 35-64 and 65+, respectively). The prevalence in those that first used cigarettes daily prior to age 18 (5.3%) was significantly higher ($p=0.0006$) than those who did not (3.5%). Multiple logistic regression analysis showed that any tobacco use in the past year (OR=1.37, 95% CI = 1.11 - 1.68, $p = 0.0029$), first cigarettes daily use prior to age 18 (OR = 1.37, 95% CI = 1.07 - 1.77, $p = 0.0132$), obesity (OR = 1.57, 95% CI = 1.30 - 1.90, $p = <.0001$), being female (OR = 2.43, 95% CI = 1.96 - 3.01, $p = <.0001$), adults in the ages of 65+ years (OR = 1.66, 95% CI = 1.29 - 2.14, $p = <.0001$), and people that lived in small metro county type (OR = 1.28, 95% CI = 1.03 - 1.60, $p = 0.0283$) were positively associated with bronchitis. Compared to Whites, Hispanics were less likely to have bronchitis (OR = 0.59, 95% CI = 0.42 - 0.83). Gender-stratified analyses showed that obesity in male (OR=1.54, 95% CI = 1.05 - 2.27, $p = 0.029$) and female (OR = 1.60, 95% CI = 1.25 - 2.04, $p=0.0002$) is positively associated with bronchitis. It was also noticed that female who used tobacco in the past year (OR = 1.40, 95% CI = 1.08 - 1.80, $p = 0.0102$), used cigarettes daily prior to age 18 (OR = 1.38, 95% CI = 1.03 - 1.84, $p = 0.0319$), age group 35-64 (OR = 1.33, 95% CI = 1.03 - 1.72, $p = 0.0298$), age group 65+ (OR = 1.881, 95% CI = 1.41 - 2.52, $p = <.0001$), and lived in small metro county type (OR = 1.38, 95% CI = 1.03 - 1.84, $p = 0.0293$) were positively associated with bronchitis. In conclusion, early and past year tobacco smoking, obesity and being a female were positively associated with bronchitis; while risk factors for bronchitis vary between males and females. Intervention strategies that target risk reduction of bronchitis may be tailored accordingly.

Mtg Rm 2 9:30 THE EFFECT OF AN IPAD APPLICATION WITH SYSTEMATIC INSTRUCTION ON ELA RELATED SKILLS FOR HIGH SCHOOL STUDENTS WITH SIGNIFICANT DISABILITES

Andrew Baxter and Dr. Pamela Mims. Department of Teaching and Learning, Clemmer College of Education, East Tennessee State University, Johnson City, TN.

Understanding text is a critical aspect of academic and functional development for students of all abilities. Reading and listening to text and deriving meaning is an interactive process that involves multiple senses. For students with autism spectrum disorder (ASD) and/or intellectual disability (ID) the interactive process requires an evidence-based approach that makes use of systematic instruction (e.g., response prompting, reinforcement, error correction procedures) along with adapted versions of text. The investigator of this study looked to examine the effect of an iPad application with systematic instruction on the English Language Arts (ELA) skills of text and listening comprehension for students with ASD and/or ID.

Building upon the research of recent studies that have sought to develop and adapt grade-level literature for students with moderate and severe disabilities, this study sought to find the effectiveness of an adapted text version of *To Kill a Mockingbird*, by Harper Lee, for students at the high school level who had been diagnosed with ASD and/or ID. The procedure was evaluated using a multiple probe across participants single case design. Outcomes were measured for improved ELA skills after the intervention phase and were also measured for student engagement. The study phases included baseline, intervention, and maintenance. The interventionist conducted baseline sessions for five sessions prior to intervention to find out if data for each student was low and stable or descending. Students were introduced into intervention or baseline sequence in a staggered procession until all students completed intervention. Experimental control was demonstrated by a consistent change in the level of data from baseline condition to intervention condition across students for all chapters assessed. The implementation of this adapted text included evidenced-based supports such as time delay, the system of least prompts and picture supports taught in conjunction with the use of the iPad application. The results showed a functional relation between use of an iPad with systematic instruction and text and listening comprehension for students with significant disabilities. Overlap of baseline data and intervention data only occurred for a single data point for one participant, and all students displayed considerable gains across vocabulary and comprehension questions during intervention phase. The results from this study will contribute to the research on technology and its role in instruction for students with significant disabilities.

Mtg Rm 2 10:00 TEACHING VOICE OUTPUT COMMUNICATION AIDES TO STUDENTS WITH SEVERE DISABILITIES: A COMPREHENSIVE LITERATURE REVIEW

Mollie Bellows and Dr. Pamela Mims. Department of Teaching and Learning, Clemmer College of Education, East Tennessee State University, Johnson City, TN.

Many students with significant cognitive disabilities have communication challenges. Difficulty speaking can be barrier to accessing grade-aligned curricula, receiving services, and advocating on one's behalf. Recent technological advances in the use of microswitches, adaptive tools which capitalize on an individual's body movements to access technology, and Voice Output Communication Aides (VOCAs), assistive technology which produces a recorded message, have decreased these barriers and improved the quality of life for many individuals with significant cognitive difficulties. While special education teachers may have access to assistive technology, microswitches and VOCAs are underutilized in most special education classrooms. A research-base has not been previously established for teaching the use this technology. The purpose of this literature review was to review current research and to establish a research-basis for instructional practices to teach students with severe cognitive disabilities to access communication through the use of one press microswitches of VOCAs. To conduct the review, researchers analyzed studies published online from 1970 to 2015. Researchers reviewed each article to determine which studies met the inclusion criteria and coded rigorously examined each article for quality. The Results of the review indicate that several strategies are successful in teaching individuals with significant cognitive disabilities to use VOCAs or microswitches to access assistive communication devices. Systematic prompting, naturalistic teaching procedures, and the use of preferred stimuli resulted in acquisition of the target skill. The results of this literature review have significant implications for both research and practice in the field of special education. Awareness of these practices can lead to improved educational and social outcomes for students with significant cognitive disabilities.

**Mtg Rm 2 ANXIETY SYMPTOMS AND HEALTHCARE UTILIZATION
10:15 AMONG PERSONS WITH FIBROMYALGIA: MEDIATING
ROLE OF TREATMENT ADHERENCE**

Byron D. Brooks and Dr. Jameson K. Hirsch. Department of Psychology,
College of Arts and Sciences, East Tennessee State University, Johnson
City, TN.

Reducing healthcare expenditures is a common institutional and policy priority, and one consistent contributor to increased health costs is frequency of healthcare service use. Healthcare utilization (HCU) is, of course, increased in persons with chronic illness, such as fibromyalgia, but may be exacerbated by mental illness. Individuals with fibromyalgia, who are at greater risk for psychopathology (e.g., anxiety) than the general population, may inefficiently use healthcare resources (e.g., frequent emergency room visits). Anxiety symptoms may directly affect healthcare utilization, but may also indirectly impact HCU via their deleterious effect on ability to follow-through with important treatment-related behaviors. Treatment adherence, or the degree to which a patient follows medical advice from a healthcare provider, is a critical component of health prognosis and, when sporadic or absent, contributes to morbidity and mortality. Yet, persons who are overly-concerned about their health may be unable to effectively fulfill treatment suggestions, perhaps resulting in increased HCU; this premise has not been previously examined in persons with fibromyalgia. We hypothesized that: (1) treatment adherence would be negatively related to anxiety and HCU; (2) HCU and anxiety would be positively related; and (3) treatment adherence would mediate the relation between anxiety symptoms and HCU, such that greater anxiety would be related to less treatment adherence and, in turn, greater HCU. Participants were 508 persons with fibromyalgia recruited, online, via support organizations and social media. Our sample was primarily white (91.8%;n=383), female (95.7%;n=401), and middle-aged (M=47.72 years, SD=13.14). Participants completed self-report measures: Depression, Anxiety, and Stress Scales (anxiety subscale), Multidimensional Health Profile-Physical (HCU subscale), and the Medical Outcomes Study Treatment Adherence Scale. Bivariate correlations and mediation analyses were conducted, covarying age, sex, and race. In partial support of bivariate hypotheses, anxiety and HCU were positively related and both were negatively related to treatment adherence. Multivariate hypotheses were supported, as the direct effect of anxiety symptoms on HCU was mediated when treatment adherence was added (DE=.07,SE=.02,p<.001,IE 95% CI[-.02,-.002]). Greater anxiety was related to less treatment adherence and, in turn, to greater HCU. Our results indicate that anxiety has a deleterious effect on the ability to fulfill treatment recommendations and, in turn, negatively impacts healthcare utilization, in persons with fibromyalgia. Individuals with anxiety may have low self-efficacy for health behavior engagement, and avoidant tendencies, reducing ability to effectively engage in treatment. In turn, failure to follow the treatment recommendations appears to result in the need for increased use of services. Addressing anxiety and poor adherence among those with fibromyalgia, perhaps via cognitive-behavioral strategies (e.g., reframing beliefs about health efficacy), may improve treatment adherence and reduce HCU.

**Mtg Rm 2 THE ARTHURIAN UNCANNY: ALIGNMENT OF AESTHETIC
10:30 SUCCESS IN THE ANGLOPHONIC IMAGINATION**

Danielle Byington, Dr. Mark Holland, Dr. Daniel Westover, and Dr.
Thomas Crofts. Department of Literature and Language, College of Arts
and Sciences, East Tennessee State University, Johnson City, TN.

While Arthurian legend is a broad canon of literature full of character and quest variations, the myth itself acts as a structure for a homeostasis of aesthetics. Three tropes are present in the general King Arthur story – the distant setting, the advisor, and the water-based transition – all of which provide an organic unity to the metanarrative. This synthesis of Anglophonic imagination lingers throughout works succeeding the late Medieval period, resurfacing in a variety of mediums overtime. Utilizing theories by Sigmund Freud, James Hillman, and Iris Murdoch, I have analyzed how the archetypes of a fictionalized setting, a prophetic figure, and a plot transition involving water can produce an alignment of aesthetics. This order satisfies an audience informed by Anglophonic imagination, and they are more willing to celebrate the perceived work as accomplished art. Using diagrams, I have created a formula that demonstrates the relationship between these three tropes and perception's anxiety to find aesthetic familiarity in their collective presence.

**Mtg Rm 2 SUBSTANCE USE AND ITS EFFECT ON ATTEMPTED SUICIDE
11:00 IN HIGH SCHOOL STUDENTS: A QUANTITATIVE ANALYSIS**

Mark Dula, Dr. Kesheng Wang, Dr. Ying Liu and Dr. Shimin Zheng.
Department of Biostatistics and Epidemiology, College of Public Health,
East Tennessee State University, Johnson City, TN.

The physical effects of substance use (tobacco, alcohol, and marijuana) are well known, but it is not clear whether the use of these substances can be a warning sign for psychological or emotional problems in high school students. The Youth Risk Behavior Survey (YRBS) is a nationwide survey conducted by the Centers for Disease Control and Prevention every other year which asks students questions about risk behaviors such as substance use, sexual activity, the amount of violence in their lives, and suicide attempts. We examined students who were involved in the use of substances more commonly found in high schools (tobacco, alcohol, and marijuana) to see if they were significantly more likely to attempt suicide than their peers who were not involved in this type of activity. A multiple logistic regression analysis was performed on the 2013 Nationwide YRBS data (n = 13,583) to examine this effect while controlling for the following possible covariates: depression, gender, age, race, lack of sleep, and access to weapons. Results of this analysis showed a significant increase in suicide attempts among students who used tobacco and marijuana (OR = 1.987, 95%CI = 1.638, 2.411; OR = 1.273, 95%CI = 1.038, 1.561, respectively). However, the results of this analysis did not show a significant increase in suicide attempts for students that consumed alcohol. It was interesting to see that while possession and use of marijuana for a high school student is a more highly punishable crime, tobacco use is a better indicator for possible attempts at suicide. While there are many variables at play when it comes to substance use and suicide risk, these results indicate that students who are identified as users of tobacco and marijuana should be looked at more closely as they represent a population more susceptible to attempting suicide.

**Mtg Rm 2 EFFECTS OF VIDEO GAME STREAMING ON CONSUMER
11:15 ATTITUDES AND BEHAVIOR**

Brianne Foster and Dr. Robert A. Dunn. Department of Mass
Communication, College of Arts and Sciences, East Tennessee State
University, Johnson City, TN.

Video game streaming has introduced to consumers a new method of creating branded content. Little research exists on how game streams influence consumer attitudes and behaviors. The objective of the study is to examine the influence of game streaming on consumer attitudes and behavior, and to understand how game streaming functions as a form of advertising for video games. Using Elaboration Likelihood Model as a guiding framework, the researchers hypothesized that viewers of video game streams would perceive the stream to be a useful source of information when purchasing the product is being considered. Knowing how streams function among viewers is important if streaming is to be incorporated into a digital marketing strategy. To study this phenomenon, the researchers constructed a three-part survey online, and administered the survey to undergraduate students via the online participant pool Sona Systems. Part one of the survey consisted of seven multiple choice questions that addressed participants' video gaming habits and familiarity with game streams. Participants were also asked to provide their age and gender. Part two of the survey required participants to watch a five minute stream of Call of Duty: Black Ops III. Part three of the survey used Likert-scales, semantic differential scales, and multiple choice questions to measure usefulness and quality of information, source credibility, shared identity, and purchase intention. While data is currently being collected, the researchers expect that participants will find video game streams to be a useful source of information when considering purchasing a video game. It is also expected that results will provide marketing implications for the video game industry, specifically how video game streams can potentially influence consumer behavior and how they should be incorporated into a digital marketing strategy. However, if results show that streams had no influence on consumer attitudes and behavior, the researchers will consider limitations and possible errors. Other variables such as motives for viewing streams will also be considered, as many view streams simply for the entertainment and social interaction it provides.

Mtg Rm 2 11:30 SUICIDAL BEHAVIOR AMONG FIBROMYALGIA PATIENTS: IDENTIFICATION OF RISK FACTORS AND THE PROTECTIVE ROLE OF SELF-COMPASSION

Andrea Kaniuka¹, Byron Brooks¹, Dr. Fuschia M. Sirois², and Dr. Jameson K. Hirsch¹.

¹ Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN;

² Department of Psychology, University of Sheffield, Sheffield, United Kingdom.

Individuals with fibromyalgia are at increased suicide risk. Characterized by pain, sleep disturbance, and fatigue, fibromyalgia may contribute to suicide risk as a result of its disruptive effects on psychosocial and physical functioning. It is unknown, however, whether traditional suicide risk/protective factors are applicable to persons with fibromyalgia, or whether disease-specific patterns exist. As such, we examined the relations between adaptive and maladaptive inter-/intra-personal factors and suicidal behavior among persons with fibromyalgia. At the bivariate level, we hypothesized that the risk factors of alcohol and drug use, hopelessness, depression, anxiety, and fibromyalgia impact would be positively related to suicidal behavior, and that the protective factors of spirituality, religiousness, optimism, self-compassion, silver lining, and social support would be inversely related to suicidal behavior. At the multivariate level, we hypothesized that these risk/protective factors would be independently associated with suicidal behavior; we also compared risk/protective factor robustness in combined analyses. Our sample of persons with fibromyalgia (N=401) was primarily White (96.2%;n=401) and female (91.8%;n=383) with a mean age of 47.72 years (SD=13.14). Participants completed self-report measures: Suicidal Behavior Questionnaire-Revised; Alcohol Use Disorders Identification Test; Drug Abuse Screening Test; Beck Hopelessness Scale; Depression Anxiety Stress Scales; Fibromyalgia Impact Questionnaire-Revised; Fetzer Multidimensional Measurement of Religiousness; Life Orientation Test-Revised; Self-Compassion Scale; Silver Lining Questionnaire; and Multidimensional Health Profile-Psychological: Social Support. Hierarchical linear regressions were used to examine independent predictors of suicide risk. Multivariate analyses were conducted to examine clusters of variables simultaneously: (i) risk factors, (ii) protective factors, and (iii) risk and protective factors [covarying age, sex, race]. Moderation analyses were conducted to examine the buffering role of the most robust protective factor, self-compassion. All risk/protective factors were independently associated with suicide in expected directions except alcohol misuse, spirituality, religiousness, silver lining, and social support. When risk factors were examined as a block, only drug use and depression were significantly related to suicide. When protective factors were examined as a block, no significant factor emerged. When all factors were entered into the model, fibromyalgia impact ($\beta = .22$, $SE = .03$, $p = .04$), depression ($\beta = .47$, $SE = .12$, $p < .001$) and anxiety ($\beta = .23$, $SE = .11$, $p = .03$) emerged as robust indicators of suicidal behavior, and self-compassion ($\beta = .28$, $SE = .06$, $p = .04$) emerged as a robust protective factor. Further, self-compassion significantly moderated the relation between fibromyalgia impact and suicidal behavior ($\beta = -.004$, $SE = .002$, $t(293) = -2.91$, $p < .01$, $CI [-.01, -.001]$). With regard to suicide risk, persons with fibromyalgia may be particularly vulnerable to the impact of functional impairment on daily activities and anxiety/depressive symptoms; however, self-compassion may be a critical point of intervention. Therapeutically addressing risk factors (e.g., via Cognitive-Behavioral & Interpersonal Therapies), and promoting self-compassion (e.g., via Mindfulness Self-Compassion or Acceptance and Commitment Therapy), may decrease suicide risk in fibromyalgia patients.

Mtg Rm 2 11:45 SOCIOPOLITICAL CONTROL AND YOUTH SUBSTANCE USE: A COMPARISON OF URBAN AND RURAL CULTURE

Leigh Kassem and Dr. Dustin Osborne. Department of Criminal Justice and Criminology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Age of onset for drug use is strongly correlated with abuse and addiction. One in seven of those who report initial substance use under age eighteen become addicted, compared to one in twenty eight who report first use at age twenty one or older. Additionally, 90 percent of those who meet the criteria for a clinical

diagnosis of addiction began smoking, drinking, or using other drugs before the age of eighteen. Although drugs have historically been viewed as an urban problem, rural drug use has significantly increased within the last decade. Most research regarding urban/rural comparisons of drug use have been rooted in social disorganization theory. There is a growing body of literature in which sociopolitical control and civic engagement have been positively correlated with resilience and positive outcomes in high-risk, urban populations, but this perspective has not yet been utilized in a comparison of urban and rural youth drug use. The current study uses secondary data from the 2013 Monitoring the Future survey to determine how the relationship between sociopolitical control and substance use differs between rural and urban youth for tobacco, alcohol, marijuana, and other substances.

**Mtg Rm 2 GENDER PERFORMANCE AND ADVERBIAL CLAUSES IN
1:00 SHAKESPEARE**

Kelsey Kiser and Dr. Theresa McGarry. Department of Literature and Language, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Although a variety of research has been conducted on the effects of gender on language, comparatively little has been done on the specific role of syntax in gender performance. Mondorf (2004) conducted research on adverbial clauses using the London Lund Corpus and concluded that men and women used them differently. Specifically, she claimed that women used adverbial clauses to minimize commitment to their utterances by using more causal, conditional, and purpose clauses. Men, she found, used adverbial clauses to strengthen their arguments, particularly by using concessive clauses frequently. However, subsequent studies have not replicated these gender-based differences. Thus, this study was designed to extend this research focus to historical English by analyzing Shakespeare. We examined eight comedies and eight histories in search of adverbial clauses. Using computer software, we coded these plays with regards to the four types of adverbial clauses (causal, conditional, purpose, and concessive), their position in relation to the main clause, the gender of the speaker, and the gender composition of the group on stage. These results were then totaled and analyzed for significant differences. Our analysis indicates that women and men use causal, conditional, and concessive clauses at rates proportional to their total amount of speech. However, they varied in their usage of purpose clauses: men used them more than predicted in the comedies, particularly in single-gender contexts, while women used them more often in the histories, specifically in mixed-gender contexts. There were no other significant, gender-based differences; therefore, adverbial clause usage does not appear to be as strongly tied to gender as previous literature suggests. More research is necessary to determine whether this is the result of differences between historical and modern English, scripted and natural speech, or another of the many possibilities.

**Mtg Rm 2 ECOLOGICAL ANALYSIS OF CIVILIAN RESIDENTIAL
1:15 STRUCTURE FIRE FATALITY IN JOHNSON CITY, TN, THE
NORTHEAST TN REGION AND THE STATE OF TN FROM 2010
- 2014**

Edward Leinaar^{1,2}, Aaron Gillespie², and Dr. Mildred Maisonet¹.

¹ Department of Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN;

² Johnson City Fire Department, Johnson City, TN.

Incidence of fire fatality in Tennessee increased from 2002-2010 as national rates decreased. A recent assessment of the public safety system in Johnson City, TN found a greater rate of fire fatality in Johnson City (JC), compared to the state. This is unusual, as jurisdictions with populations smaller than 10,000 typically have the greatest risk of fire fatality in TN. Risk factors for fire fatality include smoking, alcohol or drug impairment, physical or mental disability, age younger than 5- or greater than 65-years, and low socioeconomic status. Nationally, presence of smoke detectors is protective against fatality. An ecological investigation was conducted comparing annual trends in civilian residential structure fire fatality rates in JC

to rates in the Northeast TN region (NETN) and the State of TN from 2005-2014, analyzing differences in demographic and fire incident characteristics between these geographic regions. We hypothesized that geographic regions with greater percent rurality and lower socioeconomic status indicators would have higher rates of residential structure fire fatality. We also hypothesized that presence of smoke detectors would be protective against fatality and that fire incident characteristics would be similar in JC to those of NETN. Data extracted from the Tennessee Fire Incident Reporting System for all structure fire incidents occurring in the State of Tennessee from January 1, 2005 to December 31, 2014 was obtained upon request from the Tennessee State Fire Marshal's office. Analyses were restricted to incidents occurring in single- or multi-family dwellings and boarding houses, reported as building fires (excluding confined fires) or fires in mobile homes used as fixed residences. Demographic variables were obtained for each geographic region from United States Census Bureau intercensal data and census summary reports. Estimates of socioeconomic indicators for the eight-county NETN region, including Carter, Greene, Hancock, Hawkins, Johnson, Unicoi, Washington, and Sullivan counties, were derived by averaging estimates for each county to represent a composite measure for the region. Frequency analyses and significance testing were performed for each geographic level, comparing fire incident and demographic characteristics. The average residential fire fatality rate per 100,000 for the 10-year period was greatest for JC (1.89), while the rate for NETN (0.91) was lower than that for the State (1.25). Contrary to our hypothesis, the region with greatest percent rurality, NETN (55.74%), had the lowest average fatality rate. While education attainment rates for high school and college graduation, as well as the median value of owner-occupied households, are greater in JC than both the NETN Region and the State, the percent of persons below poverty level is greatest in JC (23.2%). Fatality in JC occurred most often in one- or two-family dwellings (91%) and from cooking fires (45%). There is much difference in characteristics of fire incidents among geographic levels. Results of this study will be useful to inform targeted fire prevention interventions in the JC community, where a public health disparity clearly exists.

**Mtg Rm 2 REDUCING CHILDHOOD OBESITY AND CHRONIC DISEASE
1:30 IN CENTRAL APPALACHIA**

Alyssa Lovelace, James Fey, Dr. Kate Beatty, Ginny Kidwell, Paula Masters, and Dr. Deborah Slawson. Department of Community and Behavioral Health, College of Public Health, East Tennessee State University, Johnson City, TN.

Background: Compared to other regions of the United States, people living in Appalachia bear a heavier burden from obesity related chronic conditions such as cardiovascular disease, stroke, diabetes, fibromyalgia, and sleep apnea as well as higher rates of premature mortality for those diseases. Childhood obesity in particular poses a burgeoning and understated threat to the public health system. **Objectives:** The purpose of this study was, working with the Appalachian Funders Network, identify the policies and practices that have a positive impact on the reduction of childhood obesity and chronic disease in central Appalachia (TN, VA, KY, WV, NC, and OH). **Methods:** Mixed methods approach was utilized. Survey of practitioners and funders identified efforts to reduce childhood obesity including obesity prevention, healthy eating and/or physical activity. Focus groups conducted across the region provided participant generated strategies to address gaps and needs. **Results:** Over 400 practitioners and 40 funders completed the survey. Eight focus groups were conducted across central Appalachia. Based on the finding, a set of recommendations to inform future grant making strategies will be compiled. Preliminary results demonstrate some areas of disconnect between funders and practitioners. Programs were more sustainable if funded from within the community rather than from an outside source. Further, the success of a program seems to be based on need and the collaboration of the practitioners and funders. **Conclusions:** Using a mixed-methods approach, an aggregate of data provides a comprehensive picture of the current health condition of central Appalachia. Working with the Appalachian Funders Network, a group of 80 funders, the findings from this study have the potential to impact the work on practitioners and funders in the region. This collaboration hopes to promote a sustainable healthy lifestyle within Tennessee and greater Appalachia.

**Mtg Rm 2 GEOGRAPHIC DIFFERENCES AND TRENDS IN BIRTH
1:45 OUTCOMES 2009 - 2014: NORTHEAST TENNESSEE VS
TENNESSEE**

Eunice Mogusu, Dr. Claudia A. Kozinetz, Dr. Shimin Zheng and Lee Cutshaw. Department of Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN.

Literature provides evidence for disparities and inequities in health and birth outcomes based on geographical location, which highlight differential mother characteristics. These differences influence behaviors associated with adverse birth outcomes such as premature birth and low birth weight (LBW), the leading causes of infant morbidity and mortality. Consistent with the Healthy People 2020 and Millennium Development goal, to reduce infant morbidity and mortality rates, we sought to compare maternal characteristics and behaviors and the occurrence of adverse birth outcomes in Northeast (NETN) region, as defined by the Tennessee Department of Health, compared to the rest of Tennessee (TN). TN vital statistics birth record data for the years 2009 - 2014 were used in this analysis; n = 20,786 and 482,681 live births for NETN and TN respectively. Bivariate analyses were performed to deduce the demographic and birth characteristics and their proportions across the years. Logistic regression was used to calculate crude odds ratios for pre-pregnancy smokers, with the dependent variables of preterm birth and LBW. We followed with adjusted odds ratios, which controlled for mother's demographic variables; age, education years and reported household income and mother's behavioral characteristics; pre-pregnancy cigarette smoking, prenatal care by first trimester and previous preterm birth. From 2009 through 2014, the percentage of teenage mothers decreased for both TN groups, with a larger proportion in NETN (%:13.8,12.2,12.5, 11.9,9.6,9.4) compared to TN (%:12.8,11.8,10.8,10.0,9.0,8.4). A larger percentage of TN mothers did not have a high school degree or completed GED compared to NETN. A larger proportion of NETN mothers were married at the time of birth of the infant (%:60.3,60.5,59.3,58.6,57.6,57.8) compared to TN mothers (%:55.5,55.9,55.9,55.8,56.0,56.0). Over the period, 34% of NETN women smoked during the 3 months prior to pregnancy versus 21% for TN mothers. Through the third trimester 24% of NETN mothers reported cigarette smoking compared to 13% of TN mothers. Throughout, more adverse birth outcomes were observed in NETN. Compared to non-smokers, for six consecutive years and overall, the odds of a LBW among pre-pregnancy smoking mothers were higher in NETN (odds ratio (OR):2.16,1.73,2.56,2.03, 2.02,1.83,2.05) than in TN (OR:1.51,1.53,1.56,1.56,1.56,1.52,1.54), p-values <0.0001 and the odds of a preterm birth also relatively higher in NETN (OR:1.43,1.19,1.50,1.07,1.31,1.06,1.26) than in TN (OR:1.51,1.53,1.56,1.56,1.56,1.52,1.54). Correspondingly, the adjusted OR for six consecutive years and overall for LBW among pre-pregnancy smoking mothers contrasted with their counterparts were still higher in NETN (OR:2.17,1.50,2.71,1.63,2.04,2.14,1.99) than TN (OR:1.33,1.38,1.36,1.37,1.37,1.37,1.36) and the odds of preterm birth relatively higher in NETN (OR:1.34,1.07,1.33,0.84,1.32,1.11,1.16) than TN (OR:1.12,1.08,1.10,1.10,1.09,1.08,1.10). Establishing the geographic differences in prenatal smoking and birth outcomes and their associations is an imperative use of the birth records data. It would guide intervention design and evaluate performances of the existing ones thus facilitate improvements to promote and improve the health of TN population.

**Mtg Rm 2 DIVERGENT DISCOURSE: A CASE STUDY ANALYZING THE
2:15 EFFECTS OF CAMPUS COMMUNICATION ABOUT SEXUAL
ASSAULT**

Melissa H. Nipper and Dr. Amber Kinser. Department of Communication and Performance, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

This research analyzes campus discourse at a university in south central Appalachia in an effort to highlight the crucial role of communication in the prevention of sexual assault and its powerful effects on communities and individuals. By conducting a qualitative case study at this university, the researcher seeks to build upon current scholarship about sexual assault discourse by answering the following research questions: How does the discourse of a college campus represent and address sexual assault? How can this

discourse optimally aid in responding to the issue of sexual assault on campus and reducing survivor stigma? Using a critical feminist lens, this case study analyzes data gathered through participant observation at campus events dealing with the issue of sexual assault, the collection of official university documents and correspondence that address sexual assault, and eight in-depth interviews at the university – four with campus professionals whose job it is to communicate about the issue of sexual assault and four with sexual assault survivors on campus. Through these interviews, the study identifies the communication goals, interpretations, and strategies of these two important speech communities who participate in sexual assault discourse on college campuses. The findings suggest that while both groups – campus professionals and survivors – talk about the problem of sexual assault and the importance of addressing it on campus, the parties diverge on the core function of sexual assault communication. The campus professionals see sexual assault as a matter of issue management, and their communication reflects this view. To survivors, sexual assault is a matter of identity management, and that fact drives their communication. Survivors emphasize the effects of informal campus conversations, where they often hear rape myths that blame victims. This study considers not only what we can learn by examining the official communication channels dealing with the issue of sexual assault on a university campus, but also what we can learn from those whose identity is affected by the issue. The interviews point to ways in which universities can create a climate that is more conducive to healthy dialogue about sexual assault. The study concludes by identifying a framework for informing university and college campus conversations and language choices in ways that better respond, and communicate responsiveness, to the issue of sexual assault. The recommendations underscore current research by emphasizing the importance of working to actively decimate rape myths on university campuses. It also broadens the current research by suggesting a need to create safe spaces where survivors can report and talk about sexual assault and form solidarity with other survivors.

Mtg Rm 2 2:30 DECONSTRUCTING SCIENCE PRACTICE SKILLS IN THE INTRODUCTORY BIOLOGY CLASSROOM: INVESTIGATING INSTRUCTOR TEACHING STRATEGIES

Sara Normark and Dr. Anna Hiatt. Department of Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Science practice skills are a critical component of introductory biology curricula that better prepare students for STEM-capable careers. These skills are important for not only continued education, but for utilization in careers in such areas as health and chemical engineering, which are popular employers in our local area of Northeast Tennessee. With variability in formal education, teaching experience, research experience, resources available and professional development opportunities for biology instructors, local instructors may vary in their teaching practices with respect to science skills. Are certain faculty more adept at scaffolding skills into their curriculum or breaking down those skills for students, because of those potential differences in professional background? To explore this question, we will be using a mixed-methods approach to survey individual faculty about their science skills teaching practices and basic demographic information to identify any emergent trends in how faculty scaffold and unpack science practice skills. Establishing this baseline of assessment of teacher abilities to integrate concepts and skills may influence the kinds of faculty development programs that are needed in the area to optimize how they scaffold and unpack science skills.

Mtg Rm 2 2:45 TEMPORAL TRENDS IN PRIMARY LIVER CANCER (PLC) SURVIVAL RATES IN US ADULTS 45 YEARS AND OLDER

Renice Obure, Ajinkya Kumbhare and Dr. Megan Quinn. Department of Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN.

Introduction: Liver cancer is projected to be the third leading cause of cancer related deaths in the United States by 2030. The most common primary liver cancer (PLC), hepatocellular carcinoma (HCC), is the fastest rising cause of cancer death in the U.S. The study examines the temporal trends of PLC survivorship

in U.S adults. **Methods:** Surveillance Epidemiology and End Results (SEER) 18 registry was used. Cases were defined by International Classification of Disease (ICD)-O-2/ICD-O-3 primary sites C22.0 (liver) and C22.1 (intrahepatic bile duct). Morphology codes 8160 - 8161, 8170 - 8175 and 8180 were used for specific histologies used to define cases. Analyses were completed using SPSS. The sample excluded all cases <45 years of age as most cases of PLC occur after that age period. Data from 1973 to 2012 was used to describe the age and marital status at diagnosis, race, gender, stage, and surgery recommendation of a sample of 77,365 cases. Marital status at diagnosis was dichotomized. Cases with missing marital status or of unknown race were excluded from the analysis. SEER historic staging variable was used. Cancer directed surgery variable was recoded into four categories; surgery performed, surgery recommended but not performed, surgery not recommended and autopsy only or unknown. Year of diagnosis was categorized into 5-year cohorts beginning 1973. Cause-specific survival and trend was examined using life table cox regression model. Hazard ratio (HR) and the corresponding confidence intervals are reported. **Results:** Average age of PLC diagnosis in the sample was 65 years (M-65.54: SD-11.11). Other sample characteristics include: gender (72.5% male), race (69.0% white), marital status at diagnosis (57% married), staging (41.3%) localized and surgery recommendation (57.9%) surgery not recommended. The median survival time was 11.31 months with 35% and 16% chance of surviving at 1 year and 5 years, respectively. If surgery was recommended but not performed an individual's risk of dying increased twofold compared to those who underwent surgery (HR: 2.77, CI: 2.67-2.88). The median survival time and 5 year survival rate for localized cancers improved from 8.02 months and 3% in 1973-1977 cohort to 41.66 months and 32% in the 2003-2007 cohort. Five year survival rate after surgery also improved over time from 7% in 1973-1977 to 44% in 2003-2007. The risk of dying from the cancer in 2008-2012 was 62.3% less than in 1973-1977 (HR: 0.377, CI: 0.353-0.403). **Conclusions:** General trends show an increase in the survival rates for PLC particularly for localized cancers and with surgery. This good news is a challenge for the public health community to develop screening methods that could detect localized cases in order to continue improving the prognosis of PLC.

Mtg Rm 2 3:15 COMMUNITY ENGAGEMENT TO REDUCE TOBACCO USE: MAIN FINDINGS FROM A POPULATION HEALTH IMPROVEMENT PLAN FOR TOBACCO CONTROL

Crystal Robertson¹, Hadii M. Mamudu², Mary Ann Littleton³, Daniel Owusu¹, Rafie Boghozian⁴, Candice Collins¹, Liang Wang¹.

Departments of ¹ Biostatistics and Epidemiology, ² Health Services Management and Policy, and ³ Community and Behavioral Health, College of Public Health, East Tennessee State University, Johnson City, TN;

⁴ Department of Management and Marketing, College of Business and Technology, East Tennessee State University, Johnson City, TN.

Tobacco use continues to be the leading preventable cause of death in the United States, contributing to over 480,000 deaths and \$300 billion in economic costs. Tennessee's smoking prevalence continues to be higher than the national average (24.3% vs. 18.1% in 2013); yet, little known is about policies and programs for addressing this public health problem. This situation poses challenge to attaining the Healthy People 2020 goal of 12% adult smoking rate in the United States. The study aimed to engage Northeast Tennessee communities, where tobacco use prevalence is disproportionately highest in Tennessee, to identify region-specific approaches and evidence-based practices for tobacco control. A mixed-methods approach based on a three-prong framework of Protection, Prevention, and Cessation was used for the study. Utilizing a community-based participatory research approach (CBPR), data were gathered and analyzed using NVivo to create descriptive statistics and guide recommendations and future work in tobacco control. Collectively, 222 individuals and 91 unique organizations contributed through health councils, informant interviews, and stakeholder meetings. Although cigarette smoking predominates, there is pervasive use of smokeless tobacco products and e-cigarettes across all ages. Overall, five regional goals

emerged: Protect the population from tobacco use exposure through policy enforcement and implementation and counter-marketing; Prevent initiation of use with comprehensive youth-focused programs that increase knowledge and awareness; Expand access to cessation resources and treatment, especially in high risk populations; Foster collaboration and partnership; and Monitor data for evaluation and validity. Of 25 recommendations identified, two are paramount: continuing and increasing funding for tobacco control, and removing the state tobacco preemption to facilitate local innovation. The Population Health Improvement Plan process provided the opportunity for community mobilization for tobacco control and expansion of culturally-tailored best practice programs. The stalled decline of cigarettes smoking and uptake in alternative tobacco products in the United States suggest the need for a community-specific approach to tobacco control. The study revealed priority issues and recommendations that embody and underscore the most basic factors needed for tobacco control; hence, implementation will increase community participation in tobacco control and potentially reduce the high burden of tobacco use in Northeast Tennessee and statewide.

Mtg Rm 2 3:30 EXPOSURE EFFECT OF BACILLUS THURINGIENSIS ON HUMAN HEALTH - A SYSTEMATIC REVIEW

Sonica Sayam¹, Ruby Yadav¹, Ifeoma D. Ozodiegwu¹, Ken Silver², Mildred Maisonet¹

Departments of ¹ Biostatistics and Epidemiology, and ² Environmental Health, College of Public Health, East Tennessee State University, Johnson City, TN.

Background: For over 30 years the organism *Bacillus thuringiensis* (B.t.) has been used as a microbial pesticide. Studies on human health outcomes related to B.t. exposure have reported symptoms like upper airway irritation, stomach discomfort and diarrhea. But findings of different studies have not been assessed systematically. Objective: This review aims to compile the epidemiological evidence on human health effects of exposure to B.t. Method: Two databases, PubMed and Toxline, were reviewed systematically. A predefined search protocol was used for screening. In PubMed, the search term [“bacillus thuringiensis”] and a search filter on species was applied to include only human studies. Text word [“bacillus thuringiensis” and human] was used in Toxline excluding PubMed records. A team of two reviewers independently screened peer-reviewed articles relevant to this topic, obtained from these two databases from 1965 to 16th February, 2016. Only peer-reviewed analytic epidemiological studies were included for the review and the members of the team agreed upon a final list of the articles. Result: Initially, 421 articles from PubMed, and 235 articles from Toxline were extracted using the search terms. A total of 30 articles, 24 from PubMed and 6 from Toxline, met the screening criteria. Finally, 10 articles met the inclusion criteria for the review. Preliminary findings suggest a minimal risk of serious health hazard from exposure to B.t. But a strong association has been observed with the development of IgE mediated sensitization due to B.t. exposure. Also, one of the B.t. toxins (Cry1Ab) has been detected to cross the placenta. More studies are needed in this field to analyze the potential health outcomes related to sensitization and any probable adverse effects on a fetus.

Mtg Rm 2 3:45 DOES NEIGHBORHOOD DISADVANTAGE AFFECT SUBCLINICAL ATHEROSCLEROSIS?

Pooja Subedi¹, Hadii M. Mamudu², Antwan Jones³, Timir Paul⁴, Sreenivas P. Veeranki⁵, Liang Wang¹, Hemang Panchal⁴, Arsham Alamian¹, Ali Alamin², Matthew Budoff⁶.

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⁵Department of Preventive Medicine and Community Health, University of Texas Medical Branch, Galveston, TX;

⁶ Los Angeles Biomedical Research Institute, Torrance, CA.

Cardiovascular health disparities across subpopulations and geographies have been well-documented in urban areas. Evidence suggests that racial minorities and low-socioeconomic groups have high risks of developing cardiovascular diseases (CVD). Residents of the Appalachia also exhibit high rates of CVD, but little is known about the relationships between cardiovascular risk factors, spatial disadvantage, and cardiovascular health outcomes in this region. Thus, this study aimed to examine the independent association between neighborhood factors and subclinical atherosclerosis in an asymptomatic population from central Appalachia. Community-dwelling asymptomatic individuals (n=210) were screened for Coronary Artery Calcium (CAC), a subclinical marker for coronary atherosclerosis, from January 2010 to January 2014. Based on the standard Agatston Scale, participants were grouped into 4 CAC scores: zero (CAC = 0), mild (CAC = 1-99), moderate (CAC = 100-399) and severe (CAC = 400) to determine the severity of coronary artery disease (CAD). Demographic information (e.g., age, gender, race, and marital status), cardiovascular risk factors (e.g., hypertension, hypercholesterolemia, obesity, smoking, and family history of CAD), and neighborhood level characteristics (racial and socioeconomic characteristics of the population) were used in ordinal logistic regression analyses performed in Stata 14.1. Of the 210 participants, over three-fourths (79%) had a CAC score greater than 1. While 67% of the participants were hypertensive, 80% had hypercholesterolemia, 75% were overweight or obese, 52% had a history of smoking, and 55% had a family history of CAD. There were significant differences in the socioeconomic environment of these residents. Specifically, zip-code median household income was higher for individuals with zero CAC score. Additionally, the zip-code household poverty percentage was higher for those with CAC scores = 1. Although all the neighborhood factors increased the odds of having higher CAC score, none of them were statistically significant. The positive, albeit statistically non-significant, association of adverse neighborhood factors with higher CAC scores suggests the need for larger studies for further understanding of this association. Finally, achieving the Healthy People 2020 goal of reducing or eliminating disparities requires risk factor screening and control in high prevalent areas such as central Appalachia, and understanding the neighborhood level dynamics for CVD.

Mtg Rm 2 4:00 HEAT-RELATED MORTALITY DUE TO CLIMATE CHANGE - ASSOCIATIONS, CONFOUNDERS, VULNERABILITIES AND ADAPTATIONS: AN EPIDEMIOLOGIC REVIEW (2009 - 2015)

Reem Tariq and Dr. Ying Li. Department of Environmental Health, College of Public Health, East Tennessee State University, Johnson City, TN.

The rising global temperatures are a consequence of the increasing concentrations of the greenhouse gases (GHG) in our atmosphere. This unprecedented yet steady increase in GHG concentrations has led to an increase in the incidence of adverse high-temperature weather phenomena. The aim of this study was to perform a detailed and systematic literature review to study the global dynamic between elevated ambient

temperatures and heat-related mortality. The review also aimed at exploring the effect of pollutants as possible confounders, to identify vulnerable populations and to study population adaptations to heat that might mitigate heat-related mortality in urban settings. The review was performed exclusively on PubMed. Only epidemiological studies were selected. A time constraint ranging from 2009 to 2015 was applied to the review findings. Only peer-reviewed journals published in the English language were included. The following key terms were used for heat-related mortality associations - heat, high temperature and mortality. Additional keywords were used for the confounders, vulnerable populations and adaptations sections, such as “ozone”, “vulnerable subgroups” or “adaptations”. Studies reporting data on cold effects were excluded from the review. The search resulted in a total of 83 studies, which were included in the review based on the selection criteria. These studies were categorized and presented in four sections - heat-mortality associations, effects of pollutants as confounders, vulnerable populations and adaptations. It was found that elevated ambient temperature was associated with high mortality. Additionally, risks of mortality were found to be higher for certain populations, particularly the elderly (65 years or older), infants and the socioeconomically disadvantaged groups. In conclusion, the heat-associated risks of mortality have increased with the escalating climate-change scenario. However, it is important to note that these risks are dependent on factors such as geographical location, socioeconomic status, age, and occupational status. Adaptations to heat are possible in the form of increased use of air-conditioning and promotion of “green” living spaces.

Master’s Candidates

✧ Natural Sciences ✧

Mtg Rm 3 10:15 SYNTHESIS AND CHARACTERIZATION OF A NEW CYANO-SUBSTITUTED BIS(PYRAZOLYL)BORATE AND ITS THALLIUM(I) COMPLEX.

Chris Acquah , Dr Ismail Kady, and Dr Peter Zhao.

Department of Chemistry, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Scorpionate are versatile and flexible ligands with a wide range of applications including catalysis, C-H bond activation, formation of new class of materials, and mimicking enzymatic reactions. This is as a result of its steric and electronic properties, and due to the relative ease with which the 3, and 5-positions of the pyrazole ring can be functionalized. In this work, we report the synthesis of a new class of scorpionate ligands known as cyanoscorpionates which can crosslink various metal centers. Thus, Bis (4-cyano-3, 5-diphenylpyrazolyl)borate BpPh₂,4CN was synthesized and fully characterized by ¹H NMR and FT-IR. Coordination of Bis (4-cyano-3,5-diphenylpyrazolyl)borate BpPh₂,4CN to Thallium (I) metal was performed and we are currently elucidating its molecular structure by X-Ray crystallography.

Mtg Rm 3 10:30 SYNTHESIS OF A 3-DIAZONIUM -4-(TRIFLUOROVINYLOXY) - PERFLUOROBUTANESULFONYLFLUORIDE ZWITTERIONIC MONOMER FOR POLYMER ELECTROLYTE MEMBRANE FUEL CELL

Isaac Darko Addo and Dr. Hua Mei. Department of Chemistry, College of Arts and Sciences, East Tennessee state university, Johnson City, TN.

3-Diazonium- 4-(trifluorovinyl) - perfluorobutanesulfonyl fluoride zwitterionic monomer (I) is proposed to be polymerized and further act as a new electrolyte for Polymer exchange membrane fuel cell (PEMFCs). One reason is that, aromatic trifluorovinyl aryl ether (TFVE) can easily be homopolymerized to aromatic perfluorocyclobutane (PFCB) polymer. Furthermore, the diazonium moiety in the monomer is expected to covalently attach the electrolyte to the carbon electrodes support to maximize the efficiency of utilization of the catalyst. A seven steps synthetic scheme is designed to obtain such monomer from polytetrafluoroethylene. After successfully synthesizing 4-(2-bromotetrafluoroethoxy)-3-nitro-benzensulfonyl amide, the next stage of the work is to couple it with the nonafluorobutanesulfonyl fluoride group C₄F₉SO₂F. All the intermediates were characterized by ¹H and ¹⁹F NMR and FTIR spectroscopy.

Mtg Rm 3 10:45 SYNTHESIS OF 5-NITRO-1, 3-BENZENEDISULFONYLAMIDE MONOMER FOR PROTON EXCHANGE MEMBRANE FUEL CELLS (PEMFCs)

Abdulmajeed Alayyaf and Dr. Hua Mei. Department of Chemistry, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

The overall goal of the research is to prepare one specific monomer, which can be polymerized as membrane electrolytes for PEM Fuel Cells. The copolymer of 5-nitro-1, 3-benzenedisulfonamide and perfluoroalkyl disulfonyl fluoride is proposed to improve the proton conductivity of proton exchange membrane (PEM) fuel cells. After losing diazonium group and forming a covalent bond with the carbon electrode in PEMFCs, the polymer is expected to increase the membrane-electrode interface and ion conducting polymer compatibility in the membrane and in the catalyst layer of the electrode. Thus, the target is to synthesize 5-nitro-1, 3-benzenedisulfonamide from sodium 1, 3-benzenedisulfonate salt. According to the literature, the synthesis is designed with three steps: 1) nitration reaction; 2) chlorination reaction; and 3) ammonolysis reaction. The target monomer will be copolymerized with perfluoroalkyl disulfonyl fluoride in the coupling reaction. Then, the aromatic nitro group will be converted to diazonium group before or after the copolymerization. The prepared monomer and the intermediates are characterized by NMR, IR, and GC/MS spectra.

Mtg Rm 3 11:15 SYNTHESIS, CHARACTERIZATION AND IN VITRO EVALUATION OF NOVEL PYRROLO[2,1-C][1,4]BENZODIAZEPINE TETRACYCLIC ANALOGS AS POTENTIAL ANTI-CANCER AGENTS

Joel K. Annor-Gyamfi and Dr. Abbas G. Shilabin. Department of Chemistry, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Benzodiazepines are pharmacologically important heterocyclic compounds widely used as scaffolds for various therapeutic purposes. Pyrrolo[2,1-c][1,4]benzodiazepines (PBDs) are naturally occurring antitumor antibiotics isolated from the cell cultures of Streptomyces species and they have been known to form a class of biologically active compounds capable of recognizing and binding to specific sequences of DNA,

resulting in a wide variety of potential biological responses. Therefore, current research has been focused on the synthesis and characterization of a novel series of Pyrrolo[2,1-c][1,4]benzodiazepine derivatives. A set of 5- and 6-membered annulated PBD derivatives were synthesized from the parent PBD in a multi-step reactions approach and characterized using ¹H-, ¹³C-NMR and GC-MS. The in vitro cytotoxicity of these compounds is investigated using NCI-60 cancer cell lines.

**Mtg Rm 3 ANALYSES OF ANANDAMIDE-MEDIATED GROWTH
11:30 INHIBITION IN PHYSCOMITRELLA PATENS**

Jedaidah Chilufya and Aruna Kilaru. Department of Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City TN.

In higher plants, a class of bioactive fatty acid ethanolamides or N-acylethanolamines (NAEs) mediate growth, development, cellular organization and response to stress, in an abscisic acid (ABA)-dependent or independent manner. Unlike in higher plants, *Physcomitrella patens*, a bryophyte contains anandamide or NAE 20:4, a mammalian endocannabinoid ligand that mediates a multitude of physiological functions including development and stress. Unique lipids in mosses are considered vital for their resilience to environmental stresses; such lipids might enable them to recognize stress at the cellular level, and respond with membrane reorganization and altered growth. Since the identification of anandamide in moss, we have shown that, like abscisic acid (ABA), it inhibits gametophyte growth in a dose-dependent manner and reduced chlorophyll content. It is hypothesized that moss gametophores undergo morphological and cellular changes during anandamide-mediated growth inhibition. To test this, gametophyte growth and morphological changes in phyllodes, under different concentrations of NAE 20:4, were digitally captured using Canon EOS 70D, and analyzed using ImageJ software. NAE 20:4 but not its free fatty acid, arachidonic acid, not only inhibited growth of both shoots and rhizoids in a dose-dependent manner but also showed remarkable cellular changes. Phyllodes and protonemal cells of NAE 20:4 treated plants were further examined under stereo and compound light microscopes. Long- and short-term treatment with anandamide resulted in reduced chloroplast number, cytoplasmic shrinkage and plasmolysis in phyllodes and protonemal cells. A 100 micromolar NAE 20:4 treatment resulted in complete loss of green pigmentation in phyllodes. Effects of anandamide on cytoskeletal organization will be studied using *Physcomitrella* plants expressing GFP-talin and tubulin, via confocal microscopy. Together, these data will provide insights into anandamide-mediated cellular responses during growth inhibition.

**Mtg Rm 3 AN ENESTROM-KAKEYA THEOREM FOR A NEW CLASS
11:45 OF POLYNOMIALS**

William Ty Frazier and Dr. Robert Gardner. Department of Mathematics and Statistics, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

In the study of optimization problems in Calculus, one sees that locating the zeros of functions are essential. A classical result of Enestrom and Kakeya considers polynomials with real, nonnegative, and monotone increasing coefficients and shows that the zeros of such a polynomial must lie in the closed unit disk centered at the origin in the complex plane. Over the last 100 years, numerous generalizations of the result have been presented. In this talk, we give two new results concerning the location of the zeros of a polynomial with complex coefficients in which we impose a monotonicity condition on the coefficients with indices which are congruent modulo m (where m is less than the degree of the polynomial). Our results generalize a number of previously known results.

Mtg Rm 3 1:00 MOLECULAR DOCKING, SYNTHESIS AND EVALUATION OF 1,2,4-OXADIAZOLINONE DERIVATIVES AS POTENTIAL NON B-LACTAM B-LACTAMASE INHIBITORS.

Joseph Osamudiamen Osazee and Abbas G. Shilabin. Department of Chemistry, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

As antimicrobial resistance continues to be a menace world over, it becomes very important to find new ways to curb it. Scientists daily are in search of novel lead compounds to serve as inhibitors for B-lactamases. 1,2,4-oxadiazolinones have been known to have numerous biological activities ranging from analgesic, antipyretic and antibacterial properties to anticancer properties depending on the derivation. Novel 1,2,4-oxadiazolin-5-(thio)one derivatives were synthesized in three step procedures from N-phenylacetamide in good yield and tested for possible inhibition against class A TEM-1 and class C p99 B-lactamases, respectively. Molecular docking studies revealed reasonable interactions of ligands with active site residues resulting in firm non-covalent hydrogen bonding, as well as the presence of Serine- γ -OH in proximity of electrophilic site. Further binding affinity energies of inhibitory compounds were calculated to vary in the range of -2.69 and -3.09 kcal/mol. Enzyme inhibition assay of TEM-1 and p99 B-lactamases showed poor inhibition of the enzymes by the derivatives in the presence of B-lactamase substrate nitrocefin. In addition to optimization of current derivatives, we will examine their new biological activities through other assays including minimum inhibitory concentration (MIC) for antimicrobial properties.

Mtg Rm 3 1:15 DEVELOPMENT OF AN EFFICIENT METHOD FOR EXTRACTION AND PURIFICATION OF AN INHIBITORY COMPOUND PRODUCED BY RHODOCOCCLUS SP. MTM3W5.2

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The actinomycete genus *Rhodococcus* are aerobic, GC-rich nonsporulating, non-motile Gram-Positive bacteria. They are known to produce bioactive secondary metabolites that are derived from polyketides or nonribosomal peptides. Recently, the *Rhodococcus* strain MTM3W5.2 was isolated from a soil sample collected from Morristown in East Tennessee. This bacterium produces an antibacterial compound that has activity against all *Rhodococcus* species tested. Part of a gene required to produce this inhibitor molecule was previously discovered and found to be similar to a polyketide synthase gene from *Streptomyces*. This motivated us to purify and characterize this antimicrobial compound. In this study, the inhibitory molecule was extracted from both agar and broth cultures of strain MTM3W5.2. An effective High Performance Liquid Chromatography (HPLC), gradient elution method was developed to separate and purify the antibacterial compound(s). The approach is based on primary purification of crude culture extract on a Sephadex LH-20 column, followed by preparative reversed phase column chromatography using the Hamilton PRPTM-C18 column coupled to multiple rounds of reversed phase HPLC using a Kinetex[®] 5u EVO C18 100 Å column. A disk diffusion assay was used to detect inhibitory activity of the compound and served to guide each step of the purification process. Stability of the inhibitory molecule was determined based on UV absorption spectroscopy. The ¹H NMR, ¹³C NMR, ¹H-¹H COSY, HMBC, HSQC, TOCSY, ROESY and NOESY spectra was determined on the purified compound. Its structural determination is currently under investigation.

Mtg Rm 3 1:30 CHARACTERIZATION OF ANTI-INFLAMMATORY MICROGLIA IN ANTERIOR CINGULATE CORTEX WHITE MATTER IN AUTISM SPECTRUM DISORDER

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Autism spectrum disorder (ASD) is a group of neurodevelopmental disorders that affects 1 in 68 children in the United States. The disorders are described by varying degrees of behavioral alterations in social communication and repetitive actions. The neurobiological basis of ASD has yet to be completely characterized, but likely involves inadequate cellular communication in specific brain regions associated with social behaviors. The anterior cingulate cortex (ACC), also referred to as Brodmann area 24 (BA24), is a brain region that has been associated with multiple aspects of social behavior including decision-making, personal interactions, and empathy. As shown using magnetic resonance imaging, subjects with ASD demonstrate decreased synchronization and hypo-activation in the ACC during complex tasks, when compared to typically developing (TD) control subjects. Studies using diffusion tensor imaging have identified unique white matter pathological changes in ASD including increased volume and decreased structural integrity in the ACC. Alterations in ACC white matter are likely attributed to glia cells since an abundance of microglia and macroglia (oligodendrocytes and astrocytes) are found in this matter type. Microglia are responsible for central nervous system and immune system protection through cellular activation via chemotactic signals released by apoptotic or dysfunctional neurons with exposed phosphatidylserine on the neuronal surface. Microglial activation results in two distinct physiological effects: the pro-inflammatory (M1) phenotype produces cytokines as a defense mechanism to promote CNS healing, while the anti-inflammatory (M2) phenotype promotes neuronal remodeling and phagocytosis of apoptotic neurons. It is hypothesized that an increase in anti-inflammatory microglia gene expression occurs in the ACC from ASD subjects; however, insufficient data exists to confirm this hypothesis. As a result, we are attempting to develop methods to study the gene and protein expression of anti-inflammatory microglia in postmortem white matter tissue from ASD and typically developing control brain donors. We found that grossly punch-dissected white matter, containing both superficial and deep white matter, yielded sufficient RNA amounts for gene expression studies. For protein studies, multiple antibodies for the M2 anti-inflammatory mannose receptor were used for immunohistochemistry of frozen tissue without successful identification of this cell type in white matter. Immediate future studies will include immunohistochemistry of the mannose receptor using fixed tissue. Additionally, gene expression analyses of anti-inflammatory microglia will be performed using thirteen pairs of ASD and TD punch-dissected tissue. The current findings advance ASD research by providing valuable information for the experimental design to study glia pathology, which could ultimately lead to the development of therapeutic options and advanced diagnostic tools.

Mtg Rm 3 2:00 SINGLE CRYSTAL X-RAY DIFFRACTION MODELING OF DISORDER IN MOLYBDENUM AND COPPER ENZYME LIKE COMPLEXES

Gabriel Thompson and Dr. Cassandra Eagle. Department of Chemistry, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Enzymes such as sulfite oxidase, nitrate reductase, and nitrogenase contain molybdenum cofactors. The study of model molybdenum cofactors is essential to understanding these enzymes. These model compounds are able to mimic the activity of a molybdenum cofactor since they have a similar coordination environment, and they can undergo oxygen atom transfer processes, which are important reactions

catalyzed by molybdenum cofactors. The object of this research was to characterize, by single crystal X-ray diffraction, three such model compounds. The first model compound, $\text{MoSO}_6\text{N}_2\text{C}_{21}\text{H}_{21}$, presented no crystallographic challenges. Its crystal data are: Crystal system: monoclinic, Space group: P21/c, Unit Cell dimensions: a: 10.96870 Å, b: 12.34360 Å, c: 15.62550 Å, α : 90.0000°, β : 99.4340°, γ : 90.0000°, R1: 0.0437, wR2: 0.0969, Goodness of Fit: 1.077, Maximum Shift/Error: 0.001. The second compound, $\text{CuCl}_2\text{O}_2\text{N}_2\text{C}_{26}\text{H}_{36}$, initially had a discrepancy index (R1) of 0.1497, which indicated disorder. Modern crystal structure commands, such as SADI, SIMU, and FLAT, were employed to model the disorder. These reduced the discrepancy index to 0.1010. The crystal data are: Crystal system: monoclinic, Space group: P21/c, Unit Cell dimensions: a: 14.52400 Å, b: 21.07100 Å, c: 18.87500 Å, α : 90.0000°, β : 110.6900°, γ : 90.0000°, R1: 0.1010, wR2: 0.2262, Goodness of Fit: 0.991, Maximum Shift/Error: 0.000. The third compound $\text{MoClS}_2\text{O}_4\text{N}_3\text{C}_{18}\text{H}_{18}$, was even more challenging due to intractable disorder. Attempts to resolve this disorder were unsuccessful, although structural parameters were obtained with reasonable certainty. The crystal data obtained were Crystal system: monoclinic, Space group: P21/c, Unit Cell dimensions: a: 42.376 Å, b: 6.750 Å, c: 15.491 Å, α : 90.0000°, β : 92.8100°, γ : 90.0000°, R1: 0.1775, wR2: 0.4608, Goodness of Fit: 0.954, Maximum Shift/Error: 0.000. From these results we now have a better understanding of the structure of these compounds and can use that information to better understand the nature and functions of similar cofactors in biological systems.

Mtg Rm 3 CHARACTERIZATION OF FATTY ACID AMIDE HYDROLASES 2:15 IN TOMATO

Vijay Tiwari, Derek Stuffle and Aruna Kilaru. Department of Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

N-acyl ethanolamines (NAEs) are fatty acid amides derived from a minor membrane lipid constituent N-acyl phosphatidylethanolamine, structurally consisting the linkage of fatty acid to the ethanolamines. NAE is hydrolysed by fatty acid amide hydrolase (FAAH) into free fatty acid and ethanolamine in both plants and animals. In plants, FAAH gene has been thus far characterized in Arabidopsis, where it was shown to act as a modulator of endogenous NAE levels, seedling growth and their ability to respond to biotic and abiotic stress. Based on the evidence that NAEs occur in tomato (*Solanum lycopersicum*) seeds, we hypothesized that there is a functional FAAH that hydrolyzes NAEs in tomato. To test this, we performed in silico analysis using AtFAAH sequence as a template and identified six orthologs in tomato. These six *S. lycopersicum* FAAH homologs have the characteristic amidase signature sequence and conserved catalytic residues. Protein structures of putative SIFAAH1 and 2 were predicted using molecular visualization system (PyMOL). They showed similar domain structure with minor differences in spatial arrangement when compared with that of AtFAAH. Among the six homologs only putative SIFAAH1 and SIFAAH2 expression levels were associated with seedling development. Therefore the study was focused on cloning and characterization of SIFAAH1 and 2. Thus far, full-length coding sequence of putative SIFAAH1 was cloned into a heterologous expression system and its expression was confirmed by Western blot. Biochemical characterization of its hydrolytic activity against radiolabelled NAE substrates is underway. Furthermore, expression of SIFAAH1 and SIFAAH2 will be quantified and correlated with the NAE levels and hydrolytic activity at different developmental stages. This study is expected to reveal how NAE metabolite levels are modulated in tomato plant during its development.

Mtg Rm 3 2:30 COMPUTATIONAL QUANTUM CHEMISTRY STUDIES OF RADICAL INTERMEDIATES FORMED DURING OXIDATION OF MELATONIN

Constance E. Warden and Scott J. Kirkby. Department of Chemistry, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Free radicals are connected to oxidative stress that results in aging, cancer, Parkinson's, Alzheimer's, and Sickle Cell Disease, among many other health problems. Indirect methods, such as spin trapping, are commonly used to circumvent the difficulty of direct experimental observation and identification of short-lived free radicals. Spin trapping stabilizes and lengthens the lifetime of the radical through reaction with another molecule so that it is detectable by Electron Paramagnetic Resonance spectroscopy. Recent efforts have been directed towards in vivo spin trapping. However, the most common nitroso and nitron spin traps are known to be toxic at high concentrations. Melatonin is a relatively nontoxic natural antioxidant that is directly reactive towards the hydroxyl radical and relatively unreactive towards the superoxide radical. While melatonin as an antioxidant has been experimentally well studied, its reaction mechanisms are still not well understood. This presentation will focus on computational quantum chemistry studies of proposed reaction mechanisms in the gas phase for direct oxidation of melatonin. Geometry optimizations were performed using Hartree-Fock and Density Functional Theory methods. Basis set extrapolation methods were used to calculate single point energies from Møller-Plesset perturbation theory in conjunction with Dunning's correlation-consistent polarized valence-only basis sets. Stable structures and conformations of melatonin radical intermediates will help understand how melatonin functions as an antioxidant and determine if a melatonin derivative could function as a possible in vivo spin trap.

Doctoral Candidates

✧ Social and Behavioral Sciences ✧

Forum CAFFEINE SELF-ADMINISTRATION IN THE RAT

Room Curtis Bradley and Matthew Palmatier. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN

10:15

No previous study has established repeatable and reliable self-administration of caffeine in non-human species. However, we have shown that caffeine can increase behavior by increasing responding for non-drug reinforcers. The goal of the present studies was to determine whether the reinforcement enhancing effects of caffeine could increase caffeine self-administration in rats. In two experiments rats were shaped to respond for saccharin (0.2% w/v) under a progressive ratio (PR) schedule of reinforcement. After this shaping procedure, the reinforcer was shifted to one of the following stimuli: oral tap water, oral or intravenous (iv) caffeine, oral saccharin alone (no change) or caffeine (oral or iv)+saccharin. Rats were allowed to respond until reaching a breaking point, operationally defined as 30 min without earning a reinforcer. Caffeine was self-administered in oral and intravenous solutions, but only when it was accompanied by oral saccharin. Rats that self-administered oral or iv caffeine did not respond more than rats responding for tap water ($F < 1$). Rats that self-administered oral or iv caffeine in conjunction with the saccharin reinforcer responded more and reached higher breaking points than all other groups ($p < 0.05$) and this effect was reliable and repeatable over test sessions (main effect of Session and Group x Session interaction, $p < 0.05$), and these differences maintained over maintenance phase of 5 test days. Additional tests with different concentrations of oral caffeine indicated that the effect was dose-dependent (main effect of Caffeine Concentration, $p < 0.05$). The findings replicate previous work that caffeine alone is not a primary reinforcer. However, they also demonstrate that response-contingent caffeine can increase operant responding in a reliable and repeatable manner when presented in conjunction with other non-drug rewards.

Forum **SHIFTS IN RITUAL RESPONSE TO LOSS DUE TO DEATH:**
Room **AN ASSESSMENT OF FUNERAL SERVICE MOURNING**
10:30 **TRENDS OVER TIME**

Lawrence D. Childress and Dr. Andrea D. Clements. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN

Introduction: As the predominant social expression of grief, funerals have been purported to be waning in occurrence and/or transitioning to emergent, less conventional ceremonial forms. In this research, trends regarding the cost, nature (type), and prevalence of funeral services were examined relative to an extant data set from two funeral homes of shared ownership in northeast Tennessee. The purpose was to verify or refute purported change(s) in the frequency and/or ceremonial emphasis of funerals in the study area.

Methods: Anonymized, archival data from two funeral homes in northeast Tennessee (N = 2,581), spanning five years (2008-2012), were evaluated for trends over time with respect to two outcome variables: (1) the presence/absence of a funeral, and (2) the degree of ceremonial emphasis. Results: A binary logistic regression model was fit to the data with annualized time bins (2008 - 2012) as predictors of the dichotomous outcome variable (presence/absence of a funeral). An omnibus test of the fitted model against that of a constant/intercept-only model was not statistically significant, indicating that time alone (irrespective of covariates) did not reliably predict whether there would be a funeral ceremony or not [chi square (4) = 6.558, p = .161]. Ceremonial emphasis was then regressed on annualized time bins using a multinomial logistic model without covariates. Model fitting information indicated a statistically significant difference between the final model (including the predictors) and the intercept-only model, suggesting that – in the absence of covariates – annualized time bins did reliably predict degree of ceremonial emphasis [chi square (8) = 149.570, p < .001], with an apparent trend toward decreased ceremonial emphasis. With the covariates of geographic location and retail spending included in the model, and using dummy coding to compare the probability of each degree of ceremonial emphasis to all other categories of emphasis combined, subsequent binomial logistic regressions indicated that although some modest degree of incremental change is apparent, weaving together strands of statistical significance does not result in a meaningful overall explanation of how (and/or why) that change may be occurring. Conclusion: These results do not support the proposition that funerals are declining in their frequency of occurrence, but they do indicate some incremental alterations in the ceremonial emphasis of ritual response to death, as influenced by the passage of time (demarcated annually), economic impacts (relative to retail spending), and geographic location. This research highlights the need for additional empirical investigation into factors explaining possible shifts in mourning (e.g., funerals) as well as other aspects of loss response.

Forum **BREASTFEEDING REDUCES CHILDHOOD OBESITY RISKS**
Room Candice Collins¹, Melanie Pitts¹, Dr. Youfa Wang², Dr. Bin Xie³,
10:45 and Dr. Liang Wang¹

¹ Department of Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN;

² Systems-oriented Global Childhood Obesity Intervention Program, Department of Epidemiology and Environmental Health, University at Buffalo, The State University of New York, Buffalo, NY;

³ School of Community and Global Health, Claremont Graduate University, Claremont, CA.

Past research shows an inverse association between breastfeeding and the risk of childhood obesity. However, there are mixed findings and the amount and duration of decreased risk varies in different studies. This study examined breastfeeding and its duration on childhood obesity risks from 24 months through grade 6. Longitudinal data from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development were analyzed using logistic regression models and Generalized Estimating Equation (GEE). Breastfeeding status was reported by mothers at child age 1 and 6 months. Child weight and height were measured six times at ages 24 months, 36 months, 54 months, grade

1, grade 3, and grade 6. Childhood overweight and obesity were defined as body mass index =85th and =95th percentile of U.S. national growth charts, respectively. It was found that prevalence of breastfeeding was low in the U.S., 57.0% and 47.8% at 1 and 6 months, respectively, and varied by maternal characteristics (e.g., poverty level, marital status) and child characteristics (e.g., ethnicity, birth weight) (all $p < 0.05$). Multiple logistic regression shows that breastfeeding at month 1 was significantly associated with 53% (odds ratio (OR): 0.47, 95% confidence interval (CI): 0.30-0.73) and 47% (OR: 0.53, 95% CI: 0.36-0.78) decreased risks for childhood obesity at grades 1 and 6, respectively. According to GEE analysis, risks of overweight and obesity were significantly lowered by 24% (OR: 0.76, 95% CI: 0.60-0.96) and 36% (OR: 0.64, 95% CI: 0.47-0.88) from 24 months through grade 6, respectively. In addition, the duration of breastfeeding (more than 6 months versus never) was associated with a decreased risk for childhood obesity (OR: 0.58, 95% CI: 0.36-0.94). Our study found that breastfeeding reduced the risk of childhood obesity. The rate of breastfeeding was low in the U.S. in the 1990s, which may have some long-term effects on the affected children.

**Forum THE NEED FOR MENTAL HEALTH PROFESSIONALS WITHIN
Room PRIMARY HEALTH CARE**

11:15 Lydia Eisenbrandt, and Dr. Jill Stinson. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Mental health concerns are presented in primary care settings regularly, yet a majority of these issues go undetected or are misdiagnosed by primary care physicians (PCPs). This may be due to a lack of mental health training for PCPs during their medical education. Over time, medical school curricula have evolved to include mental health training in order to bridge this gap in the healthcare system and to more readily identify patients in need of mental health services. The current study investigated AMA-accredited medical school curricula from universities across the US and US territories (N = 170) who train physicians in primary care, family medicine, or other generalist tracks. Data on mental health training were collected from the public websites of each school. Results showed that most universities indicated at least some type of required mental health training (85.3%), which were either didactic or experiential in nature. Although this result appears encouraging, further examination reveals that this training was most often limited to only one 4-week psychology-related course and a 6-week psychiatry rotation. Overall, many universities indicated at least one required course (N = 95), and most universities reported a required psychiatry rotation (N = 135). Moreover, only 12.9% of the sample reported having at least both didactic and experiential training required. The implications of this are varied. First, PCPs often have only a short amount of time with their patients, reducing their ability to fully assess both medical and mental health. A lack of exposure to mental health needs may lead to missed opportunities for intervention and improvement in patient health. Second, it is important for mental health professionals to work closely with PCPs in primary healthcare settings in order to improve rates for detection and treatment of mental health problems. In addition to improved patient outcomes, having mental health professionals integrate within primary healthcare can serve to decrease the stigma associated with seeking mental health treatment, as well as reduce long-term healthcare costs. This can also increase access to care for those individuals who are unable to see a mental healthcare provider, especially in rural areas. Finally, overall health may improve in relation to better mental healthcare, since medical and mental health have been consistently shown to significantly influence one another.

**Forum SELF-COMPASSION AND AUTHENTICITY MEDIATING
Room STIGMA'S IMPACT FOR SEXUAL MINORITIES**

11:30 Emma G. Fredrick and Dr. Stacey L. Williams. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Sexual minorities (i.e., those who do not identify as straight) experience stigma, or negative stereotypes, discrimination, and status loss. These negative experiences can lead to a host of health issues and decreased quality of life. Previous work has found that self-acceptance (conceptualized as positive sexual minority identity and self-esteem) mediates the relationship between stigma and mental health outcomes for sexual

minority college students. The current work expands these findings by testing the relations between authenticity of identity and self-compassion (a less contingent measure of self-worth than self-esteem) and multiple dimensions of quality of life. Targeted online advertisement was used to recruit 220 sexual minorities. Structural equation modeling analyses showed that self-compassion and authenticity significantly mediated the relation between public stigma and a latent factor of quality life comprised of four dimensions (physical, psychological, social, and environmental; $\chi^2=57.33$, $df=51$, $p=0.25$; $CFI=.99$; $SRMR=0.5$; $RMSEA$ (90% CI)=0.24 [0.00, 0.05]). These findings indicate that self-compassion and authenticity of identity are potential targets for interventions to increase the quality of life of sexual minorities. Potential avenues for these interventions will be discussed.

**Forum IMPACT OF CHILDHOOD ADVERSITY AND OUT-OF-HOME
Room PLACEMENT FOR YOUTH WITH SEXUAL BEHAVIOR
 PROBLEMS**

11:45 Kelcey L. Hall and Dr. Jill D. Stinson. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Early exposure to abuse, neglect, and household dysfunction is linked to long-term detrimental effects on mental and physical health. In the mid-1990s, Kaiser Permanente and the CDC surveyed adults in the community and found a strong and cumulative relationship between the degree of exposure to adverse childhood experiences (ACEs) and risk factors for leading causes of death in adulthood. At present, most research using ACE survey methodology examines community-based adult samples, and populations who experience the greatest number of adversities are largely ignored. An additional factor indicative of household dysfunction that has not been thoroughly explored in the context of ACE survey methodology is foster care placement. Further, little is understood regarding the impact of out-of-home placement on persons with disproportionately high ACE scores and subsequent difficulties with sexual and aggressive behavior. Studies investigating differential risk factors and outcomes could inform prevention, policy, and treatment. As such, the current study seeks to investigate the impact of childhood adversity and out-of-home placement on the onset of aggression and problem sexual behavior using ACE survey methodology in a sample of juveniles receiving residential treatment for sexual misconduct. Data for this study were collected from archival records of children and adolescents who have received sexual offender treatment at a treatment center for male youth ($N=120$; 88% Caucasian) for periods ranging from one month to more than four years ($M=13.68$ months, $SD=10.96$). These participants have a mean age of 14.63 years ($SD=1.56$; Range: 11 to 17 years) at the time of first admission into the facility. As expected, the adolescents in this study have experienced higher rates of adverse childhood experiences than the general adult population and male adolescents involved in the juvenile justice system previously reported in the literature. Only 2.5% of the current sample experienced no ACEs and 74.2% faced four or more adversities, which is considered to be high risk in the literature. Participants had a mean age at first out-of-home placement of 9 years ($SD=5.21$) and had an average of 3.7 out-of-home placements at time of admission to the facility. The association of childhood adversities, the number of non-psychiatric out-of-home placements, and age at first out-of-home placement with earlier onset of aggressive and sexual offending behaviors will be investigated using Cox proportional hazard analyses. Behavioral outcomes (e.g., onset of sexual and aggressive behavior problems; substance use; arrest history; and, treatment length) between individuals who were placed in family members' homes versus those placed in non-familial foster care will also be explored. Implications for prevention and environmental responsiveness will be addressed.

Forum PREVALENCE OF AND RISK FACTORS FOR ADOLESCENT
Room OBESITY IN TENNESSEE USING THE 2010 YOUTH RISK
1:00 BEHAVIOR SURVEY DATA: AN ANALYSIS USING STRATIFIED
HIERARCHICAL LOGISTIC REGRESSION

Nicole Holt¹, Shimin Zheng¹, Casey L. Morrell¹, Megan A. Quinn¹, and Sheryl Strasser².

¹ Department of Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN

² School of Public Health, Georgia State University, Atlanta, GA

The purpose of the present study was to utilize a statewide, representative sample of students in grades 6-8 in Tennessee to determine the co-occurrence of health risk behaviors such as smoking, substance use and eating disorders, among adolescents by determining the impact gender, age, race, and geographic region have on the association of these behaviors with the prevalence of adolescent obesity. We also explored the role that district, school, and class level health risk behavior variables play in adolescent obesity. Among adolescent females in the sample, 17.25% were obese, whereas 27.27% of males were obese. Stratified Hierarchical Logistic Regression Analysis demonstrated that several variables such as having ever tried smoking, having a weight misperception, and eating disorder, watching TV for more than 3 hours a day, and not engaging on a sports team remained consistent in their significant association with adolescent obesity across all groups. The findings from this study suggest that certain risk behaviors play an important role in adolescent obesity. Perhaps the most significant finding of our study that requires more investigation is the effect of education on adolescent obesity.

Forum CHALLENGES IN RURAL RE-ENTRY: MENTAL HEALTH
Room PROVIDERS' PERSPECTIVES ON INTERPROFESSIONAL
1:15 RELATIONSHIPS WITH CRIMINAL JUSTICE PROFESSIONALS

Michael P. Lasher, Courtney Cook, and Dr. Jill D. Stinson. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Criminal justice professionals like probation and parole officers draw from psychologists, social workers, and other mental health treatment providers to improve offender outcomes. The value of mental health interventions for offenders has been well documented in the literature. However, the values, roles and responsibilities, and goals for offender outcomes may differ for these professional groups. Probation and parole officers prioritize safety through the specific mechanisms of deterrence, control, punishment, and restoration. Officers meet these goals by some combination of law enforcement and case management roles. Mental health treatment providers, in contrast, are concerned with the individual offender's perspectives, values, and needs, and reducing symptoms or behaviors associated with criminal activity. Providers' roles are often defined by their background and training. However, in rural areas where specialized providers are less available, professional roles may become blurred. Given the differences between the criminal justice and mental health professions, the quality of these interprofessional relationships is an area ripe for study. This qualitative study examines the experiences of mental health professionals providing services to offenders in a rural area of south-central Appalachia. Participants (N = 38) include professionals from the fields of psychology, psychiatry, counseling, and social work. Services provided by these individuals include, but are not restricted to, forensic evaluation, adult and juvenile offender treatment (i.e., sex offender treatment, anger management, substance abuse treatment, and domestic violence counseling), prosocial psychoeducation, and traditional psychotherapy with offenders. Providers from multiple agencies participated in individual or focus group interviews and completed a pre-interview questionnaire about their training background, services provided, and caseload. This exploratory study uses thematic analysis to identify important themes and subthemes related to the following aims: to

identify characteristics of interprofessional interactions and partnerships between rural community treatment providers and agents of the criminal justice system, as perceived by treatment providers, to examine if interprofessional partnerships reflect best practice competencies identified in healthcare research (i.e., values and ethics, roles and responsibilities, interprofessional communication, and teams and teamwork), and to establish the impact of interprofessional partnerships on offenders' success in rural communities. Future directions, including the examination of perceptions of probation and parole officers and other risk management agents, will be discussed.

Forum ESTIMATING ZIKA VIRUS POTENTIAL IN THE UNITED STATES:
Room A COMPARATIVE SPATIAL ANALYSIS OF ZIKA VECTORS
1:30 Julie Obenauer and Dr. Megan Quinn. Department of Biostatistics and
Epidemiology, College of Public Health, East Tennessee State University,
Johnson City, TN.

Introduction: Zika virus, or Zika, was originally discovered in Uganda in 1947 and has since spread across the Pacific and into Brazil. Considering that travel to and from Zika-infected areas is common, it is easy to see how the United States (US) might be susceptible an outbreak of this illness. Zika is transmitted primarily by bites from an infected *Aedes aegypti* mosquito but *Aedes albopictus* is also a competent vector. The ability of the Zika virus to become endemic in an area is dependent upon the presence of these two mosquitoes. As of February 24, 2016, no locally acquired, vector-transmitted cases of Zika had occurred in the US. This means that, so far, Zika has not become established in the US mosquito population. However, it is important to know where these two species of mosquitoes are present, and why the US is different from other susceptible countries, in order to develop prevention and treatment strategies. This project used geographic information systems (GIS) software to map the current known habitats of *A. aegypti* and *A. albopictus* in the Western Hemisphere to determine areas most at risk for a Zika outbreak. This analysis also examined habitats by mean temperature to identify the habitable zones for these mosquitoes. Methods: Analysis was conducted in ArcGIS 10.3 using *A. aegypti* and *A. albopictus* occurrence data available from datadryad.org. This is a comprehensive data file listing occurrences of both species worldwide. The dataset contains more than 40,000 occurrences dated between 1960 and 2014. Point occurrence data was plotted using latitude and longitude then a world map, with countries as boundaries, was added for visual reference. Mean temperature data from WorldClim.org was added to illustrate the preferred temperature ranges for the two vector species. Finally, species occurrence data were analyzed for species density to determine where the two vectors were most densely clustered. Results: A visual inspection revealed that both vectors species are present in the Southeastern US and the Southern and Eastern regions of Brazil. There were many more reports *A. aegypti* and *A. albopictus* in Brazil (5057 and 3444, respectively) than in the US (444 and 1600, respectively). However, *A. aegypti*, the primary vector was the more common species in Brazil where *A. albopictus* was more common in the US. Temperature mapping revealed that the *A. albopictus* was present at cooler temperatures, between 2 and 13°C in the US and areas at or above 13°C Brazil. *A. aegypti* was located primarily in locations where mean temperatures were above 13°C and most common above 18°C. Density mapping showed that there was a much denser mosquito presence pattern in Brazil. Conclusions: The Southeastern US is an established habitat for both vector species of Zika. However, the temperature ranges for species occurrence is somewhat different in Brazil and the US, with mosquitoes in the US generally occurring at cooler temperatures. This difference, combined with the higher density of vectors in Brazil, may place the US at a decreased risk of endemic Zika transmission.

Forum E-CIGARETTE USE AMONG HIGH SCHOOL STUDENTS IN

Room NORTHEAST TENNESSEE

2:00 Daniel Owusu¹, Candice Collins¹, Jocelyn Aibangbee¹, Crystal Robertson², Dr. Mary Ann Littleton³, Dr. Sreenivas P Veeranki⁴, Boghozian Rafie⁵, Dr. Liang Wang¹ and Dr. Hadii Mamudu⁶.

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E-cigarette use among middle and high school students in the United States has risen from 4.5% in 2013 to 13.4% in 2014. While state specific data are unknown for e-cigarette use, prevalence rate of tobacco use among adolescents in Tennessee (29.9 %) is higher than the national average (21.4 %). This study aimed to estimate prevalence and dual use of e-cigarettes among high school students in a tobacco high burden state. A school-based survey was conducted in one county's high schools. SAS version 9.4 (SAS Institute, Cary, NC, USA) was used to conduct data management and statistical analysis. Chi-square test was then run to compare prevalence and dual use of e-cigarettes by sex (male or female). Of the 959 students included in the analysis, 13%, 9.0%, 11.1% currently vape, smoke cigarettes, and use smokeless tobacco, respectively. Overall, 4.5% currently vape and use smokeless tobacco, and 6.7% vape and smoke cigarettes. More than half of the participants who vape also smoke cigarettes (64/125), and 3.5% of the total sample use all the three tobacco products. Vaping is higher in males than females (18.6% vs. 8.1%), but males are more likely to use smokeless tobacco than vape (21.5% vs. 18.6%), while females are more likely to vape (8.1% vs. 1.8%). Approximately 38%, 25% and 33% of participants have ever vaped, ever used smokeless tobacco and ever smoked cigarettes, respectively. The findings of this study suggest that more of the high school students have tried e-cigarette than any tobacco product. While this calls for more studies to assess the impact of vaping on health and tobacco use and control, the high prevalence of vaping suggests critical need for preventive policies and programs to address this emerging public health problem in the region.

Forum RELATIONSHIP BETWEEN PERSONAL EXPERIENCES WITH
Room MENTAL ILLNESS AND MENTAL HEALTH STIGMA ENDORSED
2:15 BY HEALTHCARE STUDENTS

Dannel K. Petgrave and Chris S. Dula. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Mental health stigma is a widely recognized barrier to accessing mental health services. Interestingly, healthcare professionals have been shown to endorse greater stigma toward mentally ill individuals than the general public, negatively impacting patient outcomes. Direct and indirect experiences with mental illness may mitigate mental health stigma endorsed by healthcare professionals and students. No research to date has investigated the relationship between the quantity of personal experiences with mental illness and mental health stigma. The present study investigated this relationship in a sample of 163 healthcare students (i.e., medicine, nursing, and pharmacy) enrolled in a multidisciplinary healthcare communications course at baseline and a mid-semester assessment. Participants completed the Opening Minds Scale for Health Care Providers and the Marlowe-Crowne Social Desirability Scale. It was hypothesized that the number of personal experiences with mental illness would be negatively associated with mental health stigma at both assessments. Results at baseline and the mid-semester assessment supported this hypothesis and these associations were strengthened when social desirability was controlled for. These findings may be important for identifying healthcare students that may benefit from anti-stigma interventions. The present study is limited by the range of experiences assessed and healthcare professions sampled.

Forum EATING AND EMOTION: ASSESSING THE RELATIONSHIP
Room BETWEEN EATING PATTERNS AND DIFFICULTY IN EMOTION
2:30 REGULATION IN A BARIATRIC SURGERY SEEKING SAMPLE
Brittany V. Williams and Dr. Jill D. Stinson. Department of Psychology,
College of Arts and Sciences, East Tennessee State University,
Johnson City, TN.

Morbid obesity, defined by having a BMI of 40 or greater, has gained increasing attention. Despite a greater number of bariatric surgery cases for the treatment of obesity, research has demonstrated concerning results for patients, particularly involving weight regain and the development of mental illness. Patients seeking bariatric surgery are often required to complete a psychological evaluation to determine readiness for the procedure and associated post-operative lifestyle changes. However, research suggests mixed results in determining predictors for post-surgical success. Few studies have looked at emotionality and eating patterns in bariatric surgery seeking patients, though emotional eating is often talked about in the literature. It is likely that emotional eating and problematic patterns of emotional regulation that may contribute to obesity carry implications for post-surgical mental health and weight loss maintenance. In the current study, 30 bariatric surgery-seeking patients have thus far completed the Dutch Eating Behaviors Questionnaire and the Difficulties in Emotion Regulation Scale. Preliminary data suggest a significant relationship between emotional eating patterns and a difficulty in emotion regulation ($r = .397$, $p = .049$). Trends toward significance were also discovered between difficulties in emotion regulation and restricted and external eating patterns (restrained, $r = -.356$, $p = .081$; external, $r = .330$, $p = .099$). This preliminary data is part of a larger study on emotion and eating patterns in bariatric surgery seeking patients, and additional data will help us better understand these relationships. Results may have implications for intervention regarding emotional dysregulation prior to and following bariatric surgery.

Medical Residents, Clinical Fellows, Medical Students and Pharmacy Students

E. TN HIGH-OUTPUT HEART FAILURE IN OSLER-WEBER-RENDU
Room SYNDROME WORSENS RECURRENT EPISTAXIS FROM
1:00 KIESSELBACH'S AREA SYNDROME (REKAS)
Venugopal Brijmohan Bhattad, Tawadros Fady, Karakattu Sajin, Ugoeke
Nene, Ghulam Murtaza, Abdul Ahad Khan, Christopher Cook, and Tamarro
Taylor.
Department of Internal Medicine, Quillen College of Medicine, East
Tennessee State University, Johnson City, TN

73yo female with known history of Osler-Weber Rendu syndrome (also known as hereditary hemorrhagic telangiectasia or HHT) presented to emergency room with recurrent and recent worsening of nosebleeds (epistaxis). She also has anemia of blood loss in the setting of arteriovenous malformations (AVMs). Patient presented with textbook definition with all 4 Curaçao criteria, supporting the diagnosis of HHT and they included spontaneous recurrent epistaxis (presented with nosebleeds), multiple telangiectasia in typical

locations (inside the mouth), Proven visceral AVMs (lungs, gastrointestinal tract), first-degree family member with HHT (elder son and her mother). She presented with heart rate of 98 per minute and blood pressure of 117/72mmHg. Other vitals stable. Physical exam was remarkable for Nares with dried blood, Palate, tongue and lip telangiectasia, multiple skin telangiectasia, and grade III/VI systolic ejection murmur. Labs showed Hemoglobin of 7.1mg/dl and hematocrit of 24%, otherwise normal white blood count and platelet count. Mean-corpuscular volume was normal. Basic metabolic panel was normal. Old endoscopy, CT chest was consistent with multiple AVMs in Gastrointestinal tract and lungs respectively. Recent CT sinuses of head showed mucosal thickening of the left maxillary and sphenoid sinus. Stress echocardiogram was consistent with ejection fraction of 72%. Thus, patient had beginning of high-output heart failure, an early sign of worsening and recurrent epistaxis in the setting of AVMs and acute anemia. Patient received total 13 units of packed red-blood cells and Hematology recommended keeping up Hemoglobin at 10mg/dl which later resolved epistaxis. The mechanism for epistaxis is thought to be hyperdynamic circulation in the setting of high-output heart failure which causes the blood vessels in the Kiesselbach venous plexus to dilate and ultimately bleed. It was observed in our study that recurrent epistaxis from Kiesselbach area syndrome (REKAS) is the mechanism for dilatation of blood vessels in high-output heart failure due to Osler-Weber-Rendu syndrome. Thus, to combine multiple mechanisms, iron deficiency anemia due to recurrent blood loss, AVMs, cause hyperdynamic circulation and high-output heart failure which over a period of time trigger REKAS due to dilatation of the Kiesselbach venous plexus in Osler-Weber-Rendu syndrome. Our study combines unique mechanisms from studies by Khalid et al from Washington University of St. Louis, USA and Mladina R et al from Salata University Hospital, Croatia. We hereby propose that high-output heart failure contributes to REKAS in hereditary hemorrhagic telangiectasia and REKAS can be avoided with correction of hemoglobin to approximately 10mg/dl.

**E. TN VAGUS NERVE STIMULATION IMPROVES NEURONAL ACTION
Room POTENTIAL SYNCHRONY WITH CARDIAC AND RESPIRATORY
1:15 CYCLE IN HEART FAILURE ANIMAL MODEL**

J. Nathan Cantrell, Dr. Regenia Phillips Campbell, Stephanie Scofield, Dr. Krishna Singh, and Dr. Eric Beaumont. Department of Biomedical Sciences, Quillen College of Medicine, East Tennessee State University, Johnson City, TN

More than 5.1 million Americans are afflicted with heart failure (HF), and prognosis following diagnosis is bleak, with a 5-year mortality rate around 50%. A key consequence of HF is disruption of the autonomic nervous system (dysautonomia). The vagus nerve contains fibers that carry afferent signals from the visceral organs including the baroreceptors to the medulla as well as efferent parasympathetic fibers that control cardiac output in response to perturbations in blood pressure (BP). Vagus Nerve Stimulation (VNS) has been shown to be effective in HF patients. We hypothesized that the observed dysautonomia is due to altered afferent transduction which is corrected by VNS. To test this hypothesis, rats were divided into three groups: control, HF (aorta surgically occluded 4 months prior to experiment), and HF+VNS (HF plus therapeutic VNS throughout the 4 months prior to the experiment). The activity of vagal afferent fibers was recorded in the caudal Nucleus of the Solitary Tract (NTS) in the medulla. Left ventricular pressure (LVP) and respiratory cycle data were also recorded. Using software developed in MATLAB, neuronal synchrony to cardiac cycle and respiratory cycle was calculated and compared in all three groups. We observed that the majority of neuronal action potentials recorded in the NTS were distributed during the phases of the cardiac cycle that correspond to the highest BP in the control and the HF+VNS group. This was not the case for the HF subjects without intervention. Additionally, a transient raise in BP increased neuronal activity and synchrony with the cardiac cycle in the control and the HF+VNS groups, but no significant change was observed in the HF group. The failure of the HF subjects to respond to transient raises in BP is indicative of the loss of afferent specificity at the level of the NTS. For the neuronal synchrony with respiratory cycle, we found that the action potentials were mostly recorded towards the end of the inspiration cycle, between 10 and 16 mm H₂O, which corresponds to the maximal activation of the lung's stretch receptor (also carried by afferent vagus fibers). We observed that neurons from control and HF+VNS animals significantly increased their probability of firing during acute VNS, whereas neurons from HF animals showed an opposite distribution. Again this suggests that the NTS neuronal network reacted differently in HF rats, compared to the other groups. Rats receiving therapeutic VNS were closer to

the control than the HF rat with no intervention. Loss of proper afferent transduction is considered a major contributor to the progression of HF. Our results provide insight on the progression of HF and the decline of the baroreflex at the neuronal level. By better understanding these control mechanisms, it is possible to optimize the therapeutic strategy for patients with altered autonomic functions as seen in HF, hypertension, and myocardial infarction to help restore normal baroreflex function.

**E. TN POLYMICROBIAL INTERACTIONS: REDISCOVERY AND
Room CHARACTERIZATION OF AN INHIBITOR OF NEISSERIA
1:30 GONORRHOEAE**

John Kirby and Dr. Michael Kruppa. Department of Biomedical Sciences,
Quillen College of Medicine, East Tennessee State University, Johnson City,
TN

In the United States, it is estimated that nearly 820,000 people are infected with *Neisseria gonorrhoeae* annually. Individuals with this infection may or may not display symptoms of an active gonococcal infection. Typically, this infection can be readily treated with current available antibiotics. However, in recent years a trend of increasing resistance to a variety of antibacterial agents has occurred in many medically important bacteria, including *Neisseria*. In 2013, the observation of a completely resistant strain of *N. gonorrhoeae* was seen in Japan. This was followed by report identifying completely resistant gonococci in the United States. The opportunistic fungus, *Candida albicans* is a common agent associated with genital yeast infections as well as invasive infections of immunocompromised individuals. Recent work by our group and others has shown that bacteria and *C. albicans* communicate between species and in turn influence their growth dynamics and potential virulence properties. In a report from Hipp et al (1974. AEM vol 27(1), 192-196), it was demonstrated that *C. albicans* can inhibit the growth of *N. gonorrhoeae* on chocolate agar using a flip-flop plate culture method. Typically one side of the plate is inoculated with *C. albicans* allowed to grow 24 hours then the agar is flipped to allow for growth of *N. gonorrhoeae*. This presentation documents the rediscovery of this inhibitory activity produced by *C. albicans*. We hypothesize that this inhibitory factor produced by *C. albicans* is a cell-cell communication molecule. Testing of the quorum sensing molecule trans,trans-farnesol resulted in no growth inhibition of *N. gonorrhoeae* as well as two other secreted molecules from *C. albicans*, tryptophol and phenylethyl alcohol. This suggested a molecule of a likely unknown nature. We were able to concentrate the inhibitory activity and demonstrate inhibition of *N. gonorrhoeae* on a new medium we have designated as white chocolate agar. In addition, we were able to extend our initial observation and also demonstrate that *C. dubliniensis* and *C. parapsilosis* also have this inhibitory activity of gonorrheal growth. This work has the potential to expand the number of factors that come into fungal-bacterial interactions.

**E. TN BEYOND-USE DATE DETERMINATION OF LIDOCAINE-
Room CONTAINING MAGIC MOUTHWASH PREPARATIONS**

2:00 Loren Madden Kirk¹, Dr. Stacy D. Brown¹, Yao Luu¹, Amanda Ogle¹, Jessica Huffman¹, and Paul O. Lewis, PharmD².

¹ Gatton College of Pharmacy, East Tennessee State University, Johnson City,
TN

² Johnson City Medical Center, Johnson City, TN

Purpose: This research was aimed to develop and validate a stability-indicating high performance liquid chromatographic (HPLC) method with ultra-violet (UV) detection of lidocaine hydrochloride. This method was applied to a beyond-use date (BUD) determination of lidocaine in two "Magic" mouthwash preparations, stored in amber plastic oral syringes at room temperature. Such preparations are commonly used to treat pain associated with chemotherapy or radiation-induced mucositis, canker sores, and other oral

pain conditions. Methods: The HPLC-UV assay was validated according to USP Guidelines for system suitability, precision, accuracy, linearity, specificity, and robustness. Two formulations of mouthwash containing lidocaine: diphenhydramine: aluminum hydroxide/magnesium hydroxide/simethicone were prepared in 1:1:1 and 1:2.5:2.5 ratios, and divided into 3 ml aliquots in oral syringes. Lidocaine concentrations in these samples, as well as in a control product of 2% viscous lidocaine solution were measured periodically for 90 days. Results: The data indicate a 14-day BUD for the 1:2.5:2.5 formulation and a 7-day BUD for the 1:1:1 formulation. The control product remained within 90-110% stability limits for the 90-day duration of the study. The lidocaine prepared in solution with aluminum hydroxide/magnesium hydroxide/simethicone is vulnerable to the alkaline pH environment this diluent creates. Additionally, the stability of the lidocaine in the mouthwash preparations was prolonged at lower drug concentrations. Conclusions: These data support the packaging of lidocaine separately from other components of “Magic” mouthwash, especially if the duration of the product’s need extends beyond one week.

**E. TN ANABOLIC STEROID-INDUCED AORTIC DISSECTION IN AN
Room OTHERWISE HEALTHY YOUNG MALE**

2:15 Dr. Jennifer M. Treece, Dr. Balraj Singh, and Dr. Timir K. Paul. Department of Internal Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN;

A case report of an otherwise healthy young male who developed an aortic dissection secondary to anabolic steroid use, a rare but often catastrophic condition if not diagnosed and managed acutely. Patient does not have Marfan’s Syndrome, a collagen disorder, family history of aortic dissection, or any other predisposing risk factor for dissection other than anabolic steroid use. Anabolic steroids predispose people to aortic dissection, especially during the hemodynamic stress of weight lifting. Although rare, aortic dissection needs to be in the differential when a young weightlifter presents with chest pain as delay in diagnosis is fatal.

Poster Presentation Abstracts

Undergraduates

✧ Society, Behavior, Learning, ✧
Humanities and Engineering

1. THE USE OF ECOMAPS TO IDENTIFY SOCIAL DETERMINANTS OF MOTHERS WITH POSTPARTUM DEPRESSION IN THE ETSU PEDIATRIC CLINIC

J. Brooke Bouldin¹, Natalie Wigle¹, Jessica Kelliher Rabon²,
Deborah Thibeault¹, and Dr. Jodi Polaha³.

Departments of ¹ Social Work, and ² Psychology, College of Arts and Sciences,
East Tennessee State University, Johnson City, TN;

³ Department of Family Medicine, Quillen College of Medicine, East Tennessee
State University, Johnson City, TN.

The birth of a child can be a stressful time accompanied by an array of emotions including depression. Postpartum depression (PPD) affects approximately 1 out of 7 new mothers. It can affect a new mother's sleep, appetite, mood, and bond with her baby, as well as impact child development and well-being, if left untreated. Beginning in March, 2013, ETSU Pediatrics deployed an evidence based screening tool, the Edinburgh Postpartum Depression Scale (EPDS), to identify mothers of newborns with PPD. Mothers attending well-visits with their baby from birth to six months of age who score above an eight on the screener are provided with education about PPD, referrals, brief on-site counseling, and phone-call follow-up. Many of these mothers express concerns about resources and social factors that impact their health and mood. An Ecomap is a visual representation of strengths and stressors of a patient's relationship with their environment, social supports, and resources. The awareness of a patient's relationships and support within their environment can be useful for assessment of needs and intervention on their behalf. The objective of this study is to pilot the utility of the Ecomap to illuminate common stressors of the social determinants contributing to or exacerbating symptoms of PPD, in order to provide brief solution-focused interventions and referrals to alleviate the stressors. Although Ecomaps have been utilized in clinic settings, there is a lack of research on their effectiveness in identifying social determinants of mothers with PPD. We hypothesized that implementing the Ecomap with mothers that present with an elevated EPDS score will identify a significant number of social determinates that are actionable by social workers on staff. When a mother presented with a score of eight or above on the EPDS administered during a well-child check, the social work staff completed an Ecomap with mothers via a warm handoff. The social determinants identified on the Ecomaps were then categorized and counted to determine biggest social needs of mothers at the ETSU Pediatric clinic from 11/13/2015 through 02/28/2016. The clinic completed 27 ecomaps with mothers who scored 7 or above at well child checks. Transportation and mental health services presented as the most common domains that social work was able to effectively act to rectify. Overall, the utilization of the Ecomap was successful in identifying social determinants contributing to or exacerbating symptoms of PPD. Addressing these stressors through resource allocation and brief solution-focused therapies may contribute to a reduction of PPD symptoms. Future research, therefore, should examine whether addressing these social stressors reduces symptoms of PPD above and beyond targeting depressive symptoms alone in mothers presenting at pediatric clinics.

2. DIFFERENTIAL NEURAL EEG ACTIVITY IN LOW AND HIGH HYPNOTIZABLE INDIVIDUALS EXPERIENCING EXPERIMENTALLY INDUCED TACTILE STIMULI

Crockett, Mattie N., Stowers, James W, and Horton, James E. Department of Social Science, The University of Virginia's College at Wise, Wise, VA.

Event Related Potentials (ERP) derived from electroencephalograph (EEG) recordings of a paired stimulus paradigm has been a common approach to studying sensory gating. By measuring the amplitude of ERP components, (voltage deflections that are time locked to sensory events). Prior research (Horton & Crawford, 2004) indicated that highly hypnotizable individuals (highs) have a more effective anterior frontolimbic system underlying inhibitory abilities allowing highs to inhibit sensory information and produce hypnotic analgesia. Highs demonstrated shorter latencies for somatosensory evoked potentials (Horton, et.al., 1998). This study investigated the effect of hypnotic trait and state on sensory gating and the underlying neural activity in highs as well as in low hypnotizable individuals (lows). Subjects were screened for hypnotic susceptibility with the Harvard Group Scale of Hypnotic Susceptibility Form A (Shor & Orne, 1962). Subjects scoring from 0 - 3 were selected as lows and those scoring from 9 - 12 were selected as highs. These subjects participated in the sensory gating experiment. Paired stimuli 500ms apart consisting of moderately painful electrical shocks by a Grass stimulator presented to subjects every 3 seconds for 25 presentations resulted in significant differences in ERP amplitude for frontal regions of the brain (i.e. FP1) around 100ms following the stimulus. High's amplitude was reduced for the second stimulus of the pair $t(4)=2.994, p<.04$. There was a significant difference in the amplitude of the P100 for the second stimulus of the pair between groups during hypnosis with the highs having a lower amplitude $F(1,8)=6.874, P<.031$. Neural synchronization and desynchronization investigated by filtering and rectifying ERP epochs for Alpha frequency showed significant differences between un hypnotized lows and highs for the second stimulus $F(1,8)=12.084, p<.008$ as well as differences between the first and second stimuli for hypnotized highs $t(4)=1.718, p<.050$. Neural synchronization and desynchronization of filtered and rectified Theta frequency showed synchronization in highs not hypnotized awake on the first shock but no synchronization on the second shock. The lows not hypnotized show desynchronization in the first shock or second shock. Hypnotized highs had desynchronization on the first shock but phase shift synchronization on the second shock, which we attribute to dual processing between the brain stem inhibition and the thalamic inhibition. Lows hypnotized showed indicators of synchronization on the first shock but desynchronization on the second shock. Highs demonstrated primarily brain stem inhibition of pain in both alert and hypnotized conditions with brief thalamic inhibitory activity preceding the shift to brain stem inhibition while lows demonstrated only thalamic inhibition of pain during a relaxed state after a hypnotic induction.

3. ADOLESCENT METHYLPHENIDATE EXPOSURE ALTERS THE BEHAVIORAL RESPONSE TO NICOTINE AND SENSITIZES ACCUMBAL BDNF

Caitlynn C. De Preter, Seth L. Kirby, Lauren A. Beuttel, Dr, Matthew I. Palmatier, Dr. Russell W. Brown. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

This study was designed to analyze the effects of adolescent exposure to methylphenidate (MPH; trade name: Ritalin) on conditioned place preference (CPP) and nicotine self-administration in rats. MPH is the most commonly prescribed medication for Attention Deficit-Hyperactivity Disorder (ADHD) which is diagnosed in 3-5% of adolescents in the United States. Rats were treated ip with 1 mg/kg MPH or saline using a "school day" regimen of five days on, two days off, beginning on postnatal day (P)28. A 1 mg/kg dose of MPH has been shown to result in brain plasma levels equivalent to clinical dosing in humans. In one group of animals, during the final two weeks of MPH treatment, animals were conditioned to nicotine (0.5 mg/kg free base) or saline using the CPP (Conditioned Place Preference) behavioral paradigm. CPP is a test of the associative value of rewarding drugs. One day after the post-conditioning preference test, brain tissue was analyzed for Brain-derived neurotrophic factor (BDNF), which is known to play a critical role in synaptic maintenance and growth in the nucleus accumbens, a brain area of the basal forebrain that plays a

critical role in drug reinforcement. In a separate group of rats, animals were tested on nicotine self-administration. Drug self-administration is the only behavioral test in rodents that assays the volitional value of addictive drugs in rats, in that animals are trained to self-administer the drug through an implanted jugular catheter. Using this behavioral paradigm, we can assess the reinforcing and motivational properties of a drug which is important to assess for abuse potential. Regardless of the behavioral test, MPH was always given at 0800 and the behavioral test began at a minimum 6 h after MPH treatment, allowing for complete plasma clearance of MPH. For CPP, a pre-test was given to determine the rat's natural preference in a three chamber shuttle box, and animals were always conditioned with nicotine against their natural preference. For drug self-administration, female animals were surgically implanted with jugular vein cannulae on approximately P35, and self-administration began on P42. Sipper tubes were available to the rats in this paradigm, and responses to licking the tube produced an infusion of nicotine solution (30µg/kg) over a range of fixed ratio reinforcement schedules followed by a progressive ratio schedule, a measure of motivation. Results revealed that MPH enhanced nicotine CPP in female adolescent rats, and MPH robustly sensitized the nicotine response to BDNF in the nucleus accumbens of females, but this effect was muted in males. Self-administration results revealed that rats given pre-exposed to saline demonstrated enhanced motivation to self-administer nicotine as compared to MPH exposed rats. In conclusion, MPH altered the behavioral response to nicotine which may be mediated through the sensitized BDNF response to nicotine produced by adolescent MPH.

4. DOES CHILDHOOD TENSION LEAD TO ADULT INTERVENTION?: THE RELATIONSHIP BETWEEN CHILD ABUSE AND NEGLECT AND ADULT DEPRESSION AND ANXIETY

Sherry Delph, Jimmy Lewis, Kaitlyn Rice, Andrew Campbell, Alison Davis, and Dr. Chris Dula. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Childhood maltreatment has become a growing problem over the past several years, with a large portion of children reporting these experiences. It has been linked to many developmental issues, as well as emotional problems and complications with addiction. Previous studies of childhood maltreatment have predicted future depression and/or anxiety. The purpose of the current study was to investigate the relationship between various types of childhood trauma and adulthood depression and anxiety. It was hypothesized that there would be positive correlations between childhood trauma and depression, anxiety, and stress. Additionally, emotional abuse was expected to have higher correlations with depression, anxiety, and stress, compared to the other types of childhood maltreatment. Participants were recruited from a Southeastern university via an anonymous online survey management system, where students received course credit for their participation. Participants completed the Childhood Trauma Questionnaire (CTQ) and the Depression Anxiety Stress Scale (DASS). Results provided support for both hypotheses, as all relationships between childhood maltreatment and adulthood negative emotionality were moderately, positively correlated, and as emotional abuse had the strongest correlations for anxiety and stress. Emotional neglect, however, had the largest relationship with depression. Further research on these relationships could provide insight into how different interventions associated with childhood trauma might be structured in order to reduce the likelihood of the occurrence of adulthood mental health concerns.

5. THE EFFECTS OF ANTIPSYCHOTIC TREATMENT UPON NICOTINE ASSOCIATIVE REWARD IN A NEONATAL QUINPIROLE MODEL OF SCHIZOPHRENIA

Adam Denton¹, Seth Kirby¹, Charlotte Kaestner², Kate Burgess³ and Dr. Russell Brown³

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³ Department of Biomedical Sciences, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Research has revealed that schizophrenics are significantly more likely to smoke cigarettes than the general population, and consume nicotine products at a much more prevalent rate. Further exacerbating this issue, it has previously been demonstrated in clinical populations that the type of antipsychotic treatment (typical versus atypical) may result in either an increase or a decrease of the already heightened smoking behavior. With these clinical issues in mind, the present study sought to examine the effects of antipsychotic treatment upon the associative reward of nicotine within a rodent model of schizophrenia. Neonatal quinpirole (dopamine D2/D3 agonist) treatment to rats results in increased dopamine D2 receptor sensitivity throughout the rat's lifetime, which is consistently found in human schizophrenics. As a measure of associative reward, a conditioned place preference paradigm (CPP) was used. Rats were neonatally treated with quinpirole (1 mg/kg dose) or saline from postnatal days (P)1-21, which is the first three weeks of the life of the rat. Animals were then raised to P41 without any further drug treatment, and were administered two consecutive drug free preference tests given in a three chamber shuttle box on P41 and P42. Beginning on P43, animals were conditioned with nicotine which was preceded by an injection of either a typical antipsychotic (haloperidol, 0.5 mg/kg dose) or an atypical antipsychotic (clozapine, 2.5 mg/kg dose) for a period of eight days. The doses of these drugs correspond to doses typically prescribed in humans. Following eight days of conditioning in which these drug treatments were given each day, animal place preference was evaluated in a drug free post-test on P51. The difference between time spent in the conditioned/unconditioned context between pre-test and post-test was utilized as a measure of associative reward. It was found that treatment with clozapine reduced enhanced nicotine place preference in rats neonatally treated with quinpirole. Haloperidol, on the other hand, completely reduced nicotine place preference to control levels. Given that haloperidol is a very potent D2 receptor antagonist, these findings highlight the importance of the dopamine D2 receptor as well as dopamine D2 receptor sensitivity in nicotine reward. These findings show that the typical antipsychotic haloperidol was more effective at eliminating the associative rewarding effects of nicotine than the atypical antipsychotic clozapine.

6. EFFORTFUL CONTROL IN TWO-YEAR-OLDS PREDICTS VOCABULARY PRODUCTIVITY

Lindsey N. Derry, Jaima S. Price, and Wallace E. Dixon, Jr.

Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Temperament is a biological predisposition, which impacts physical or social interactions. Research suggests that temperamental characteristics may impact word learning. For example, a child's ability to regulate their attention directly impacts word-world mapping under conditions of distraction. In recent years, effortful control, a dimension of temperament, has increasingly become the subject of research in children. Effortful control has been identified as a predictor for school performance. Effortful control includes the ability to regulate attention, inhibit or activate behavior, and sensitivity to environmental stimulation. Most research has involved children later in development after they have started school, mainly around the ages from seven to 12, and have investigated the extent to which effortful control contributes to literary competence. The purpose of this project was to discover relationships between effortful control and language ability in infants. Data from 24-month-old infants (N=23) recruited from the greater Tri-Cities Tennessee region are presented here. The Early Childhood Behavior Questionnaire (ECBQ) and MacArthur Bates Communication Development Inventory-Words and Sentences (CDI-WS) were used to assess temperamental Effortful Control and language ability, respectively. Regression analysis

revealed a significant relationship. It indicated that 24-month language ability was predicted by Effortful control; nouns ($R^2 = .210$, $F(1, 23) = 5.587$, $.028$), predicates ($R^2 = .180$, $F(1, 23) = 4.835$, $.039$), and closed-class words ($R^2 = .229$, $F(1, 23) = 6.529$, $.018$). Linguistic ability included words a child was able to produce as reported by parents. Nouns were defined as sounds, animals, vehicles, toys, food, clothing, body parts, household objects, furniture, outside things, places, people, and games and routines. Predicates included action words. Finally, closed-class were defined as those parts of speech or word classes that do not readily accept new members to the class, and included pronouns, conjunctions, prepositions and words denoting time. Although the relationship between language and temperament in early infancy has been the subject of empirical investigation, the current study provides insight into how differences in early effortful control may impact language ability within the third year of life. This finding extends the previous understanding that temperamental characteristics impact language ability early on in childhood. Understanding this relationship may highlight points of early intervention, and also help to identify language deficits early in infancy. Future research should further investigate the extent to which early effortful control may be used as an early diagnostic tool. Identifying language deficits early on in life could also help prevent language barriers and language development that may hinder further learning.

7. EFFECTS OF VIOLENT VS. NEUTRAL SCENES ON EMPATHIC CONCERN IN THE FACE OF REAL-WORLD VIOLENCE

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Are people less likely to feel empathetic towards others because of exposure to fictional television violence? The current study seeks to identify a connection between decreased empathy in the face of real-life violence and exposure to fictional television violence. More importantly, this study hopes to look at a possible difference between trait empathy, and state empathy. Shen (2010) created the state empathy scale to see how empathy manifests during message processing. Messages are imbedded in the shows and movies we watch, telling us how to treat others and handle social situations. This study hopes to combine research like Shen's with other media violence research in hopes to better understand its impact on deeper human feelings towards others. (Krahe, Moller, Huesmann, Kirwil, Felber, & Berger, 2011; Funk, Baldacci, Pasold, & Baumgardner, 2004). This study will be conducted via an online platform, Qualtrics. Participants will be given self-report measures in trait empathy, prosocial tendencies, state empathy, and perceived stress. Trait empathy and prosocial tendencies will be measured before random assignment to either fictional violent clips or neutral clips, as a baseline self-report of perceived feelings toward other people. After being exposed to either of the two conditions, all participants will be shown a real-life video clipping from news footage or a documentary. This particular clip will be used to see if there is any change between the initial empathy measure and the state empathy measure taken immediately after viewing the last clips. All participants will be asked questions to assess any discomfort, and will then be debriefed. Participants are predicted to report less empathy after being exposed to fictional violence, as compared to those in the neutral condition.

8. A DOUBLE HIT STRESS RODENT MODEL OF MAJOR DEPRESSIVE DISORDER

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Social defeat is an ethologically relevant stressor that utilizes the natural establishment of social rank in male rodents which has been shown to be relevant to major depressive disorder (MDD) and post-traumatic stress disorder (PTSD). Social defeat is induced through mating a male with an ovariectomized (OVX) female to establish the male's territory. This creates the "Resident." The subjects under study are naïve males which are introduced to resident's cage, placed there by the experimenter, and are referred to as the

“Intruder.” Typically, an interaction ensues such that the resident attacks the intruder. Among the symptoms observed in the subordinate male (intruder) are weight loss, increased heart rate, sleep disturbances, increased body temperature and hypothalamo-pituitary adrenal axis disturbances and patients diagnosed with PTSD also demonstrate similar types of physiological responses. Intruder rats may also display anxiety-like behavior when exposed to novel stressors. In the present study, we wished to establish a social defeat stress model in combination with the chronic unpredictable stress model, which is considered a mild stressor to the rodent. In this way, we create a “double hit” model that may more accurately mimic severe stress which is common in both MDD and PTSD. In the present study, residents established dominance over the intruder for 10 consecutive days and each day, social defeat stress was followed by a another stressor which was given a stressor at random times during the day, known as chronic unpredictable stress. These stressors included 30 min restraint, 1 h shaking/crowding, a cold water swim, a warm water swim or a tipped cage for 24 h. In one cohort of animals, brain tissue was taken 24 h after the last stressor and these analyses were compared to an untreated control group. In a second cohort, animals were tested on a sucrose preference test in which two bottles containing 0.8% sucrose was placed on their cages for three consecutive days (days 8-10 of social defeat stress), and the total amount of sucrose was calculated relative to total volume consumed. Brain tissue analyses revealed significant white matter DNA methylation, similar to what has been found and reported in human post-mortem MDD tissue. Further, animals given the social defeat + chronic unpredictable stress demonstrated a deficit in sucrose preference, a natural reward, revealing that these animals were anhedonic as compared to controls. Therefore, it appears that social defeat plus chronic unpredictable stress produces a phenotype relevant to clinical data in humans.

9. DETERMINING THE ROLE OF EMOTION IN BRAIN-COMPUTER INTERFACE PERFORMANCE

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Brain-computer interface (BCI) devices create a bridge between a functioning brain and the outside world. For individuals suffering from neurodegenerative diseases such as amyotrophic lateral sclerosis, this is often their last option to restore their ability to communicate. While some individuals can successfully operate the system to communicate with the outside world, others are unable to use the system at all. Therefore, it is important to conduct studies investigating potential factors that impact BCI performance. While the majority of research in the field has focused on examining the effects of signal processing and stimulus presentation techniques on performance, recent research has suggested psychological factors may play an important role. The current study elicits pleasant, unpleasant, and neutral emotions in participants by having them view a series of pictures. Participants are then fitted with an EEG cap and complete a BCI task by spelling out a total of 6, 6-letter words to measure their BCI performance. Differences in BCI performance based on the emotion that was elicited are then analyzed to determine the effects of emotion on performance. This study could have important implications on how BCI training is conducted and could potentially improve the BCI performance of many users.

10. DO IMPULSIVITY AND HYPERACTIVITY INCREASE AGGRESSIVE ACTIVITY? EXAMINING THE RELATIONSHIP BETWEEN IMPULSIVENESS, ADHD, AND AGGRESSION

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Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that affects a significant percentage of the population (Center for Disease Control, CDC, 2015). It is estimated that some 5% to 6% of school-aged children have ADHD, with 30%-60% having symptoms persist into adulthood

(CDC, 2015; Tremblay, 1996). According to Tremblay (1996), some researchers feel ADHD may have a few beneficial qualities (e.g., creativity, high energy); however, many others view ADHD as only having negative implications with regard to academic, social, and career outcomes. Having ADHD during childhood may lead into adulthood problems of increased impulsivity and aggression. Impulsivity has been generally defined as engaging in behavior without due consideration of its consequences, or as behaviors that indicate excessive risk or are inappropriate to the situation (Oades et al., 2008). Impulsivity has been linked with aggression in individuals with and without ADHD, producing a greater tendency to engage in aggressive behavior when responding to negative or neutral environmental stimuli. Impulsiveness and hyperactivity in adult ADHD have both been shown to be associated with hostility and aggressive behavior, including low threshold for anger, physical violence toward others, and threats of, or actual, self-harm (Dowson & Blackwell, 2010). These variables were examined amongst participants who were recruited via an online participant management system. This convenience sample was composed of undergraduate students who were enrolled in various psychology courses where they received modest credit for participation in the study, which was approved by the Institutional Review Board prior to data collection. It was hypothesized that impulsiveness scores and ADHD scores, would be positively correlated, and that both would be related to various hostility and aggression scale scores. The hypotheses were supported, and their implications for future research are discussed in this presentation.

11. MODERNIZING EDUCATIONAL RESOURCES FOR AN ADVANCED ANATOMY LAB EXPERIENCE

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The flipped classroom has changed the approach to student education and has been successfully incorporated into many college courses across the country. Typically, the student attends lecture, takes notes, and then attempts to construct an understanding outside of class. With the flipped classroom, students view pre-recorded lectures and they attend an interactive class where discussions between professors and students apply the material to construct understanding. The first year medical students and physical therapy students experience this type of learning in their Gross anatomy courses. The “lecture” portion of the course combines pre-recorded lessons and interactive group quizzes on the material, and the lab portion involves a team approach to dissections to further apply the content and integrate a variety of educational resources. Typical anatomy lab resources include text (anatomy atlas, dissector guide) and notes. While most content is universally beneficial, the delivery platform was not ideal. Illustrated 2D figures do not provide the student with a realistic visualization of human dissection. The books and notes tend to ruin easily in the lab which makes the learning process less efficient. This moved our lab to adopt iPad technology for access to course materials, applications, and e-books. Therefore, the Quillen Dissector iBook was created to continue to move resources to a more accessible format. Students have utilized the Dissector iBook for the lab portion of the anatomy courses. The students were given a pre-survey and post-survey to see which dissector was preferred. The data collected found that both medical and physical therapy students preferred the Quillen iBook over other commonly used dissectors. The Quillen iBook provided labeled photos of actual dissected specimens. This provides the students with a more realistic perspective of the human body and better guidance on how to approach each dissection. The Quillen iBook is available on an iPad located at each group’s dissection table. The iPad allows easy access and prevents any damage to paper-based resources. Other iBook features include quizzes, glossary terms, clinical correlations, and clinically applicable cases. The quizzes prompt the students to assess their progress, while the glossary terms aide in the understanding of the terminology. The inclusion of Apple TV allows the iBook material to be viewed by the entire class through the mirroring capabilities, enhancing the faculty’s

ability to guide students through difficult dissections. The Quillen iBook aides in the educational process by being an effective resource and, in line with the adopted flipped classroom concept, it allows students to work as a team to apply the educational concepts and correlate clinical relevance.

12. PREDICTING THE EFFECTS OF SYRIAN DIVERGENCE: USING THE RESULT OF PAST UPRISINGS IN SYRIA TO PREDICT THE FUTURE EFFECTS OF PRESENT DAY EVENTS

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The Syrian uprising first began in March 2011 as a conflict between the Syrian government, anti-government protesters, and jihadist militants. The uprising in Syria is known as the Syrian Civil War. As a result of the Syrian Civil War, Over 4 million Syrians have left everything behind to seek refuge in other countries or are displaced. It's understood that the citizens of Syria must flee in order to maintain their livelihood, but there's one issue yet to be discussed. If all of these people are fleeing Syria, what happens to the people and infrastructure that's left behind? Will things be the same as they left it before the war? Will Syria continue to flourish with 4,000,000 less people? To answer these questions I analyzed the city of Aleppo, Syria using IDRISI Selva software to locate any geographic changes during Syria's previous uprising initiated by the Muslim brotherhood from 1976 until 1982 to predict possible changes in Aleppo's current geographic makeup due to Syria's current Crisis. To start my project I downloaded Landsat data of Aleppo, Syria USGS 1972 to exactly eleven years later in 1983 and converted the data from a tiff to be better formatted with IDRISI. I then created a false color composite of the landsat images from 1972 to 1983 to see if there were any changes within the city. Upon seeing what seemed to be a change, I converted the landsat image values to radiance, which enabled me to make a preliminary change detection image of Aleppo. In order to get more detail, I decided to use classification change detection. In order to do this I used the initial false color composite to develop a list of spectral classes. After this I digitized the spectral polygons for water, vegetation, commercial/industrial/transportation, residential, and desert. I then created signature group files for both the 1972 and 1983 images, these would be used to create a maximum likelihood classification. I then used the IDRISI ASSIGN program to re class the images which resulted in an image with only the needed classes for observation. Finally, I overlaid the two independent classifications using crosstab to obtain a single change map. To complete my research, I used the statistics generated by the IDRISI Crosstab to find the significance of change in the city of Aleppo from 1972 to 1983. The kappa score shows 0.3486 significance strength. This means that the change that occurred was not very significant. In saying that, it is safe to predict that, depending on the variables at hand during the country's current situation, the effect may have very much of an impact on Syria due to the lack of infrastructural growth in Aleppo's past crisis. Normal, healthy countries are always growing and expanding their geographic boundaries.

13. EXPECTATIONS OF REJECTION AND SUPPORT SEEKING AMONG COLLEGE STUDENTS WITH STIGMATIZED IDENTITIES

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This project (1) examined the relationship between expectations of rejection and type of support seeking among college students reporting a stigmatized identity, and (2) explored differences in expectations of rejection and indirect support seeking by visible (e.g., minority race, overweight) versus concealable (e.g., mental illness, sexual identity) stigmas. Prior research has shown individuals expecting rejection are less willing to seek support or disclose stigmatized identities. This prior work has indicated individuals expecting rejection may seek support in indirect ways, which ironically contributes to rejection they encounter. Indirect support seeking does not include disclosure and is vague in its attempts to seek solace or advice. This project involved two studies, one that examined trait level expectations of rejection (i.e., rejection sensitivity or RS), and one that that examined state level expectations of rejection. Study 1

consisted of secondary analysis of data from an online study entitled “Perceptions of Identity among University Students”. 408 participants completed this study and received SONA participation credit in psychology courses. Of the total sample, 20% (n = 81) reported a stigmatized characteristic, while 31% of those with stigma was classified as visible (e.g., weight; race) and 69% was classified as concealable (e.g., mental illness). Results revealed no significant differences in RS between those with and without stigma ($p > .05$). Those with concealable stigmas reported more RS than those with visible stigmas ($t = -3.15, p < .05$), but RS was not significantly related to more indirect support seeking strategies ($p > .05$). Study 2 consisted of 147 college students with a stigmatized identity (41% visible, 59% concealable) that participated in an online letter writing experiment. College students were randomly assigned to one of three writing conditions: anticipating rejection, anticipating acceptance, and neutral. In all conditions participants were asked to type a letter to someone about an identity-related event. Expectations of rejection was manipulated by varying to whom participants wrote letters (someone they knew would be rejecting, accepting, or someone they did not feel strongly about). Letters were coded for indirect support seeking by two independent coders. Any discrepancies were discussed to consensus. Results showed a non-significant effect of letter writing condition overall. However, a significant interaction was indicated for those reporting a visible stigma. Specifically, those with visible stigmas used more indirect seeking strategies when expecting rejection. Considering both Studies 1 and 2, trait rejection expectations were not significantly related to indirect seeking for individuals with stigma. Although state rejection expectations of rejection were related to more indirect seeking among those with stigmatized identities, the impact of them may depend on type of stigma. In spite of those with concealable identities having more trait RS, those with visible stigmas may be more impacted by situations that call attention to their stigmatized identity and choose to seek support more indirectly. Still, future research is needed to address limitations of this work such as whether the support network from whom support is being sought are similarly stigmatized.

14. ARREST OR HOSPITALIZATION? AN EXAMINATION OF THE RELATIONSHIP BETWEEN PSYCHIATRIC SYMPTOMS, TRAUMATIC CHILDHOOD EXPERIENCES, AND SOCIO-ECOLOGICAL FACTORS IN FORENSIC MENTAL HEALTH SYSTEM RESPONSES TO OFFENDER BEHAVIOR

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It has been well documented that Adverse Childhood Experiences (ACEs) lead to unfavorable outcomes in later life, especially with regard to health and psychological outcomes. Recent research has demonstrated the impact of early childhood adversity on the onset of aggression and illegal behavior. However, often those with mental illness diagnoses with comorbid behavioral problems exhibit trajectories that include both arrest and hospitalization. While some are arrested for their criminal behavior, others are hospitalized. This begs the question: are those with mental illness and behavioral problems more likely to be arrested, or hospitalized, for their early behavioral problems? In the current study, it was hypothesized that arrest precedes hospitalization for the majority of these offenders, and that specific diagnoses of a mental illness are related to outcome. It was also hypothesized that early exposure to environmental adversity, as measured by the age of earliest ACE and total ACE score, would impact whether offenders were arrested or hospitalized first. The data for this study were gathered from comprised sample of 182 adult psychiatric inpatients in a secure forensic facility. Data were archival and retrospective in nature. All participants had been hospitalized following acts of violence or aggression, exhibiting a history of both behavioral problems as well as mental illness. A series of logistic and linear regressions were used to examine the relationship between reason for first admission to a psychiatric facility, diagnosis of a mental disorder, and early childhood adversity to clarify whether early problematic behaviors resulted in initial arrest or psychiatric hospitalization. Results indicate that subjects were much more likely to be hospitalized initially than arrested (33.5% arrested first, 66.5% hospitalized first). A diagnosis of impulse control disorder was significantly related to whether initial incident led to arrest or hospitalization ($p=0.030$), while the diagnosis

of ADHD neared significance ($p=0.056$). No significant relationship was found between incidence of initial arrest or hospitalization and age that drug/alcohol abuse began. Other findings and implications for future research will be discussed.

15. THE EFFECT OF THE SIZE OF FACIAL STIMULI ON USING A P300 BRAIN-COMPUTER INTERFACE

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Non-invasive Brain Computer Interface (BCI) technology can restore communication for those who are no longer able to communicate due to loss of muscle control. Nonetheless, in comparison to other methods of non-muscular communication, such as an eye tracker, BCIs provide relatively slow communication. Therefore, it is important to implement techniques that can improve both accuracy and speed of BCI performance. One method of improving accuracy in BCI performance has been the presentation of familiar faces rather than the canonical presentation whereby the characters in an alphanumeric display change from grey to white. Previous studies have shown that in addition to the P300 event-related potential component faces elicits the N170 and N400 components. The addition of these components can increase the speed and accuracy with which items can be selected from the display. Previous studies have used face stimuli that are typically much larger than the items contained in the display. The purpose of the present study was to investigate the influence of image size and image content. Based on the results of previous studies, we predicted that faces would provide higher accuracy than non-face stimuli. To test this hypothesis we designed four conditions: large face stimuli, small face stimuli, large non-face stimuli, and small non-face stimuli. The familiar image of Albert Einstein sticking his tongue out was used as the face image. The non-face image was constructed using a crystalize filter (Photoshop CS5.5) and rotating it 180 degrees, thereby preserving the image content while making the stimulus unrecognizable as a face. The “checkerboard” paradigm was used to present stimuli and a Latin square design was used to determine the order of presentation: The preliminary data indicate there are no statistically significant differences between the four conditions. Nevertheless, mean accuracy in the small crystalized stimulus condition was higher than the small face, large face, and large crystalized conditions. Additional data will be collected to further test the hypothesis that face stimuli provide higher rates of speed and accuracy.

16. FIBROMYALGIA IMPACT AND SYMPTOMS OF ANXIETY AND DEPRESSION: VITALITY AND HOPELESSNESS AS MEDIATORS

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Individuals with fibromyalgia, a condition characterized by musculoskeletal pain and fatigue, are at significant risk for functional impairment and psychopathology. For example, individuals with fibromyalgia are three times as likely to experience depression compared to the general population, and nearly 65% of persons with fibromyalgia experience anxiety during the course of their illness. Mechanisms underlying the relation between disease impact and anxiety/depression within this population are speculated, but it may be that the deleterious impact of fibromyalgia on activities of daily living (i.e., fibromyalgia impact) contributes to risk. Identifying factors which may explain the disease-psychopathology linkage is essential to developing effective interventions to improve mental health among those with fibromyalgia. Two such factors, vitality (i.e., feeling alive and alert; mental and physical energy) and hopelessness (i.e., lack of positive thoughts about the future) may buffer and increase risk, respectively. Fibromyalgia impact may contribute to decreased energization and, in turn, to a more-negative view of the future and greater psychopathology risk. We hypothesized that the associations between fibromyalgia impact, hopelessness, and anxiety and depressive symptoms would be positive, and that all of these factors would be negatively related to vitality, at the bivariate level. At the multivariate level, we hypothesized that greater fibromyalgia impact would be related to less vitality and, in turn, to

greater hopelessness and consequent higher levels of anxiety and depression. Our sample of persons with fibromyalgia (N=508) were primarily White (91.8%; n=383) and female (95.7%; n=401), with a mean age of 47.72 years (SD=13.14). Participants completed self-report measures, including: Fibromyalgia Impact Questionnaire-Revised, Depression Anxiety Stress Scales, Beck Hopelessness Scale, and Subjective Vitality Scale. Bivariate and serial mediation analyses were conducted, covarying age, sex, and race. Bivariate and multivariate hypotheses were supported. In mediation models, the direct effect of fibromyalgia impact on depression (DE=.07, SE=.02, p<.001; IE 95% CI [.03,.10]) and anxiety symptoms (DE=.21, SE=.03, p<.001; IE 95% CI [.15,.28]) was reduced, but remained significant, when vitality and hopelessness were tested as mediators. Our findings indicate that greater functional limitation may impede physical and psychological energization, contributing to a constricted view of the future and consequent symptoms of psychopathology. Therapeutically reducing hopelessness and bolstering ability to cope with fibromyalgia, perhaps via Cognitive Behavioral (i.e., increasing self-efficacy, reframing the future) or Mindfulness-based strategies (e.g., enhance vitality), may reduce psychopathology risk among this population.

17. EVALUATING THE FEASIBILITY OF A STEPPED-CARE PROTOCOL FOR POSTPARTUM DESPRESSION VIA ADOPTION AND MAINTENANCE

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Introduction: Research has shown that Postpartum Depression (PPD) occurs in 10-20% of new mothers. Symptoms of PPD include excessive sadness, increased anxiety, guilt, and possible suicidal ideation. PPD can increase a mother's risk for health and psychological dysfunction including future psychiatric illnesses, substance abuse, and decrease her adaptive functioning. PDD can also have negative implications on child safety practices and a child's psychosocial and developmental wellbeing. Treatments for PPD, such as medication and psychotherapy, have been shown to be effective at reducing the number and severity of a mother's symptoms, and generally improving their lives and the lives of their families. Unfortunately, many mothers do not receive treatment due to fears of stigma, inadequate screening practices and an inability to access care. Thus, early detection and improved access to care is critical and literature suggests formal screening practices increases the rate of detection. Pediatrician's offices serve as ideal locations to screen mothers and connect them to appropriate services because of frequent contact with the mother.

Methods: Recognizing this public health concern, the American Academy of Pediatrics developed PPD screening guidelines. ETSU Pediatrics, a local pediatric primary care clinic, adhered to these guidelines, assembled an interdisciplinary health care team, and developed a stepped care protocol to not only screen all new mothers but connect them with immediate, onsite behavioral health services. The protocol consisted of four distinct phases: 1) distribution of the Edinburgh Postnatal Depression Scale (EPDS), an evidence-based tool screening for depression in new mothers, to every mother of infants 0 to 6 months at their well-child visit; 2) appropriate documentation of the EPDS score and plan of action noted within the electronic medical record (EHR); 3) brief behavioral health intervention conducted by the on-site behavioral health consultant, and/or referral to outside provider; 4) phone call follow up with mother and referred provider. The aim of the study is to evaluate components of intervention feasibility based upon the RE-AIM framework (Reach, Effectiveness, Adoption, Implementation, and Maintenance), which stems from the Dissemination and Implementation Science field. This particular project extends past previous pilot studies to include EHR chart review from an entire year and evaluates the protocol's feasibility by examining Adoption and Maintenance domains. **Results:** Results were collected from EHR and billing records of all patients, 0 to 6 months of age, seen at the clinic from February 26, 2014 to February 25, 2015 (n = 755) for their well-child visit (n = 2,459). Adoption will examine feasibility by noting the percentage of mothers who were administered the EPDS as well as the general trend in administration across the year. Maintenance will examine feasibility from a financial perspective and reveal the amount of reimbursement accrued by billing for the EPDS. **Conclusions:** The anticipated results will have implications on the

feasibility of identifying and treating PPD within a pediatric primary care setting using a stepped-care protocol. Potential facilitators and barriers to this the protocol's implementation within ETSU Pediatrics will be discussed.

18. B-P-D AND CRE-A-TIV-ITY: THE STUDY OF BORDERLINE PERSONALITY DISORDER AND INNOVATION

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Borderline Personality Disorder (BPD) is a personality disorder that is associated with various symptoms such as unstable mood, impulsive behavior, and depression. This disorder is found in roughly 2% of adults, most commonly females, and is typically not diagnosed until after adolescence. Creativity is an outlet most people use to express their emotions or use to explain their thoughts (e.g., painting, writing, singing). Research suggests that there is a relationship between personality disorders and creative tendencies, though no studies have specifically examined the relationship between borderline personality disorder and creativity. This relationship is posited to be due the high-emotional nature of the disorders, as they use this as an outlet for their emotions. It was hypothesized that creativity and BPD will be positively related to one another. Participants were obtained via an online survey management system, in which students received extra credit for participation. There was no formal measure utilized in the literature to examine symptoms of borderline personality disorder. Therefore, the researchers created a measure called the Borderline Personality Disorder Criteria - Self-Rating Scale, based on the DSM-5 criteria for the disorder. The Creative Behavior Inventory was used to gauge various behaviors associated with creativity. Results indicated that a small, but significant correlation exists between creativity and total BPD score; however, the symptoms found to be most related to creativity were: psychotic features, self-harm behaviors, and fear of abandonment. This research has implications for potential therapies aimed toward individuals with borderline personality disorder, as creative endeavors might serve as a form of self-expression.

19. ECO-SMART CAN

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With increase in the population of East Tennessee State University (ETSU) community and a new football stadium, the cleanliness of the campus needs to be maintained and improved. Also, keeping the campus clean will help prevent some diseases, amongst which some caused by mold. Traditionally, ETSU maintenance operate on daily or biweekly routes to pick up trash and recycle bins on a designated time, regardless if the containers are full or not. The time, resources and labor combined in collecting the trash could be saved if the ETSU maintenance knew which trash needed to be empty at the right time. Therefore, I decided to use the Internet of Things (IoT) to create a device that will optimize trash collection, to reduce cost and pollution. The IoT is the concept of connecting any device or man-made object to the internet, and provides the ability to transfer data over the internet. The Eco-Smart Can will use the same concept of the IoT and connect a build device using an open-source computer and software to send data from the from a traditional trash container to maintenance facility office. My device will shoot sonar waves to know the level of the trash in the container. It will also measure temperatures inside the container, because high temperatures can cause bacteria or germ to reproduce faster. Data collected from the sensors will be sent over a cellular network General Packet Radio Service (GPRS) or Internet (through WIFI) for analysis and displayed on Ubidots which is a cloud web platform to display collected data. I will set-up the platform in a way that will allow maintenance workers to receive an alert of the trash cans that need to be collected, so that they can plan an effective route. Since, I have not yet started the project I except to learn: the use of IoT device, create blueprint, and prototyping. This device will be useful to the ETSUs maintenance facility or any other sanitary institution with the aim of tracking trash level and act fast. Therefore, the risk of being contaminated by disease cause by germs and bacteria contained in trash containers would reduce. In addition, workers will know which trash containers to prioritize and would accordingly make plans to use

the best route. Upon completion, if my device does not work I will still a report describing all the methods and resources used. This is will serve as reference for anyone have the same ideas. They will know what not to do and might be able to able find the right way to meet the goals.

20. QUALITY OF LIFE AND TRAUMA IN FIRST RESPONDERS: MODERATING ROLE OF SELF-EFFICACY

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First responders are at increased risk for adverse mental health conditions (e.g., acute stress), possibly due to exposure to traumatic events; however, not all first responders exhibit symptoms to the same degree. Positive and negative attributes of working as a first responder (e.g., professional quality of life [QOL]) may contribute to vulnerability to or protection from distress. Additionally, beliefs about one's ability to problem-solve and attain goals (e.g., self-efficacy) may ameliorate job-related difficulties and distress; this premise has not been tested. We examined the relations between professional QOL, self-efficacy, and acute stress in first responders. At the bivariate level, we hypothesized that self-efficacy and compassion satisfaction would be inversely related to acute stress, and burnout and secondary traumatic stress would be positively related to acute stress. At the multivariate level, three hypotheses were made: (1) higher self-efficacy would predict lower acute stress; (2) each professional QOL subscale would predict acute stress, such that higher compassion satisfaction would predict lower acute stress and higher secondary traumatic stress and burnout would predict greater acute stress; and, (3) self-efficacy would moderate the relation between each professional QOL subscale and acute stress. Our sample of 170 first responders were primarily male (73%, $n = 124$) and White (89.4%, $n = 151$) with a mean age of 34.75 years ($SD = 8.79$). Participants were recruited via workplace email and completed self-report measures: General Self-Efficacy Scale (GSE), Professional Quality of Life Scale (ProQOL), and Impact of Events Scale-Revised (IES-R; index of acute stress). In addition to bivariate analyses, we conducted multivariate regression analyses to examine the relation between QOL and trauma, and the moderating effect of self-efficacy. At the bivariate level, all correlations were as predicted. At the multivariate level, hypotheses were partially supported. Self-efficacy, compassion satisfaction, secondary traumatic stress, and burnout all significantly predicted acute stress. Self-efficacy significantly moderated the relation between compassion satisfaction and acute stress, $\beta = 0.12$, $p = .03$, accounting for a significant increase in the variance in acute stress, $\Delta R^2 = .03$, $F(1, 148) = 4.80$, $p = .03$. However, self-efficacy did not moderate in other models. Better professional QOL and self-efficacy were related to acute stress in first responders. Further, the relation between compassion satisfaction and acute stress was dependent on level of self-efficacy; with greater competence, the beneficial relation between compassion satisfaction and distress, is strengthened. Therapeutically addressing professional QOL, specifically secondary traumatic events, and increasing self-efficacy (e.g., via Cognitive Behavioral Therapies), may reduce risk for adverse stress reactions in first responders.

21. WHAT DOES YOUR TATTOO HAVE TO DO WITH YOU?: INVESTIGATING PERSONALITY, PREJUDICE, AND STIGMA

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Tattoos are considered by those who have them to be a form of creativity or self-expression. However, some people seem to view these bodily decorations as irresponsible, unprofessional, and sometimes offensive. The underlying reasons for these assumptions are unknown, as are details about the individuals who hold these assumptions. With that being said, there is a severe lack of research literature regarding stigmas against tattoos, overall prejudice, and personality traits. The purpose of this study is not only to contribute to the little amount of literature that exists on the topic, but to determine relationships among

these variables, and open up doorways for future research. Using an anonymous participation system (SONA), a sample of college students completed surveys including the Prejudicial Beliefs Survey (PBS), the Martin Stigma Against Tattoos Survey (MSAT), and various items derived from the Big Five Personality Inventory which were taken from the International Personality Item Pool. It was hypothesized that higher scores on the MSAT would elicit higher scores on the PBS, and that individuals who obtained higher scores on the Agreeableness subscale of the Big Five would have lower MSAT scores. Interestingly, stigma against tattoos was found to have a slight, positive correlation with agreeableness, as well as the other four personality factors measured. As these findings conflict with previous literature, it is important to understand the reasons why this might have occurred. However, higher stigma against tattoos was slightly positively correlated with general prejudicial beliefs, supporting the second hypothesis. Implications of these results are important for various reasons such as hiring processes and interpersonal relations.

22. INVESTIGATING PRESENCE AND PERSONAL SIGNIFICANCE OF APPALACHIAN ENGLISH IN CARTER COUNTY

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This study aims to produce a living portraiture of the presence and personal significance of Appalachian dialect across age cohorts for residents of Carter County, TN. Through the use of focus groups representing four age cohorts ranging from 14 - 65+, the research hopes to, using interview and self-report processes, create a narrative of Appalachian identity as it presents itself through language, across time, within the community. By conducting focus group style interviews across age cohorts, coupled with brief, self-report questionnaires, the research aims to develop an understanding of how Appalachian dialect intersects with personal identity, and how those intersections change with age and generation. Focus groups will allow for natural, dialogue based investigation of shared dialectic and identity markers among age cohorts, while the self-report questionnaire allows for individualized, quantifiable responses about participants' experience as a member of this dialect and regional community.

23. DOES CHILDHOOD TRAUMA LEAD TO RELATIONSHIP DRAMA? AN INVESTIGATION BETWEEN CHILD MALTREATMENT AND ADULT ATTACHMENT STYLE

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Childhood trauma and/or maltreatment during childhood is reported by 60% of adults. Childhood trauma has been recognized by researchers as a predisposition for various mental disorders in adulthood, such as depression and alcoholism. Researchers of childhood maltreatment have recognized a relationship with insecure adult attachment as well. The purpose of this study was to further investigate possible relationships between adult attachment styles and various forms of childhood trauma. It was hypothesized that childhood trauma would have a positive correlation with insecure adult attachment styles, and that there would be no significant differences between emotional and physical forms of childhood abuse on adult attachment. Participants were recruited from a Southeastern university using an online participant management system, where students received course credit for their participation. Participants completed self-report surveys, including the Adult Attachment Questionnaire (AAQ) and the Childhood Trauma Questionnaire (CTQ). There was a significant, positive relationship between childhood trauma and adult insecure attachment, supporting the initial hypothesis; however, emotional traumas were found to have a stronger relationship with adult insecure attachment than physical traumas. These findings have serious implications for mental health care treatment in both children and adults, especially as emotional traumas appear to have the largest impact on future attachment styles and interpersonal relationships. Further research in this area could help improve the understanding of how various childhood traumas influence future attachment styles.

24. EXAMINING THE ROLE OF PSYCHOLOGICAL FACTORS ON BRAIN-COMPUTER INTERFACE PERFORMANCE

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Brain-computer interfaces (BCI) provide an alternative form of communication to individuals suffering from neurodegenerative diseases such as amyotrophic lateral sclerosis. While some people are able to use the system at close to 100% accuracy, others are unable to use the system at all. Thus far, the field of BCI has primarily focused on improving the system by manipulating stimulus presentation and signal processing; however, more recent research has suggested that psychological factors may account for some of the individual differences in BCI performance that exist. The current study examined the impact of motivation, mood, emotion, and depression on BCI performance. Participants completed a set of four surveys designed to measure each of these four factors. They were then fitted with an EEG cap and completed a BCI task where they spelled out a total of 6, 6-letter words using only their brain. A Pearson correlation was conducted in order to look for potential relationships between the four factors and BCI performance. If any relationships between these four factors and BCI performance are found, it could potentially change the field of BCI to incorporate these psychological factors into more research as well as training to use the system.

25. "LETTER FROM BIRMINGHAM JAIL" THE TRANSFORMATIVE ACTIONS OF MARTIN LUTHER KING JR.

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The politics and pedagogical qualities of King's Letter from Birmingham Jail can be observed through the lens of Paulo Freire as his illustration of thematic universe's can be used as a framework to further contextualize the conscious of King. Freire asserts, that one's sociohistorical context, in accordance with the theories and ideas of the times, help to constitute one's thematic universe. Likewise, King encountered obstacles, in his contemporary context, to his self-actualization that once cognitively subjugated were transformative to his being. Three questions will be explored: What manifestations led to the writing of the Letter from Birmingham Jail? What were King's transformative actions? Will an answer to the first help make sense of the second? I endeavor to briefly examine the Letter from Birmingham Jail and the transformative actions of Dr. Martin Luther King Jr.

26. DIFFERENCES IN EXPERIENCES OF CHILDHOOD ABUSE BETWEEN CLINICAL AND NONCLINICAL SAMPLES

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Child abuse is highly prevalent in the United States, as prior research has shown that 21% of the child population reports experiences of sexual abuse, 28% experience physical abuse, and 11% are emotionally abused. Many studies have assessed the prevalence and consequences of child abuse, but fewer have considered the differences between individual experiences of childhood abuse. The current study investigates possible differences between nonclinical and clinical samples, specifically with regard to victim-perpetrator relationships. We hypothesize that clinical inpatient samples experience greater rates of abuse than a nonclinical sample, and also that participants from clinical samples experience more abuse by family members than those in a nonclinical setting. Our sample (N=521; 53% female; 78% Caucasian)

consists of participants who report a history of childhood emotional, physical, and/or sexual abuse in samples of university students (n=342), randomly-selected forensic adult inpatients from a maximum- and intermediate-security psychiatric facility (n=90), and youth males receiving treatment for sexual misconduct in residential care (n=89). Data were self-reported in the study of university students and retrieved from archival records in the latter two samples. Within the subsample, 69% experienced emotional abuse, 54% had been physically abused, and 45% were sexually abused during childhood. Chi-square analyses were conducted to examine the occurrence of familial versus nonfamilial perpetrators of physical and sexual abuse between two subsamples (clinical inpatient samples versus nonclinical university sample). Individuals with a history of sexual abuse in the clinical sample were more likely than those in the nonclinical sample to be sexually abused by family members, $\chi^2(1, N=230)=11.67, p = .001$. Additionally, individuals who were physically abused in the clinical sample were more likely to have been physically abused by relatives than those in the nonclinical sample, $\chi^2(1, N=235)=7.94, p = .005$. In contrast, physically abused participants in the nonclinical sample were significantly more likely than those in the clinical sample to be physically abused by nonfamily members, $\chi^2(1, N=235)=19.10, p = .000$. There was no significant difference in the likelihood of experiencing extrafamilial sexual abuse between the clinical and nonclinical samples, $\chi^2(1, N=230)=1.96, p = .162$. Our results suggest that there are significant differences between the experiences across the subsamples in this study. Additional analyses will include further investigation of the various types of perpetrators (e.g., mother, father, acquaintance, etc.) between the subsamples. Future directions and limitations will be included.

27. ENLIGHTENED OR FRIGHTENED: A LOOK AT NEUROTICISM, SPIRITUALITY, AND ANXIETY

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The objective of this study was to examine the relationship between neuroticism and the experiences associated with spirituality and anxiety. Research suggests that a relationship does exist between neuroticism and anxiety, which are both associated with states of worry or fear. It was hypothesized that this relationship would be present in this study as well. However, it was also posited that, due to the positive experiences often associated with spiritual beliefs, spirituality would help reduce anxiety, and would therefore, be negatively correlated with anxiety. This has important implications for psychotherapy, as it would allow therapists to better utilize a patient's personal beliefs in treating the symptoms of anxiety disorders. There have been studies in which individuals with a diagnosis of Generalized Anxiety Disorder (GAD) had spirituality incorporated into the therapy to assist in coping and recovery. Data for this study were collected online from a population of college students (N=364) from a southeastern university who received credit for their participation. Scales used to collect data were the Big Five Personality NEO-FFI, the Depression, Anxiety, and Stress Scale (DASS), and the Inventory on Spirituality to assess personality factors, spirituality, and negative emotionality. Results indicated that, as expected, individuals who score highly on neuroticism measures also score highly on anxiety measures. However, the findings associated with spirituality were unexpected. There was only a slight, yet significant, correlational relationship between neuroticism and spirituality, but there was not a significant relationship between spirituality and anxiety. Due to the overlap between neuroticism and anxiety, it is unclear why their relationships with spirituality were not more similar in nature; however, because of these findings, it is important to understand what the differences might be between these two experiences to improve future research. Perhaps these unexpected findings are due to a mixed relationship with spirituality, as individuals who report anxiety may have this experience as a result of their spirituality (e.g., having bad karma, not being in balance, fear of smiting by an omniscient being), as well as in spite of their spirituality, though most individuals tend to report positive effects associated with spirituality.

28. NICOTINE SELF-ADMINISTRATION IN RATS IS REDUCED BY SILENCING GIANT CHOLINERGIC INTERNEURONS IN THE NUCLEUS ACCUMBENS WITH DESIGNER RECEPTORS EXCLUSIVELY ACTIVATED BY DESIGNER DRUGS.

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Cholinergic interneurons in the accumbens have been implicated in the regulation of dopamine (DA) release during self-administration in preclinical models. The present studies used a genetically modified rat strain expressing Cre-recombinase co-localized with choline acetyltransferase (ChAT-Cre rats) to target cholinergic neurons with designer receptors exclusively activated by designer drugs (DREADDs) to silence cholinergic interneurons during nicotine self-administration. Heterozygous ChAT-Cre male rats were bred with wild-type females. Offspring were genotyped with real-time PCR and only Cre-positive rats were included in this experiment. As adults 12 males and 14 females were shaped to lever press for sucrose and were then instrumented for nicotine self-administration and injected with the DREADD receptor (HM4 Gi) at AP +1.6, M/L \pm 1.3, and D/V -7.1 mm. After recovery from surgery all rats were allowed to respond for nicotine (30 ug/kg/infusion, dose calculated as base) on an escalating fixed-ratio (FR) schedule of reinforcement from FR1 to FR5. After responding stabilized on FR5, rats were tested in an ABA design with placebo and the designer drug clozapine N-oxide (CNO) injected to the intraperitoneal cavity (3 mg/kg) 15 min before test sessions. There were no differences between males and females during nicotine self-administration testing on any schedule of reinforcement ($p > 0.05$). After CNO treatment there were significantly fewer active lever presses and reinforcers earned relative to placebo ($p < 0.05$). However, this reduction in nicotine self-administration was reversed 48 h later in a second placebo test, indicating that the effects of CNO were not non-specific or long-lasting. Histological verification indicated that the DREADD was co-localized with cholinergic neurons in the accumbens. These findings suggest that cholinergic interneurons robustly modulate DA release by nicotine during self-administration and influence nicotine reinforcement.

✧ Natural Sciences ✧

29. QUANTUM CHEMISTRY CALCULATIONS OF DMPO AND DMPO-OH - WATER CLUSTERS

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A free radical is a highly reactive chemical species with an unpaired electron in its valence shell. This reactivity is known to cause several deleterious effects in living organisms, and also makes radicals difficult to study directly. Spin traps are molecules that react with the radical of interest to produce a much more stable, and hence longer-lived product (called the radical adduct) thus allowing the use of techniques such as Electron Spin Resonance spectroscopy. 5,5-dimethyl-1-pyrroline N-oxide (DMPO) is a commonly used spin trap in the study of the reactions of the hydroxyl radical, $\cdot\text{OH}$. Past work has indicated that knowledge of the hydrogen bonding of DMPO and its hydroxyl radical adduct (DMPO-OH) is an important facet of understanding spectroscopy in solution. Towards this end, the minimum energy structures for DMPO and DMPO-OH with 1-6 water molecules were calculated using Hartree-Fock and Density Functional Theory using the standard Pople basis set 6-31G*. All calculated structures clearly show evidence for hydrogen bonding between water and the spin trap or adduct. The lowest energy structure for one water molecule shows hydrogen bonding to the spin trap oxygen, with subsequent water molecules hydrogen bonding on the side of the initial water molecule. The adduct shows similar behavior, but with the hydrogen of the hydroxyl group rotated so that it may also hydrogen bond with the water molecules.

30. STRESS SIGNALING IN A RESPONSE TO DEHYDRATION (RD22) SILENCED TRANSGENIC LINE OF NICOTIANA TABACUM

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The salicylic acid pathway in plants is crucial to defense against pathogens. This pathway enables the plant to produce an effect known as systemic acquired resistance, whereby regions of the plant not initially exposed to a pathogen become resistant. One of the key enzymes in this pathway is known as Salicylic Acid Binding Protein 2 (SABP2). It is believed that SABP2 may have many important interacting proteins which assist the plant in resisting both biotic and abiotic stressors. One of these interacting proteins, SIP-355, is a putative RESPONSE TO DEHYDRATION 22 (RD22) like protein, which is expressed during osmotic stress. It is our goal to determine the role that SIP-355 plays in abiotic stress. We have generated stable transgenic lines of *Nicotiana tabacum* silenced for SIP-355 using RNAi. Preliminary experiments were performed using leaf disk assays as well as tissue culture experiments relating to the plant's ability to cope with salt and osmotic stress. These initial experiments indicate that the SIP-355 transgenic lines exhibit an altered response to salt stress and osmotic stress as compared to wild-type plants.

31. BEHAVIORAL EFFECTS OF SUB-LETHAL CADMIUM (Cd) EXPOSURE IN THE SPIDER ANELOSIMUS STUDIOUS

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Some heavy metals are necessary for biological function, however when introduced into a system in excess they may have effects ranging from serious behavioral alteration to death. Considering the ubiquity of industrial accidents leading to pollution of waterways, we hypothesized that the introduction of heavy metals, specifically cadmium, into a watershed would have repercussions across not just aquatic species, but also across the entire food web. While the majority of research focuses on the lethality of such toxic compounds (i.e. LD50), recent studies have shown that there are sub-lethal behavioral effects that may have significant fitness consequences specifically concerning prey capture and predator avoidance. In this study the effect of consuming *Drosophila* raised in cadmium laced medium on the behavior of *Anelosimus studiosus*, a spider known to prey on insects emerging from waterways, was investigated. *Drosophila* were introduced into normal or cadmium laced (1mM) growth medium and left for one week in order to ensure consumption of contaminants. Spiders were reared in the lab on a diet of termites and *Drosophila*. For the experiment, a treatment group and a control group, each with 20 spiders, were created. The spiders were fed the corresponding *Drosophila* for three weeks. Behavioral assays were used to determine the effects of cadmium on exploratory behavior, running speed, antipredator huddle response, locomotor activity, and resting metabolic rate. It was found that the introduction of cadmium into the diet of the *Drosophila* had significant behavioral consequences for *A. studiosus* that have known fitness implications. Specifically, exposed individuals displayed significantly increased exploratory activity and respiration rate coupled with decreased predator sensitivity. There were no significant differences found in locomotor activity or running speed. Inductively coupled plasma mass spectrometry (ICP-MS) was used to quantify the amount of cadmium taken in by the experimental group. This study indicates that introduction of cadmium into a system could have wide-ranging implications, not only for the organisms directly exposed to the metal, but also for those consuming them.

32. A SURVEY OF EQUAL MASS GALAXY MERGERS IN THE INFRARED, ULTRAVIOLET, AND X-RAY

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The merger of two equal mass spiral galaxies may produce an elliptical galaxy. For a sample of interacting and merging pairs of galaxies, we obtained data from the archives for the NASA Spitzer infrared telescope and the GALEX ultraviolet telescope. We compared our data to X-Ray data from the NASA Chandra telescope. We found trends that may be related to the number of new stars forming, the age of the stars, and/or the amount of interstellar dust present.

33. IMPACT OF REDUCED CALCIUM DURING DEVELOPMENT IN SNAKES

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In squamate reptiles, the evolutionary transition from oviparity (egg laying) to viviparity (live birth) is accompanied by loss of the calcareous outer eggshell, which suggests significant implications for the role of calcium. An experiment was designed to observe the impact of reduced calcium availability during development in the oviparous corn snake, *Pantherophis guttatus*. This experiment showed significant decreases in mass and in length of hatchling corn snakes when the outer calcareous eggshell layer was removed during development. This study was designed to determine the anatomical and developmental basis for reduced size in the hatchling snakes. In vertebrate species, length may vary due either to differing numbers of vertebrae formed during development or by having vertebrae of differing sizes. Each condition has a different implication for the role of developmental calcium in snakes. Hatchlings were prepared for skeletal analysis via clearing-and-staining. Vertebrae of each hatchling were counted and size measurements were obtained by spinal region (cervical, thoracic, and caudal). Results show a significant treatment effect on size of vertebrae, with reduced calcium (experimental) hatchlings having smaller vertebra in measured spinal regions. These findings suggest that reduced developmental calcium impacts the ossification of vertebrae and growth in late development.

34. EMISSION LINE RATIOS AND OXYGEN ABUNDANCE IN INTERACTING VS. SPIRAL GALAXIES

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Analyzing the chemical properties of star forming clumps within interacting and normal spiral galaxies may provide unprecedented aid towards our understanding of star formation. For this study, we obtain chemical properties by use of optical spectral data from the Sloan Digital Sky Survey, including the spectral line fluxes of [OI] $\lambda 6300$, [OII] $\lambda 3726$, [OIII] $\lambda 4363$, [OIII] $\lambda 4958$, [OIII] $\lambda 5006$, [NII] $\lambda 6583$, H α , and H β . These spectral line fluxes are used to calculate ratios associated with Baldwin-Phillips-Terlevich (BPT) diagrams (i.e., ([OIII] $\lambda 5006$ / H β), ([OII] $\lambda 3726$ / [OIII] $\lambda 5006$), ([OI] $\lambda 6300$ / H α), and ([NII] $\lambda 6583$ / H α)) that provide insight as to the ionization source in the region. Additionally, the spectral line fluxes are used to calculate the oxygen abundance of the regions.

35. SPECTROSCOPIC EXAMINATION OF THE VARIABLE STAR BW VUL

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We conducted a visual spectral analysis of one of the most interesting beta-Cepheid variable stars, BW Vulpeculae. Out of a fairly large number of known beta-Cephei stars, BW Vul has the largest amplitude of pulsation; this is not matched by its minor fluctuation in the visual magnitude, as this type of star is very hot and most of the energy is emitted in UV. An SBIG ST-7XE CCD, in conjunction with an SBIG Self-Guided Spectrograph, was attached to the 16" SCT telescope of the UVa-Wise Observatory and used to record several spectral windows following the evolution through the star's 4h 50m cycle. Multiple observation days secured enough data to assemble a picture describing the complex kinematics of the optical photosphere of BW Vul. Despite the scarcity of photometric observations available for the time frame of our project, we tried to correlate the spectroscopic line dynamics with the star's light curve. This was done by extrapolating photometric data collected by the AAVSO. H-Balmer, and He I spectral lines were monitored and the results indicate considerable profile variations, even in a short interval of time. The radial velocity of the pulsation was derived and used to construct a radial velocity curve providing an indication of the dramatic expansion and contraction of star's atmosphere. The deviations in some of our results from previously reported literature could be due to limitations imposed by the 2.2Å spectral resolution of our instruments.

36. STAR FORMATION IN RING GALAXIES

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Ring galaxies are specific types of interacting galaxies in which a smaller galaxy has passed through the center of the disk of another larger galaxy. The intrusion of the smaller galaxy causes the structure of the larger galaxy to compress as the smaller galaxy falls through, and to recoil back after the smaller galaxy passes through, hence the ring-like shape. In our research, we studied the star-forming regions of a sample of ring galaxies and compared to those of other interacting galaxies and normal galaxies. Using UV, optical, and IR archived images in twelve wavelengths from three telescopes, we analyzed samples of star-forming regions in ring and normal spiral galaxies using photometry. To measure the star formation rates of the star forming regions, we used computer software that picked out the regions and measured their luminosities in all twelve wavelengths, before comparing the luminosities in these wavelengths to determine the absolute luminosity. We have determined that ring galaxies have proportionally more clumps with higher star formation rates than both spirals and other interacting galaxies. These findings can help us understand galaxy evolution, including the evolution of our own galaxy.

37. RATE OF CHANGE OF THE COLUMBIA GLACIER, ALASKA

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The goal of this research was to use remote sensing data from Landsat satellites to show the rate at which the Columbia Glacier is retreating, in southeastern, Alaska. Glaciers help regulate Earth's temperature, so it is vital that they are preserved. Without them the global climate would change along with sea levels. The Glacier is a large tidewater glacier, which means, it flows directly into the sea. It is one of the most swiftly changing glaciers in the world, which started retreating in 1980. This glacier descends from an ice field 3,050 meters (10,000 feet) above sea level, and follows down the sides of the Chugach Mountains into a skinny inlet, that finally leads into the Columbia Bay. The IDRISI remote sensing software was used, with the data gathered from USGS, and NASA, via the Landsat 4 and 7 platforms. False color composite maps are used to display the glaciers, and then image change analysis shows the changes of the glacier from 1987 to its state in the year 2013. The finished maps show that there is a significant loss of visible ice and snow,

from the study time period. The rate at which the Columbia glacier has retreated since 1987, has been steadily increasing over the years, with some years, the glacier retreated more than a kilometer. The retreating of glaciers has a direct correlation with global warming, and rising sea levels. As civilization releases greenhouse gases into the atmosphere, the heat from the sun gets trapped, causing the planet to heat up, which in turn causes the glaciers to melt, and recede. As glaciers melt, large icebergs, some bigger than houses, break off, and fall in the ocean, which is called iceberg calving. This is one of the events that is causing sea levels to rise, as humans continue to heat the planet. The rate at which glaciers melt, and rising sea levels will continue at an ever increasing rate, each year, until the release of carbon dioxide, and other greenhouse gases, is reduced.

38. AFFECT OF THE MUTATION D344P ON THE REGIO AND /OR STEREOSPECIFICITY OF Cp3-O-GT

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Plants produce a vast array of secondary metabolites. The phenolic compounds flavonoids are metabolites ubiquitous among plants and are known to aid in processes such as plant reproduction, UV defense, pigmentation and development. In relation to human health, flavonoids have also been found to possess anti-inflammatory, anti-cancer, and anti-oxidant properties. Flavonoids ability to participate in so many interactions is due in part to their subclass variation and further chemical modification. One such modification is glucosylation, where a glucose molecule is added to the flavonoid substrate. The enzymes that catalyze these reactions are known as glucosyltransferases. *Citrus paradisi* contains a glucosyltransferase that is specific to the 3-O position of flavonols. To further understand the reactions it catalyzes, Cp3-O-GT structure was modeled against an anthocyanidin/flavonol 3 GT found in *Vitis vinifera* to identify candidate amino acids for mutations. Mutants were then created using site-directed mutagenesis, and one mutant, D344P, was constructed by an aspartate being replaced with a proline based off of the sequence comparison of the original enzymes. Biochemically characterizing the mutant D344P protein will determine whether the mutation has an effect on the regio and/or stereospecificity of Cp3-O-GT. An initial screening assay has been performed using radioactive UDP- glucose as a sugar donor. Early results indicated that the mutant D344P has particular affinity for flavonols and for diosmetin, a flavone. Kinetic assays are being performed to confirm these results. Studies of time course, enzyme concentration, HPLC product analysis, pH optimum and reaction kinetics will be performed to further complete D344P protein characterization.

39. THE USE OF MICROBIAL ENZYME ACTIVITIES TO IDENTIFY FECAL POLLUTION SOURCES IN SURFACE WATERS.

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A total maximum daily load (TMDL), which is the calculated total amount of pollutant that a waterbody can receive from point and non-point sources, is established for streams that do not meet their designated use criteria. Physical, chemical, and biological water quality parameters are used to attempt to identify pollution sources. Microbial enzyme activity (mg/mL) is used to monitor the changes in the microbial community by identifying changes in their metabolism. The health of a stream can be monitored by the presence and absence of microorganisms due to the response of the microbial community to prolonged pollution exposure. To fully understand the metabolic activity, MEA data are compared to other factors including biochemical oxygen demand (BOD), nitrogen, phosphate, total coliform and *Escherichia coli* concentrations. Dissolved oxygen refers to the amount of oxygen used by microorganisms to degrade organic carbon, which reduces the survivability of aerobic organisms. Nitrogen and phosphate compounds

from anthropogenic sources are readily dissolved into water and are limiting nutrients for microorganisms. Total coliforms and *E. coli* determine the fecal contamination in the waterbody. All of these factors are used to determine point and nonpoint pollution sources. From February 2014 to January 2016, water and sediment samples were collected monthly from 16 sites along Sinking Creek in Northeast Tennessee. During the two-year study, physical and field parameters were measured. Water samples were analyzed for chemical parameters including alkalinity, hardness, and BOD. Using an ion chromatograph, the concentration of phosphates and nitrates in the samples was measured. For biological parameters, the water sample was used to obtain total coliform and *E. coli* data using the Colilert enzyme substrate test. MEA data were collected from triplicate sediment samples collected at each site. These sediment samples were tested for acid and alkaline phosphatase, glucosidase, galactosidase, and dehydrogenase enzymes. The substrate for these enzymes was added to the respective sample, incubated for approximately 24 hours, and analyzed by colorimetric spectrophotometry to obtain absorbance. The enzyme concentration was calculated by comparing the absorbance to a generated standard curve. The results for the measured parameters were compared to identify correlation between the MEA concentrations and other biological and chemical parameters. The microbial activity should show a holistic view of changes in the waterbody, which should correlate with the other factors. A direct relationship between *E. coli*, total coliforms, nitrate, phosphate concentrations, and MEAs was expected. A correlation should be seen between MEAs and BOD data, due to an increase in oxygen demand during microbial metabolism. By examining multiple parameters together, the results would provide the necessary information to determine remediation efforts for the waterbody.

40. AN INFRARED STUDY OF TYPE II CEPHEID STARS FROM THE WISE SATELLITE

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Type II Cepheids are variable stars that are used for calculating the distances to galaxies. We selected a sample of Type II Cepheids from the Variable Star Index and used data collected from the NASA Wide-Field Infrared Survey Explorer satellite to study the relationships between the pulsation period and the luminosity for these stars. We compared our findings with published relations for Type I Cepheid variables and RR Lyrae stars.

*** Biomedical and Health Sciences ***

41. THE INHIBITORY POLYMICROBIAL INTERACTIONS OF ALCALIGENES FAECALIS AND STAPHYLOCOCCUS AUREUS

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For many years now, antibiotic resistance has been a growing issue within the healthcare setting; therefore, the discovery of new antimicrobial treatments has become imperative. The bacterium *Staphylococcus aureus* causes a variety of infections and is capable of antibiotic resistance, as is seen in Methicillin-resistant *Staphylococcus aureus* (MRSA) strains. Our research is centered on the interactions of *S. aureus* with *Alcaligenes faecalis*. *A. faecalis* is a gram negative bacterium that is generally considered non-pathogenic and commonly found in the environment. Non-pathogenic bacteria such as *A. faecalis* provide an opportunity to combat pathogenic bacteria through polymicrobial interactions where, in the context of human health, the enemy of my enemy is my friend. Through a series of co-culture experiments, we have shown that *A. faecalis* exhibits a suppressive effect on *S. aureus* growth and viability. In solid agar co-culture experiments, *A. faecalis* produces zones of inhibition on *S. aureus* lawns; however, *S. aureus* is unable to produce the same effect on *A. faecalis* lawns. This suppressive effect appears to work through an

unknown contact-dependent mechanism since *A. faecalis* cell-free spent media has no effect upon *S. aureus* growth and viability. In liquid co-culture, *A. faecalis* appears to also suppress *S. aureus* growth since *S. aureus* colony forming units on selective media are decreased in the presence of *A. faecalis* when compared to controls. However, this suppressive effect of *A. faecalis* appears to only work in short time periods with maximal suppression of *S. aureus* growth occurring between one to six hours of co-culture. *S. aureus* eventually overcomes this growth suppression and recovers to near control levels by the twenty-four hour time point. Taken together, these findings offer new understanding of a previously uncharacterized area of research involving non-pathogenic versus pathogenic bacteria. With a better understanding of the interactions of *A. faecalis* and *S. aureus*, new therapeutic targets and treatments may be discovered which could offer alternatives to combating particularly difficult to treat *Staphylococcus* infections such as MRSA.

42. CHARACTERIZATION OF THE TOL-PAL SYSTEM IN RHIZOBIUM LEGUMINOSARUM ATCC 14479

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The Tol-Pal system is a multicomponent system present in many Gram negative bacteria. Most of the current knowledge about the system comes from its presence in *E. coli*. The system is thought to play role in cell division as well as in membrane structure and integrity. The system includes seven proteins: TolA, TolR, TolQ, TolB, YbgF, YbgC. TolA, TolQ, and TolR are located in the inner membrane, TolB and YbgF are periplasmic proteins, TolB is an outer membrane protein, and YbgC is a cytoplasmic protein. The system has never been studied in *Rhizobium leguminosarum* ATCC 14479. The presence of *tolA* gene was accidentally discovered in *R. leguminosarum* in our lab while we were trying to locate the *ExbB* and *ExbD* genes. The aim of the current research is to identify and characterize the remaining genes of the Tol-Pal system in *R. leguminosarum*. We are using bidirectional primer walking from *tolA* gene to identify other genes.

43. TOLL LIKE RECEPTOR 4 STIMULATION INCREASES SCAVENGER RECEPTOR A EXPRESSION ON MURINE MACROPHAGES

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Sepsis is the body's response to an overwhelming infection and is a serious consequence of critical illness. It can cause tissue damage, organ failure, and death. Sepsis continues to have an unacceptably high mortality rate, due to the lack of effective treatments. Specific therapeutic targets for sepsis remain elusive since the complex functional changes that result in a septic state remain poorly understood. Macrophage Scavenger Receptor A (SRA, CD204) is a surface receptor that binds negatively charged, endogenous and exogenous ligands. We have discovered that SRA plays a significant role in the pathophysiology of sepsis. We have shown that mice with SRA have increased inflammation, decreased survival, and increased bacterial burden compared to SRA deficient mice. We have also found an increase in the expression of SRA on monocytes and macrophages in septic wild type mice. To determine the mechanism responsible for increased SRA expression in sepsis we treated a mouse macrophage cell line, J cells (J774a-1), with mediators that stimulate toll like receptors (TLRs), innate immune receptors which are activated in sepsis. The cells were cultured with ultra pure LPS (a TLR 4 ligand), PAM3CSK4 (a TLR 2 ligand), or ultra pure LPS and PAM3CSK4 for 24 hours. The cells were stained with an SRA antibody, and flow cytometry was used to measure the SRA expression for each treatment group. LPS treatment alone resulted in a significant increase in SRA expression when compared to control cells. Specifically, LPS increased SRA expression

by 53.4% compared to media alone ($p < 0.05$). PAM3CSK4 alone or in combination with LPS had no significant effect on SRA expression when compared to control cells. From these data we can conclude that an increase in SRA expression on macrophages in sepsis is mediated by TLR4 stimulation, but not by TLR2 stimulation.

44. PIN1 IN THE DNA DAMAGE RESPONSE IN RELATION TO RPA MODIFICATION

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Replication protein A (RPA) is a single stranded DNA (ssDNA) binding protein and plays a role in almost all DNA metabolic pathways including those in DNA damage responses. It binds to the ssDNA to protect it from various endonucleases, recruits proteins, assemble DNA- or protein-protein complexes, and to prolong the unwound state of the DNA for other various DNA metabolic reactions. RPA is a heterotrimer composed of three different subunits referred to as RPA14, RPA32, and RPA70. RPA can also form a complex with the protein p53. The binding of p53 to RPA reduces the amount of free p53 in the cell. When DNA damage occurs, RPA is hyperphosphorylated. This occurs on the RPA32 subunit at various serine residues. This hyperphosphorylation of RPA causes conformational changes to RPA complex and thus its biological/cellular activities. Pin1 is an isomerase. It changes a Ser/Thr-Pro bond in a protein from trans to cis or cis to trans conformation. Pin1 plays a role in many metabolic reactions. I propose that Pin1 regulates the hyperphosphorylation of RPA. To test this, siRNA was used to knockdown Pin1 in A549 cells. The cells then underwent a 24 hour treatment using hydroxyurea to induce DNA damage. The cells were collected, lysed, and treated with DNase to free any RPA bound to chromatin. Finally, RPA was visualized via western blotting.

45. THE INHIBITING EFFECTS OF ALCALIGENES FAECALIS ON DIMORPHIC CANDIDA ALBICANS

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Even though antibiotic and antifungal resistance rates continue to skyrocket at alarming rates, few new antimicrobial alternatives have been discovered. Bacterial-fungal interactions, especially those that are part of the normal human microbiota, remain poorly understood. By studying these interactions, new medical remedies may be developed to combat resistant infections. Here we investigate the interactions between *Candida albicans* and *Alcaligenes faecalis*. *C. albicans* is an opportunistic dimorphic fungus causing increased morbidity and mortality in immunocompromised patients (AIDS patients, cancer treatment patients, and those on long term antibiotics). Unique to *C. albicans* is the ability to change morphology from a relatively benign yeast form to an invasive hyphal form. *A. faecalis* is a Gram-negative bacterium commonly found in the environment and is generally considered nonpathogenic. In co-culture experiments, we show that *A. faecalis* inhibits *C. albicans* in both its yeast form and invasive hyphal form. In liquid co-culture experiments, *A. faecalis* inhibits viable colony forming units of *C. albicans* at two, four, six, and twenty-four hour time points. On solid agar co-culture experiments, this interaction seems to require a contact-dependent mechanism as cell free spent media from *A. faecalis* does not inhibit *C. albicans* growth, whereas *A. faecalis* cells produce large zones of inhibition. In initial experiments, *C. albicans* does not appear to exert the same effect on *A. faecalis* as it is unable to produce zones of inhibition on *A. faecalis* lawns in agar co-culture, nor inhibit growth of *A. faecalis* in liquid co-culture. This interaction is further supported by microscopic examination where *A. faecalis* cells can be observed attaching extensively to both *C. albicans* yeast and hyphal cells. Our findings provide new insight on unique interactions between bacteria and fungi. Understanding these bacterial-fungal interactions may help us identify possible new therapeutic and treatment targets in an area with decreasing medical alternatives.

46. CTRP3 SHOULD INCREASE GLUTATHIONYLATED PROTEINS IN ETHANOL FED LIVER.

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Chronic alcohol consumption diminishes the levels of antioxidants (e.g. glutathione, Vitamin A and E) which protect the cell from oxidative stress. Hence, decreased levels of antioxidants like glutathione leads to an increase in lipid peroxidation and liver injury. In response to tissue injury, Kupffer cells in the liver secrete cytokines which attract leukocytes and stimulate them to release free radicals and toxic enzymes that cause enhanced damage to the liver. Even so, considering that high CTRP3 levels prevent diet-induced fatty liver disease, we hypothesized that increased CTRP3 levels would reduce the levels of lipid accumulation in an alcoholic liver. Therefore, we propose that the mechanism of CTRP3 action would increase glutathione, eliminating lipid peroxidation. Using the NIAAA feeding protocol, we induced acute and chronic ethanol consumption in mice. Consequently, we placed the mice on a 10 day ethanol diet after which we gave them a single dose gavage of ethanol. In addition, considering that glutathione reduces disulfide bonds of cytoplasmic proteins to cysteines, we performed a western blot using anti-glutathione antibody [D8] (ab19534) to detect glutathionylated proteins. We anticipate that there would be fewer glutathionylated proteins in alcoholic livers. Also, in line with previous research that demonstrates the effects of CTRP3 on preventing alcoholic fatty liver disease, we expect that there would be an increase in the level of glutathionylated proteins in the liver with increased levels of CTRP3. If the presumed results are obtained, we should be able to conclude that CTRP3 can be used as a possible treatment method for alcoholics with fatty liver disease. However, if we do not obtain these results, there is something unique about this model and further research should be carried out.

47. INFLUENCE OF MECHANICAL CHOICES ON DEVELOPMENT AND PERSISTENCE OF OSTEOARTHRITIS: HOW ALEXANDER TECHNIQUE CAN PROMOTE PREVENTION AND MANAGEMENT

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Is osteoarthritis a fate unconditionally vested in genetic makeup, or are joints aggravated into inflammation by the way they are treated? Humans are a complicated conglomeration of experiences, decisions, and inheritance. Osteoarthritis, likewise, has evaded simplicity in any explanation of its causation, so it necessitates a multi-dimensional perspective. This research considers the relevance of Alexander Technique in filling a void in which treatment and management of osteoarthritis is not equally equipped to answer this multi-dimensional causation. Alexander Technique is classified as a movement therapy, but this does not quite encompass the mindset of it – that it is indeed largely a mindset about movement. More concisely, Alexander Technique emphasizes self-awareness about how a person uses his or her body to perform daily tasks. It is physical minimalism, and involves continual recognition of muscle tension along with the ability to let go of any tension that is burdensome and unnecessary. This technique has diminished pain and increased the ease of movement for those who have experienced it, even people with osteoarthritis. To build the argument that osteoarthritis can be hindered through a heightened consideration of how joints are treated, the initial component of this research investigated the vast amount of information already gleaned about the pathogenesis of this disease. The fields of physiology, genetics, immunology, and clinical practice already have much to share, and this knowledge has been combined with studies about the benefits and goals of Alexander Technique to discover the common ground of osteoarthritis treatment. The experimental component assesses the association of Alexander Technique to the minimization of pain from osteoarthritis. An online survey asks osteoarthritis cohorts about the history of their disease, the effect it has had on their pain levels and activities of daily living, and about the efficacy of their management strategies. Because each participant will be asked if he or she has received Alexander Technique lessons,

the survey can be used to analyze each respondent's experience of osteoarthritis with respect to that. Given evidence from previous research, an expected trend would show participants with Alexander Technique experience reporting less daily pain and greater freedom for activities of daily living than those with no experience of the technique. The hope is that this study will be a step in the direction of better osteoarthritis management, promoting prevention-minded awareness of joint use and providing preliminary fuel for more extensive research.

48. EFFECTS OF SPINAL CORD STIMULATION ON HEART FAILURE INDUCED HIPPOCAMPAL DAMAGE

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Background: Myocardial infarction (MI) and subsequent heart failure (HF) is associated with damage to the brain. We previously demonstrated in a canine model of HF that involves experimentally-induced MI and mitral regurgitation (MR) that thoracic spinal cord stimulation (SCS) reduces mortality and preserves autonomic responsiveness for control of cardiac function. SCS treatment also produced neuroprotective effects in the hippocampus. Here, we examined the hypothesis that SCS may produce neuroprotective effects by modifying tissue responses to oxidative damage. **Methods:** Canines (6) underwent HF model creation involving sequential inductions of MI and MR; three canines served as sham controls. MI/MR animals were randomized to two arms: "Control" with SCS OFF (N=3) and SCS ON (T1-T5, 50 Hz, 200 μ sec, 90% motor threshold) starting one week post MR induction (n=3). Both groups were maintained for 12 weeks post MI/MR induction. Autonomic status was evaluated for cardiac control prior to termination, after which brains were surgically removed. Two brain regions were dissected: prefrontal cortical white matter and hippocampus. In homogenates of white matter tissue, the activity of the antioxidant enzyme, superoxide dismutase-1 (SOD1), was measured. In addition, expression levels of the gene that encodes poly(ADP-ribose) polymerase-1 (PARP1) was measured in RNA isolated from the hippocampus. PARP1 acts as a sensor of DNA damaged by oxidation. **Results:** The activity of SOD1 in cortical white matter tissue was not significantly affected by HF and SCS also did not significantly modify enzyme activity. Nevertheless, there was a moderate trend for higher SOD1 activity in SCS-treated HF tissues. Hippocampal gene expression levels of PARP1 were significantly elevated in HF canines as compared to sham controls, an effect that was not evident in HF canines treated with SCS. **Conclusions:** Previous research in our laboratory has demonstrated that administration of SCS during HF has neuroprotective effects in the brain. Results from the present study suggest that SCS modifies mechanism engaged by oxidative DNA damage in the hippocampus. Future studies are required to determine whether effects of SCS on PARP1 are linked to the neuroprotective effects of SCS in HF.

49. ESTABLISHING THE BINDING OF CTRP3 TO LIVER CELLS

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To begin, the adipokine C1q TNF Related Protein 3, commonly referred to as CTRP3, originates from adipose tissue and circulates through the blood. Through our lab in a previous study, it has been discovered that CTRP3 has the potential to prevent fatty alcohol liver disease. With that being said, it still remains unclear as to if CTRP3 binds directly to the liver cells (hepatocytes) or works through an indirect mechanism. Figuring this out is crucial in fully grasping exactly how CTRP3 works and is what our lab wishes to find out. As a result, our hypothesis is as follows: CTRP3 binds directly to hepatocytes. In order to test our hypothesis, our method was simply that we used purified recombinant FLAG tagged CTRP3 protein. In order to detect the binding of CTRP3 H411E hepatoma cells, both immunocytochemistry and flow cytometry were used. The H411E cells are hepatoma cells used in the in vitro model of hepatocytes, which is often used in metabolic research. The H411E cell line replicates the liver-like insulin regulated glucose and lipid metabolism found in the liver. We then use immunohistochemistry and immunofluorescence in order to detect the binding of CTRP3 to the liver through the frozen and paraffin

embedded tissue sections, ex vivo. Through the above methods, the following results were obtained: the binding of the CTRP3 protein to the hepatocytes has detected, and we were able to show that the binding of CTRP3 to hepatocytes was specific. We were also able to show that there was a six-fold increase in mean fluorescent intensity of CTRP3 treated hepatocytes compared to control treatments through flow cytometry analysis. We were not able to detect the binding of recombinant CTRP3 through immunohistochemistry. In conclusion, our lab was able to confirm that the CTRP3 is able to bind to hepatocytes. A key limitation in this study was that the liver sections were treated with recombinant CTRP3 ex vivo. These were the conclusions from the previous study. From here, in the current study, we simply replicated the above experiment except we injected a live mouse with CTRP3 (in vivo) and then carry out the experiment as described above. Through this, we were able to conclude that CTRP3 does in fact bind to the liver. We were successful in being able to detect the binding of recombinant CTRP3 through immunohistochemistry.

50. IDENTIFICATION OF RHYB-LIKE GENES IN RHIZOBIUM LEGUMINOSARUM ATCC 14479

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Small RNA's are small, non-coding sequences that are 50-250 nucleotide long and play important role in the regulation of gene expression. They regulate gene expression either by binding to their target proteins or mRNA molecules. RhyB is a small non-coding RNA that is important in the metabolism and regulation of iron transport. It has been characterized in bacterium such as E. coli and has analogs in other bacterium like Pseudomonas aeruginosa. We are focused on studying siderophore, a small organic molecule with a high affinity for ferric ion, mediated iron transport in Rhizobium leguminosarum ATCC14479. It was our interest to investigate the presence and role of such small RNAs in the regulation of siderophore mediated iron transport in R. leguminosarum ATCC 14479. The small RNA, RhyB, has not been characterized in Rhizobium. For initial investigations, primers were designed based on the conserved sequences found in well characterized rhyB from other bacteria. The primers were used for the detection of the presence of rhyB or similar genes in R. leguminosarum ATCC 14479 using reverse transcription. Our primary data indicate the presence of rhyB or rhyB like genes in R. leguminosarum ATCC 14479. The present work describes the further characterization of the gene and its possible role in vicibactin mediated iron transport in R. leguminosarum ATCC 14479.

51. PRO-INFLAMMATORY MICROGLIA PATHOLOGY IN THE ANTERIOR CINGULATE CORTEX IN ASD

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Autism spectrum disorder (ASD) is a term used to categorize a variety of complex, developmental disorders of the brain that affect social behavior of over 3 million people in the United States. The presumably complex theoretical etiology of ASD is associated with neural circuits, glial pathways, and immune function that impair cellular communication between and within specific brain regions. The anterior cingulate cortex (ACC) is an important brain area involved with a variety of social behaviors including social communication and personal interactions. Microglia are the resident immune cells in the ACC and are similar to macrophages as they remove debris and produce an immune response to injury and

damage. Microglia are further divided into pro-inflammatory and neuroprotective subtypes. Pro-inflammatory microglia release cytokines and mediate the inflammatory response in the brain leading to detrimental effects including mitochondrial dysfunction and oxidative stress. Neuroprotective microglia counteract harmful effects of injury and damage to the brain. The presence of pro-inflammatory cytokines suggests neuroinflammation or immune activation in the CNS. Pro-inflammatory cytokine release has been well documented in acute trauma, infections and ischemic insults of the brain. However, cytokine contributions to neurodevelopmental disorders have not been well characterized. Elevated blood levels of pro-inflammatory cytokines including TNF-alpha, IL-1, and IL-6 have been identified in ASD. However, the cellular source of these alterations has not been investigated for specific brain regions in ASD. The current study applied immunohistochemistry and gene expression analysis to search for alterations in pro-inflammatory microglia marker proteins and genes in the ACC in ASD when compared to donor tissues taken from typically developing controls. The study used immunohistochemistry of frozen brain tissue to identify the microglial marker protein, HLA-DR. No significant difference was observed in HLA-DR immunostaining comparing ASD to control donors ($p=0.11$). Additionally, quantitative real-time PCR using punch dissected ACC white matter from control and ASD donors ($n=11$) was used to identify gene expression changes. Gene expression was examined for pro-inflammatory marker genes, IL1B, a cytokine that is produced by activated microglia, and CD68, an integral membrane receptor expressed in activated microglia. Expression levels for IL1B ($p=0.56$) and CD68 ($p=0.84$) were unchanged comparing ASD to control donors. Future studies will include the use of immunohistochemistry of fixed brain tissues rather than frozen tissues to examine potential morphological changes in microglia, and gene expression studies for additional microglia marker genes. Determining the role of these pro-inflammatory microglial cells in ASD would give a better understanding of the pathology of the disorder and could contribute to the identification of therapeutic targets to treat ASD.

52. INVESTIGATION INTO BARBELL BACK SQUAT COMPARING WEIGHTLIFTING SHOES TO BAREFOOT CONDITIONS

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This study investigated muscle activation patterns throughout the barbell back squat to determine if changes in electromyography (EMG) activity occurred among individuals wearing weightlifting shoes compared to barefooted conditions. EMG patterns from six superficial lower extremity muscles were recorded from 12 subjects (means: 22.67 ± 2.39 age, 172.28 ± 14.04 cm height, 74.88 ± 16.11 kg mass). Data collection occurred over three visits to determine one repetition maximum [1RM], conduct maximal voluntary contraction tests, and finally to perform squat tests with the footwear conditions. EMG activity at 80% of the participants' 1RM with weightlifting shoes and barefooted were recorded for analysis. A series of 2X2 ANOVA (footwear vs. phases) were used to determine if any significant changes occurred among footwear in the eccentric and concentric portions of the barbell back squat. The study had two major findings: several muscles displayed significant differences between eccentric and concentric phases in regards to EMG activity, and none of the observed muscles showed significant differences in regard to the footwear effect on EMG activity. These results indicate that changes in footwear do not alter muscle activation; although, kinematics in the squat has been shown to differ in past studies based on footwear.

53. INHIBITION OF GROWTH OF MEMBERS OF THE ENTEROBACTERIACEAE FAMILY BY SECRETED MOLECULE OF KLEBSIELLA PNEUMONIAE

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The growing world issue of multiple antibiotic resistant bacteria has been a hot area of research in the last few decades. One bacterial family in particular, Enterobacteriaceae, is responsible for many serious

infections and drug resistance found both in hospitals and the general population. Interspecies interactions are a relatively uncharacterized area of research which holds the potential to discover new and novel antimicrobials in this field. Our research is centered on the Gram-negative bacterium *Klebsiella pneumoniae*. Arguably the most significant member of the Enterobacteriaceae family, *K. pneumoniae* is both part of the normal flora of humans and a destructive pathogen that causes pneumonia, bloodstream infections, wound infections, urinary infections, and meningitis. Due to this duality in both microbiota and pathogenic states, our lab hypothesizes that *K. pneumoniae* may possess novel molecules and mechanisms that aids its effort in establishing itself among the population of other bacteria. Through a series of culturing experiments, we have shown that *K. pneumoniae* secretes a previously uncharacterized molecule or compound that inhibits other members of the Enterobacteriaceae family. In solid co-culture, *K. pneumoniae* cells and spent cell free *K. pneumoniae* media inhibit *Citrobacter freundii* and *Enterobacter cloacae* bacterial lawn growth. This growth inhibition produces large zones of inhibition and can even be observed even when diluted to 1:10,000. However, this inhibition is not seen when *C. freundii* and *E. cloacae* are placed on *K. pneumoniae* lawns. In liquid co-culture experiments using spent cell free *K. pneumoniae* media, *C. freundii* and *E. cloacae* growth is almost completely stopped at two, four, and six hour time points of co-culture. At the twenty-four hour co-culture, *C. freundii* and *E. cloacae* growth are still greatly inhibited. Interestingly, when *K. pneumoniae* is tested against another Enterobacteriaceae member, *Enterobacter aerogenes*, there is minimal inhibition shown possibly due to *E. aerogenes* being genetically similar to *K. pneumoniae*. The results of these experiments taken together indicate a potentially inhibitory or cidal compound that *K. pneumoniae* secretes that inhibits members of the increasingly drug resistant Enterobacteriaceae family. Continued research on these polymicrobial interactions could potentially identify new and novel compounds that may combat difficult to treat and drug resistant infections.

Graduate Students: Master's Candidates

✧ Society, Behavior and Learning ✧

54. INCIDENCE OF STOMACH CANCERS AMONG BLACK, ASIAN/PACIFIC ISLANDER, AND AMERICAN INDIAN/ALASKAN NATIVE MALES AGED = 30 YEARS OF AGE BY REGION, 1973-2012

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PURPOSE: The purpose of this research was to examine the incidence of stomach cancers among males by race and age in the Contract Health Service Delivery Area (CHSDA) regions from 1973-2012. The project aimed to identify disparities in stomach cancer incidence. **BACKGROUND:** Stomach cancer is the third leading cause of cancer death in the world. Incidence of stomach cancer will occur in 1 out of 111 during their lifetime. Further, the 5-year relative survival among individuals diagnosed with stomach cancer is only 28.8%. Risk factors include smoking, diet lacking in fruits and vegetables, and *H. Pylori* infection. Prevalence and incidence is more common in Eastern Asian countries like Japan, while it is less common in Northern American countries like the United States. Due to incidence of stomach cancer in the United States being rare there is not an adequate amount of research comparing different races and regions within the country. **METHODS:** Data were obtained through the Surveillance, Epidemiology, and End Results (SEER) program using SEER 9 Registry Research Data, Nov. 2014 Submission with Katrina/Rita

Population Adjustment. Frequency and rate sessions were conducted. All rates were age adjusted, using the 2000 U.S. standard population, and showed standard errors with confidence intervals. Age at diagnosis was selected at = 30 years of age. Male was selected for sex. Black and other races of Asian/Pacific Islander (A/PI) and Alaska Native/American Indian (AN/AI) were selected for race. East, northern plains, pacific coast, and southwest were selected for CHSDA region. Primary site labeled was selected under site and morphology. Cardia, fundus of stomach, body of stomach, gastric antrum, pylorus, lesser curvature of stomach, greater curvature of stomach, overlapping lesion of stomach, and stomach were all selected as primary sites. **RESULTS:** The highest overall incidence occurred in A/PI and AI/AN within the pacific coast region at a rate of 38.9 (37.9-39.9 CI). This rate was statistically different from all three of the other rates for the A/PI and AI/AN population. The lowest overall incidence occurred in Blacks within the southwest region at 23.2 (17.9-29.5 CI), with this rate being statistically different from all other regions for both A/PI and AI/AN and Blacks. The highest age specific incidence occurred in A/PI and AI/AN aged >85 living in the northern plain region at a rate of 244.4 (142.4- 391.4 CI). The lowest age specific incidence occurred in A/PI and AI/AN aged 30-35 living in the east region at a rate of 0.8 (0.2-2.3 CI). Overall, among all races and regions as age increases so does incidence of stomach cancer in males. **CONCLUSION:** Further research into specific regions, such as the pacific coast due to its high incidence when compared to other regions, should be completed. Additional understanding of regional stomach cancer disparities may help to reduce the morbidity and mortality among males with stomach cancer.

55. MYPYRAMID, PHYSICAL ACTIVITY AND METABOLIC SYNDROME IN AMERICAN ADULTS

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Research has attributed an elevated risk for chronic diseases such as coronary heart disease (CHD), diabetes and stroke with metabolic risk factors, which are closely associated with overweight, obesity and lack of physical activity. MyPyramid is an interactive tool for personalizing food choices based on the recommended dietary guidelines, an upgrade of the American food guide pyramid to include physical activity and a mix of food proportions. In light of this, the objective of the study was to determine whether the use of MyPyramid, physical activity and self-reported health status differs among three different metabolic conditions; no metabolic risk (NMR), metabolic health (MH) and metabolic syndrome (MS). Data from the National Health and Nutrition Examination Survey (NHANES) 2011-2012 were used to identify cardio-metabolic conditions with five risk factors: Waist circumference, elevated blood pressure, triglycerides, glucose and low high density lipoprotein cholesterol. The focus was on adults aged 20 to 60 years old. Differences in the use of MyPyramid and physical activity among the three different metabolic health groups were assessed and compared. About 70% of individuals were aware of MyPyramid in each metabolic status group. No significant difference was found in the “heard of MyPyramid” question among these three groups. On the contrary, differences were observed on those who tried MyPyramid plan. More individuals with MH (24.19%) tried MyPyramid than individuals with MS (18.88%) (P-value = 0.0047). More individuals with NMR (80.58%) and MH (65.21%) reported healthy diet than individuals with MS (51.75%). Moreover, there was no statistical difference in work activity among the three metabolic groups. The proportion of individuals with MS (51.75%) that engaged in light recreational activity was significantly higher than those with NMR (32.75%) and MH (38.94%) (P-value < 0.0001). Healthy diet habits such as the use of MyPyramid and recreational physical activity are important components in reducing metabolic syndrome and to ultimately address the burden of chronic diseases. A potential intervention strategy is needed to encourage the individual to increase recreational activity intensity and use MyPyramid.

56. ANALYSIS OF TENNESSEE POPULATION SERVED BY CERTIFIED STROKE CENTERS

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Stroke is the fifth leading cause of death in the United States and in Tennessee. In 2013, strokes killed 3,123 Tennessee residents yielding a mortality rate of 43.9 per 100,000. According to America's Health Rankings, Tennessee ranks 44 in deaths due to cardiovascular diseases, including heart disease and strokes, and 45 in stroke occurrence. The American Heart Association, in partnership with the Joint Commission, designates hospitals across the United States as primary or comprehensive stroke centers based on the level of stroke care they provide and guidelines set by American Heart's Get With the Guidelines-Stroke program. Currently, there are 29 certified, either primary or comprehensive, stroke centers in Tennessee and another nine in surrounding states within 50 miles of the Tennessee border. Because time to treatment is a crucial factor in determining stroke outcome, it is of interest to map the distribution of certified stroke centers in and around Tennessee and to determine the service areas for these stroke-specialized hospitals. The purpose of this research was to identify the population in Tennessee that is served within 30, 60, and 90 minutes by a certified stroke center, subsequently identifying the population at risk for being underserved in respect to stroke care. Certified stroke centers in Tennessee and surrounding states were identified through The Joint Commission Quality Check search engine and mapped using ArcMap 10.3.1 (N=38). The Network Analyst tool within ArcMap was used to generate the service areas for all 38 facilities of interest. The road network for the service area was generated from the National Highway Planning Network dataset. Census block level population data for Tennessee was imported into the ArcMap document from 2010 Census Bureau TIGER products. The population data layer was then clipped to each service area polygon and the sums of each clipped population layer were calculated using the "Statistics.." feature in ArcMap. The research yielded the following results: 69.1% of Tennesseans live within 30 minutes of a certified stroke center, 94.6% within 60 minutes, and 99.9% within 90 minutes. An estimated 6,302 Tennesseans (less than 0.1%) live more than 90 minutes from a certified stroke center. Based on these results, it appears that much of Tennessee's population is well-covered by the geographical distribution of certified stroke centers in and around the state.

57. PREDICTORS OF COLORECTAL CANCER SURVIVAL BY TUMOR SITE IN THE UNITED STATES, 2007-2012

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While there is wide range of literature about predictors of colorectal cancer (CRC) survival, research about site-specific survival of CRC is scarce. The aim of the study was to determine factors associated with CRC survival by tumor site. Data were obtained from the Surveillance, Epidemiology and End Results (SEER) program for all CRC cases from 2007-2012 (N=85,474; 44,646 (52%) males, 40,828 (48%) females). Study outcome was 5-year survival in months. Independent variables included race, sex, marital status, age and stage (based on Derived AJCC stage (6th edition)). Site of tumor was categorized into 1=ascending colon, 2=transverse colon, and 3=descending colon/sigmoid/rectum. Analyses were conducted using SAS version 9.4. PROC LIFETEST was used to compare survival rates by tumor site. Cox proportional regression was used to estimate factors associated with CRC 5-year survival by site. Hazard ratios (HRs) and associated 95% confidence intervals (CI) were reported. Participants' age ranged from 11 to 107 years. Five year survival rate of CRC was 66.3%, 66.4% and 66.3% in site 1, 2 and 3, respectively. It was observed that 25% of individuals died at the end of 29 months, 28 months and 34 months in site 1, 2 and 3 respectively.

The Log rank test indicated that survival differs by tumor site ($\chi^2 = 28.48\%$, p value < 0.001). Males had increased risk of death compared to females for site 1 only (HR=1.12, CI=1.07-1.18). Age was associated with increased risk of death in all sites (HR= 1.39 (CI=1.35-1.43), 1.43 (CI=1.37-1.50) and 1.51 (CI=1.48-1.54) for sites 1, 2 and 3 respectively). Marital status was significant for all sites. Married individuals had a decreased risk of death with HR of 0.73 (CI=0.67-0.78), 0.70 (CI=0.62-0.78) and 0.66 (CI=0.62-0.69) for sites 1, 2 and 3 respectively compared to singles; while divorced/separated/ significantly decreased risk of death in site 2 and 3 (HR=0.87, CI=0.77-0.99) and 0.90 (CI=0.85-0.95), respectively) compared to singles. Race was significant for site 1 and 3 only. AAs had 7% and 22% increased risk of death for site 1 and 3, respectively compared to W; while other race had 11% decreased risk of death in site 3 compared to W. Stage was significant for all sites. Stage 3 and 4 had the highest risk of death compared to other stages in all sites (HR ranged from 5.01-9.66 for stage 3, and 32.75-48.15 for stage 4). In conclusion, predictors of survival in site 1 (ascending colon) were sex, age, marital status, race and stage; for site 2 (transverse colon) were age, marital status and stage; and for site 3 (descending colon/sigmoid/rectum) were age, marital status, race, and stage. Survival vary by site but important predictors of CRC for all sites are age, marital status and stage. The results suggest that social support (marital status) can improve CRC survival. Further studies should adjust for other variables such as comorbidity and income status.

58. ASSESSMENT OF BREASTFEEDING RATES AMONG MOTHERS IN APPALACHIAN TENNESSEE

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Despite known associated benefits of breastmilk, such as protection against infection, decreased risk for asthma, and decreased risk for obesity, breastfeeding rates in Tennessee fail to obtain nationally set benchmark goals. According to 2014 CDC data, in Tennessee 74.9% of infants were ever breastfed, and by six and twelve months only 40.7% and 20.9% of infants were breastfed, respectively. The targets set by Healthy People 2020 are 81.9% for initiation, 60.6% at 6 months, and 34.1% at 12 months. Moreover, infants from low-income families are less likely to receive breastmilk compared to infants from higher income families. Federal resources such as Women, Infants, Children (WIC) which provides women of low economic status with supplemental food, nutrition education, and breastfeeding support. Breastfeeding rates among WIC recipients historically have been lower than those among non-WIC recipients. Recently, Tennessee WIC has improved their food package for breastfeeding mothers and increased peer counselor and breastfeeding support an attempt to address this disparity. This study aims to assess the rates of breastfeeding in Northeast Tennessee and explore whether or not differences exist in breastfeeding rates between WIC-recipients and non-WIC recipients. This study was conducted as part of the Read and Play for a Bright Future program which aims to improve health and wellness in families with young children, in part through improved breastfeeding counseling in primary care as well as expansion of breastfeeding support groups and events for local families. A survey was constructed which evaluated social and health demographics of patients in a local pediatric clinic. Using convenience sampling method, anonymous surveys were obtained from mothers of 9-24 month infants during 2013 to 2015 on four separate occasions. Preliminary data analysis estimates that 69.3% of the total sample (n=226) was enrolled in WIC. 89% of mothers reported having a high school degree during the most recent data collection. Results suggested that 72.4% of mothers had ever breastfed their infant. This number declined to 57.1% after one month, 26.6% after six months, and 6.7% after twelve months. Factors associated with breastfeeding are being explored using univariate and multi-variate analyses. While rates of breastfeeding in this Appalachian Tennessee sample are below Healthy People 2020 targets, rates of breastfeeding continuation may be higher than in the state as a whole. However, the significant decline in breastfeeding rates of 30.5% between the ages of one month and six months suggest a need for continued improvement in clinical breastfeeding and peer support for breastfeeding.

59. GRATITUDE AND SUICIDAL BEHAVIOR: PSYCHACHE AND DEPRESSION AS MEDIATORS

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Suicide is the tenth leading cause of death in the United States, with college students demonstrating higher rates of suicide attempts and ideation compared to the general population. Examination of risk and protective factors amenable to intervention is therefore crucial in order to attenuate suicide risk in college students. One risk factor linked to suicidal behavior is psychache: a subjective feeling of intense and unbearable psychological pain. The literature provides ample evidence of psychache's deleterious associations with suicidal behavior, but little is known regarding what variables may mitigate or exacerbate feelings of psychache. One variable with potentially mitigating properties is gratitude. With research supporting gratitude's protective role against the effects of depression and hopelessness in suicide, it is likely there would be a similar function with psychache due to its conceptual similarities with depression and hopelessness. Further, as psychache is posited to arise from thwarted psychological needs, it seems likely that psychache would be inversely associated with gratitude, which is encapsulated by expression of appreciation for one's current circumstances. This gratitude-psychache-suicide association was therefore tested in a sample of undergraduate students ($N = 2,042$). It was hypothesized that higher levels of gratitude would be directly associated with lower levels of suicidal behavior. It was also hypothesized that higher levels of gratitude would be associated with lower levels of psychache, which would in turn be associated with lower levels of suicidal behavior. These hypotheses were tested using parallel mediation analyses, with psychache, depression, and hopelessness serving as parallel mediators of the gratitude-suicidal behavior association. Age, gender, ethnicity, and religiousness were used as covariates. Self-report data using the Gratitude Questionnaire, Psychache Scale, Depression Anxiety Stress Scales, Beck Hopelessness Scale, and Suicidal Behaviors Questionnaire-Revised were used to measure gratitude, psychache, depression, hopelessness, and suicidal behavior, respectively. As hypothesized, higher levels of gratitude were significantly associated with lower levels of suicidal behavior, both directly and indirectly. Regarding indirect associations, higher levels of gratitude were significantly associated with lower levels of psychache and depression, which were in turn associated with lower levels of suicidal behavior. The size of psychache's effect on suicidal behavior was significantly greater than the effect of depression. These results suggest that experiencing appreciation for one's current circumstances may provide a buffer against the effects of psychological pain. Moreover, the incorporation of psychache into previously established gratitude-based interventions may further bolster their efficacy, potentially reducing the prevalence of negative suicide-related outcomes on college campuses.

60. MEDIAN AND MODE APPROXIMATION FOR SKEWED UNIMODAL CONTINUOUS DISTRIBUTIONS USING TAYLOR SERIES EXPANSION

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Background: Measures of central tendency are one of the foundational concepts of statistics, with the most commonly used measures being mean, median, and mode. While these are all very simple to calculate when data conform to a unimodal symmetric distribution, either discrete or continuous, measures of central tendency are more challenging to calculate for data distributed asymmetrically. There is a gap in the current statistical literature on computing median and mode for most skewed unimodal continuous distributions. For example, for a standardized normal distribution, mean, median, and mode are all equal to 0. The mean, median, and mode are all equal to each other. For a more general normal distribution, the mode and median are still equal to the mean. Unfortunately, the mean is highly affected by extreme values. If the distribution is skewed either positively or negatively, the mean is pulled in the direction of the skew;

however, the median and mode are more robust statistics and are not pulled as far as the mean. The traditional response is to provide an estimate of the median and mode as current methodological approaches are limited in determining their exact value once the mean is pulled away. **Methods:** The purpose of this study is to test a new statistical method, utilizing the first order and second order partial derivatives in Taylor series expansion, for approximating the median and mode of skewed unimodal continuous distributions. Specifically, to compute the approximated mode, the first order derivatives of the sum of the first three terms in the Taylor series expansion is set to zero and then the equation is solved to find the unknown. To compute the approximated median, the integration from negative infinity to the median is set to be one half and then the equation is solved for the median. Finally, to evaluate the accuracy of our derived formulae for computing the mode and median of the skewed unimodal continuous distributions, simulation study will be conducted with respect to skew normal distributions, skew t-distributions, skew exponential distributions, and others, with various parameters. **Conclusions:** The potential of this study may have a great impact on the advancement of current central tendency measurement, the gold standard used in public health and social science research. The study may answer an important question concerning the precision of median and mode estimates for skewed unimodal continuous distributions of data. If this method proves to be an accurate approximation of the median and mode, then it should become the method of choice when measures of central tendency are required.

61. AN EXPLORATORY STUDY OF PROXIMAL AND DISTAL INFLUENCES ON THE DEVELOPMENT OF SELF-IDENTITY

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Past research in childhood attachment and adolescent peer-relationships has shown that relational influences contribute to the development of self-identity (how one perceives him or herself across domains, roles, and behaviors). This suggests that proximal influences (e.g., caregivers and friends) provide a manner for behaving in, and relating to, the world and oneself. What is not well known is how more distal influences (e.g., fictional characters, figures in the media, and associations made via the internet and gaming) play a part in the development of self-identity, particularly in young children, and how that may change across development. This study (IRB approved, beginning Spring 2016) seeks to gain a clearer understanding of how youth incorporate various relational-based influences into their self-identity across development. By doing so, we may be able to inform therapies and treatment options to address problematic relationships such as gang involvement and inappropriate relationships on social media. Furthermore, increasing our understanding of whom (proximal or distal) youth are identifying with at different ages may support motivational techniques when addressing problematic behaviors, as well as the facilitation of distal mentoring relationships when proximal relationships are limited. We hypothesize that youth will be able to name a mixture of proximal and distal influences, that older youth will show increased distal influences compared to younger youth, and that youth who perceive proximal influences as lacking will also show greater reliance on distal influences. A mixed-methods, longitudinal design will be used to gather data from participants (N = 50) ranging in age from 6 to 19 years old, recruited from local schools, and from their available parent(s). Data will be gathered in person on the ETSU campus, yearly, for three consecutive years. Demographics and parent reports on parenting style, attachment style, and their child's temperament will be obtained. A semi-structured interview will also be administered to the parent, asking about their child's behaviors and self-concept. Youth participants will be administered a measure of self-perception and a semi-structured interview utilizing play figures to facilitate expression of ideas related to proximal and distal influences. Lastly, researchers will request to capture a snapshot of participants' social media profiles (i.e., Facebook). Our study exhibits numerous novel components. First, the qualitative nature of the interview differs from typical methodology to support themes surrounding self-identity. Social media data will be analyzed with current qualitative software (NVivo). Our study will be longitudinal and multi-method, aiming to capturing correlates and predictors of self-identity as a developmental process. Finally, participants will largely represent a rural population, allowing social and ecological factors such as remoteness and level of isolation to be explored.

62. SPIRITUALITY AND PSYCHOLOGICAL WELL-BEING AMONG ALS CAREGIVERS: HOPE AND PERCEIVED STRESS AS MEDIATORS

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The empirical study of the salutary relationship between spirituality/religiousness and psychological well-being is burgeoning. However, mechanisms of this association have received less empirical attention. Theory suggests that spirituality/religiousness may lead to positive psychological characteristics such as hope, which may function as a means of coping in the context of a significant stressor or stressful situation. The perceived burden and stress associated with caring for individuals with chronic illnesses such as ALS is significant, and caregivers may be at risk for increased symptoms of depression, symptoms of anxiety, somatic symptoms, and other deleterious psychological well-being related outcomes. Within the context of ALS caregiving, spirituality/religiousness may lead to hope and less perceived stress, ultimately contributing to increased caregiver psychological well-being. Cross-sectional mediation-based analyses were conducted on data collected from a sample of 85 ALS caregivers throughout the U.S., The Netherlands, and Belgium. Caregivers completed a series of self-report questionnaires including demographic information, a ALS patient functional rating scale, multiple dimensions of spirituality, hope, perceived stress, and general physical and mental health status. Participants were 78.8% female, 92.9% Caucasian, 48.2% spent over 100 hours per week caregiving, and the average age was 55.2 years. Ritualistic spirituality was not related to psychological well-being in a direct or indirect fashion. Theistic spirituality was directly, positively related to psychological well-being in ALS caregivers. Existential spirituality was directly related to psychological well-being, but in a deleterious fashion. However, when hope and perceived stress were considered as mediators within the model, the effect changed such that existential spirituality contributed salutarily to psychological well-being when operating through hope alone and also in conjunction with perceived stress. This study may be the first of its kind to explicitly model spirituality and psychological well-being in ALS caregivers, thus more research to investigate the caregiving process, barriers, promotion, and means of coping is warranted. However, this study does offer a potential mechanistic explanation for the relation of spirituality and health in a vulnerable, caregiving sample.

63. THWARTED INTERPERSONAL NEEDS AND SUICIDAL BEHAVIOR AMONG COLLEGE STUDENTS: CONDITIONAL INDIRECT EFFECTS OF NON-SUICIDAL SELF-INJURY AND SELF-COMPASSION

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Suicide is the 10th leading cause of death in the U.S., and the 2nd leading cause of death among individuals 15 to 24. Young adults attending college may be at particular risk for suicidal behavior, perhaps due to stressors unique to this age and environment (i.e., academic, financial or interpersonal difficulties). According to the Interpersonal Theory of Suicide, unmet interpersonal needs, including thwarted belongingness (TB; the unmet need to belong among others) and perceived burdensomeness (PB; the perception that one is a liability to others) contribute to suicide risk. College students are also at increased risk for engagement in non-suicidal self-injury (NSSI), or deliberate self-harm, with 17% of college students reporting engagement in NSSI. Of concern, NSSI may represent a “gateway” to suicide, as 50 to 85% of individuals who engage in NSSI report a lifetime history of suicide attempt. However, not all college students with thwarted interpersonal needs, or who engage in NSSI, also engage in suicidal behavior, perhaps due to protective characteristics that buffer risk. One such factor, self-compassion, which encompasses self-kindness (kindness and understanding towards oneself), common humanity (perception that one's experiences are universal), and mindfulness (awareness of one's thoughts and feelings without over-identification), is associated with reduced risk for psychopathology, but its relation to NSSI and suicidal behavior has not been examined in a comprehensive model. We examined the mediating effect of NSSI on the relation between thwarted interpersonal needs and suicidal behavior, hypothesizing that thwarted interpersonal needs would be related to greater engagement in NSSI and, in turn, to more suicidal behavior, and that self-compassion would moderate these associations. Our sample of college students

(N=338) was primarily White (87%;n=294) and female (67%;n=225) with a mean age of 21.18 years (SD=5.33). Participants completed self-report measures including the Interpersonal Needs Questionnaire, the Self-Harm Inventory, the Suicidal Behavior Questionnaire-Revised Scale, and the Self-Compassion Scale. Conditional indirect analyses were conducted, covarying age, sex, and race. In multivariate analyses, the direct effect of PB on suicidal behavior decreased in significance when NSSI (DE=.09, SE=.14, $p<.001$; IE lower 95% CI [.07, .12]) was tested, indicating partial mediation. When the role of self-compassion was examined, self-compassion moderated the relation of PB and NSSI ($B=-.02$, $SE=.004$, $t(315)=-4.32$, $p<.001$). As well, the direct effect of TB on suicidal behavior decreased in significance when NSSI (DE=.07, SE=.01, $p<.001$; IE lower 95% CI [.05, .10]) was tested, indicating partial mediation. When the role of self-compassion was examined, self-compassion moderated the relation of TB and NSSI ($B=-.02$, $SE=.004$, $t(315)=-3.75$, $p<.001$). Across models, individuals with greater thwarted interpersonal needs reported more engagement in NSSI and, in turn, more suicidal behavior. Our findings may have clinical implications. Therapeutically addressing risk factors for suicidal behavior, including thwarted interpersonal needs (e.g., via Interpersonal Therapy and social skills training) and engagement in NSSI (e.g., via Cognitive Behavioral Therapy), as well as promoting the protective factor of self-compassion (e.g., via Compassion Focused Therapy), may reduce suicide risk in college students.

64. THE IMPACT OF STAFF TRAINING ON RISK ASSESSMENT RELIABILITY: RESULTS FROM A STATE-WIDE TRAINING PROGRAM FOR JUVENILE PROBATION OFFICERS

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Research examining the “black box” of community supervision has historically focused on the importance of staff training in evidence based practices. However, in order for probation officers to successfully implement evidence based practices, they must be able to correctly identify offender risk levels and implement needs-based case management. While many studies have examined the predictive validity of risk assessments, very few studies have shown the importance of staff training on accurate use of these instruments. The current study consisted of a population of juvenile probation officers from a mid-Western state who were trained on the Youthful Level of Service Case Management Inventory (YLS/CMI). Using a pretest/posttest design, the study examined the importance of staff training on the validity of the scoring of the YLS/CMI. Findings indicate that staff training resulted in significant increases in accuracy of risk assessment. Implications for risk/needs responsiveness and individual case management are discussed.

65. NUCLEUS ACCUMBENS BDNF OVEREXPRESSION ALTERS THE BEHAVIORAL RESPONSE TO NICOTINE

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Brain-derived neurotrophic factor (BDNF) is a neurotrophic factor in the brain involved in synaptic differentiation, growth, and maintenance. Increases in BDNF have been shown in substance abuse and decreases in BDNF have been shown in response to stress and in major depressive disorder (MDD). In the present study, we analyzed the effects of BDNF upregulation via lentivirus on Pavlovian conditioned approach (PCA), behavioral sensitization, and nicotine self-administration in rats. For the BDNF viral vector, all reagents and kits were purchased from Invitrogen (Carlsbad, CA, USA). Lentiviral-mediated expression cassettes, with dual promoters to drive the BDNF gene and the reporter gene were constructed according to the manufacturer’s instruction and surgically injected into the nucleus accumbens (Nac), the primary brain area that mediates drug reward and reinforcement. Rats were allowed to recover for three weeks before behavioral testing commenced. All rats were trained to associate the presentation of a lever and illumination of a stimulus light with delivery of 20% sucrose in a Pavlovian conditioned approach

(PCA) task. Head entries into the receptacle where sucrose was delivered (goal tracking) and lever pressing (sign tracking) during the conditioned stimulus (CS) were measured to determine if BDNF over-expression (BDNF+) altered approach to the sign or goal location. Rats in the BDNF+ group made more goal directed behaviors during the CS than sham group. Interestingly, there were no differences in sign tracking and no differences in basal activity. This pattern suggests that BDNF over-expression may increase reward-related learning in a manner that is specific to goal tracking. Three days after completion of the PCA task, all animals were habituated to a locomotor arena for three consecutive days. The following day, animals began nicotine behavioral sensitization, and were administered nicotine (ip, 0.5 mg/kg free base) or saline every second day for seven days. Approximately 15 mins after injection, animals were behaviorally tested for 10 min sessions in a locomotor arena and activity was recorded. Results revealed that the BDNF+ group demonstrated enhanced sensitivity to the hypoactive response to nicotine. At day 7, BDNF+ animals demonstrated enhanced behavioral sensitization to nicotine as compared to all other groups, and Sham NIC animals demonstrated sensitization compared to Sham SAL controls. Thus, it appears increasing NAc BDNF expression enhances the behavioral response to nicotine. . Animals were then surgically implanted with a jugular catheter and commenced nicotine self-administration. Interestingly, BDNF+ rats demonstrated reduced nicotine self-administration. Thus, global changes in BDNF expression could be a mediating variable in endophenotypes that are more or less susceptible to drug-taking and substance dependence.

66. INCIDENCE OF HODGKIN'S LYMPHOMA IN APPALACHIAN AND NON-APPALACHIAN REGIONS OF USA.

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Hodgkin's lymphoma (HL) is cancer of white blood cells, or lymphocytes. The cause of HL is still unknown but risk factors such as infection with Epstein-Barr virus, high socio-economic status, etc are known. About 9,050 new cases and about 1,150 deaths from HL are estimated for the year 2015. HL shows striking bimodal variation in incidence with age with peaks in early adulthood and late adulthood and more common in males than females. Appalachia region (AR) encompasses 428 counties in 13 states. Mortality due to all cancers combined in AR is 7% higher than rest of the United States of America (USA). This study compared the incidence rates of HL in AR and Non-Appalachia region (N-AR) of USA and see if the incidence rates are higher for HL in the AR. Study was intended to compare the incidence rate of onset at different age groups (15-19, 20-24, 25-29, 50-54, 55-59 and 60-64 years) for males and females separately. Data were obtained from the Surveillance, Epidemiology, and End Results (SEER) program using SEER 13 Registry Research Data. SEER*Stat 8.2.1 software was used to calculate the frequency of HL and determine incidence rates (IR). It was expected that IR of AR would be higher than N-AR rates; however, this was not the case in this study. First of all for all the male groups except for 20-24 years, IR was higher in N-AR (IR- 4.3, CI-4.0, 4.5) when compared to AR (IR-4.9, CI- 3.0, 7.5). If we compare female groups then we can find the IR in age groups of young adulthood age groups is higher in AR [15-19 (IR- 3.6, CI- 2.1, 5.9), 20-24 (IR- 6.4, CI- 4.1, 9.4), and 25-29 (IR- 4.9, CI- 3.2, 7.2)] as compared to N-AR [15-19 (IR- 3.2, CI- 3.0,3.5), 20-24 (IR- 4.6, CI- 4.4, 4.9), and 25-29 (IR- 4.3, CI-4.1, 4.5)] while IR for late adulthood group is higher in N-AR [50-54 (IR- 1.9, CI- 1.7, 2.0), 55-59 (IR- 2.0, CI- 1.8, 2.1), 60-64 (IR- 2.1, CI- 1.9, 2.4)] than in AR [50-54 (IR- 1.2, CI- 0.4, 2.8), 55-59 (IR- 1.6, CI- 0.5, 3.8), 60-64 (IR- 1.8, CI- 0.5, 4.7)]. The confidence interval (CI) overlaps for both male and female of all age groups in AR and N-AR. AR have wide CI. Wide CIs imply that there is not sufficient data or small sample size to make a precise estimate. One reason for the wide CI might be because SEER doesn't collect data from all the counties of AR and therefore this may not represent the true IR for the whole AR. Thus this project gives us insight how proper planning and collection of data is important for precise interval estimation. Although the results did not prove anything, it provide a direction where to focus more on the casual or confounding factors for HL which can be present or absent in AR or N-AR.

67. JUICE CONSUMPTION AMONG CHILDREN AGED 9 TO 24 MONTHS PARTICIPATING IN WOMEN, INFANTS, AND CHILDREN (WIC) PROGRAM

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INTRODUCTION: One out of every 100 deaths from an obesity-related disease is caused by sugary drink consumption. The National Center for Health Statistics reported in 2010, sugary beverages like soda, fruit drinks, sports drinks, sweet tea, and energy drinks accounted for 46% of all added sugars in the American diet. According to the Youth Risk Behavior Surveillance in 2013, 27% of teens drank one or more soda per day, 19% drank two or more, and 11% drank three or more. Research has shown each additional 12 ounce soda a child consumes each day, attributes to an increased 60% chance of becoming obese during one and a half years of follow up time. Sugary drink consumption, childhood obesity, and low socio-economic status have been linked to increased likelihood of obesity during adulthood. Woman, Infants, and Children (WIC) is a special supplemental nutrition program hoping to improve the health of low income pregnant, postpartum, and breastfeeding mothers and their infants and children up to the age of 5. WIC provides food, nutrition education, breastfeeding promotion and referrals to health services at no charge. The WIC program is designed to supplement the participant's diet. According to food packages in Tennessee, mothers are allowed to buy 100% fruit juice in the form of two 64 ounce bottles, 48 ounces shelf stable or frozen reconstitute, three 48 ounce bottles, or one 96 ounce bottle. This study compares sugary drink consumption of WIC-participating infants and mothers to non WIC participants and aims to identify any disparities. **METHODS:** Data were obtained through ReadNPlay for a Bright Future, a program advocating for healthy active living among families with young children. Surveys were generated to assess the health and demographics of mothers and their children living in the area. A convenience sample was utilized by voluntary and anonymous submission of surveys by mothers with babies aged 9-24 months, who visited a local pediatric clinic. Collection of 320 surveys was achieved during four separate time frames within 2013-2015. The association between sugary drink consumption in children and WIC is being examined using linear regression. **RESULTS:** Preliminary data analysis revealed 69.3% of the total sample (n=226) was enrolled in WIC. 89% of mothers reported having a high school degree during the most recent data collection. Mothers reported their infants consumed an average of 4.6 ounces of sugary drinks daily (range 1-15 ounces). 66.4% of mothers reported consuming at least one sugary drink daily, while 27.1% reported consuming 3 or more daily. **CONCLUSION:** The American Academy of Pediatrics recommends infants and children should be given milk or water instead of 100% fruit juice to reduce the amount of unneeded calories and sugar. If juice is given it is recommended to limit consumption to 4-6 ounces per day. Some types of 100% fruit juice, such as grape juice, have more sugar per ounce than soda. The results of this analysis may help to evaluate the healthfulness of the current WIC food package and identify high risk groups for counseling on sugary drink consumption.

68. NATIONAL TREND AND COMPARISON IN TOTAL CHARGES FOR SINGLE VESSEL AND MULTIVESSEL PERCUTANEOUS CORONARY INTERVENTION IN ALL PATIENTS AND PATIENTS WITH DIABETES MELLITUS IN THE UNITED STATES

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Patients with diabetes and multivessel coronary artery disease treated with multivessel percutaneous coronary intervention (MVPPI) have higher mortality, non-fatal myocardial infarction and repeat revascularization rates compared to coronary artery bypass graft surgery (CABG). This is also associated with high hospital costs. The objective of our study was to assess and compare the proportions and trends

of MVPCI in diabetic and all PCI patients and the total charges associated with them. Data were retrieved from nationwide inpatient sample from 2006-2011, which is a 20% stratified probability sample of discharges in all community hospitals participating in Healthcare Cost and Utilization Project. International Classification of Diseases 9 codes were used to identify diabetic patients who underwent percutaneous coronary intervention with stents in two or more vessels. Patients with a history CABG surgery, cardiac transplant and those who were below 18 years of age were excluded from this study. Bivariate analyses were computed for demographics and various diagnosis and procedures. Trends were computed for the proportions of diabetic and all patients that received stents in single, 2 or more and 3 or more vessels and for total charges for the 24 quarters. Between 2006 and 2011, a total of 145,349 diabetic patients underwent single vessel PCI with a mean age of 63.96 ± 11.70 , 40.9% females and 59.1% males. 41,325 diabetic patients underwent = 2 vessels PCI, mean age 64.63 ± 11.64 , 39.1% females and 60.9% males. 2,406 diabetic patients underwent = 3 vessels with a mean age of 64.92 ± 11.81 and 38.5% females and 61.5% males. The mean total charges for all single vessel PCI patients for the period was on a steady rise with a mean of \$51,584.06 in the 1st quarter 2006 and \$77,075.88 in the 24th quarter, 2011. Likewise, the trend for =2 vessel PCI group steadily increased from a mean of \$61,089 to \$91,937 and those for =3 vessel PCI group up from \$73,532.08 to \$105,364 through the period. For the diabetic PCI patients, charges associated with the single vessel PCI were on the upward trend with a mean of \$53,217 in the 1st quarter to \$81,040 in the 24th quarter. Similarly, the mean total charges associated with =2 vessel diabetic PCI group increased from \$62,442 to \$93,427 and from \$78,401 to \$110,015 for the =3 vessel diabetic PCI group across the period. There was a steady increase in the total charges for both single vessel and MVPCI procedures performed on diabetic and all patients between 2006 and 2011. The results of this study can be used to assess health care delivery cost and to inform policy to reduce cost.

69. NATIONAL AND STATE TRENDS IN BMI PERCENTILE, OBESITY, AND OVERWEIGHT RATES AMONG YOUTH USING YRBSS DATA
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Adolescent obesity is an area of growing public health concern. The Centers for Disease Control and Prevention conducts surveys through their Youth Risk Behavior Surveillance System (YRBSS) every two years to monitor a variety of health risk factors and behaviors among high school and middle school students. The YRBSS compiles information about obesity and BMI percentile, among many other factors. We accessed a combined dataset available on the YRBSS website which includes all data collected from high school students' surveys from 1991 to 2013. Due to updating of questionnaires and adding of variables over the years, some variables only appear in the most recent years, limiting trend analysis to the timeframe in which the variable of interest was included. We analyzed the linear and quadratic trends in BMI percentile, obesity, and overweight rates in the national Youth Risk Behavior Survey (YRBS) from 1999 to 2013 and in the Tennessee YRBS from 2003 to 2013. Each variable was stratified by age and race to observe differences among groups. National trends show an increase in average BMI percentiles overall from 1999 to 2007, a decrease between 2007 and 2009, then another increase between 2009 and 2013. Tennessee trends show a dramatic increase in average BMI percentile overall from 2003 to 2007, then a decrease between 2007 and 2013. Since 2005, Tennessee has maintained a higher average BMI percentile (64.23, 66.37, 65.00, 64.96, 64.23) than the national average (63.47, 64.23, 62.81, 63.00, 63.51) for each recorded year, however, the decreasing trends in Tennessee and increasing trends in the nation have brought the average BMI percentiles of each to comparable rates. There is literature to support the variation of BMI among young, middle-aged, and elderly individuals. However, there is currently little evidence of differences in BMI percentiles, obesity, or overweight rates between different age groups of high school students. We expect to see little, if any, differences across different age groups of high school students in this study both nationally and at the state level. Racial and ethnic disparities exist for a variety of health conditions and outcomes. Many conditions, including obesity, disproportionately affect minority populations. We expect to see differences in BMI percentiles, obesity, and overweight rates across different races at both nationally and at the state level.

70. THE ROLE OF ADVERSE CHILDHOOD EXPERIENCES IN ADULT DIVORCE AND SEPARATION

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Background: Healthy marriage promotes better health outcomes compared to negative marital experiences. Previous research has shown that exposure to trauma prior to age 18, or Adverse Childhood Experiences (ACEs), increases the likelihood of poor health in adults. These negative experiences impact future relationships and contribute to increased risk for depression, substance abuse, and lowered immune system. This study used ACE scores by category to investigate the effect of ACEs on the risk of divorce or separation and explored the hypothesis that children who have experienced ACEs are more likely to report being divorced or separated in later life. **Methods:** ACEs examined individually included those considered as abuse (swearing, physical abuse, forced to touch, and sex) and those categorized as household dysfunction (parent/guardian depression, alcohol, or substance use, incarceration, family abuse, and parental divorce). Descriptive statistics were completed in SAS with the 2011 and 2012 Behavioral Risk Factor Surveillance System (BRFSS) data. All ACE categories were found to be significant using chi-square ($p < 0.05$). Final analysis using Stata ($N = 69,793$) compared adults who were divorced or separated to those who were married or widowed. Simple and multiple logistic regressions were completed for ACEs, controlling for income, race, age, education level and gender. **Results:** Those who experienced ACEs of forced sex or had a parent in prison had double the odds of experiencing divorce or separation ($OR = 2.46$, $p < 0.001$ and $OR = 2.03$, $p < 0.001$ respectively). Exposure to parent/guardian alcohol use in the home was shown to have a less dramatic effect on divorce/ separation, although this was still significant ($OR = 1.57$, $p < 0.001$). Forced touch was found to almost double the odds of divorce/separation ($OR = 1.96$, $p < 0.001$). Higher income was shown to have a protective effect on marital status ($OR = 0.60$, $p < 0.001$). While age, males, and education level were statistically significant, the variables did not have a meaningful effect on reducing chances of divorce/separated (ORs between 0.87 and 0.96, $p < 0.001$). **Conclusion:** Those who experienced ACEs as a child were at more risk of being currently divorced/separated. The current study found that adults who were forced to have sex or forced to touch as a child were at increased risk of divorce/separation. Individuals with a parent in prison were twice as likely to experience divorce/separation. Studying the effect ACEs have on marriage could contribute to further understanding ways in which to prevent unhealthy relationships. This in turn could reduce the risk for divorce and adverse health problems in adults who have experienced ACEs. More studies need to be done to fully understand the consequent effects on ACEs and divorce/separation.

71. EXAMINING COLONIZATION OF LAKE VICTORIA SHORES BY HYACINTH WEED

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INTRODUCTION: Water hyacinth, which is native to South America, is considered one of the most aggressive species and among the top ten worst weeds in areas where it lacks natural competitors. Invasion and proliferation of water hyacinths in Lake Victoria not only endangers aquatic life and the biodiversity of other native plant species, it also reduces the amount of water in the lake, threatening the source of livelihood for over 30 million local residents from three East African countries: Kenya, Uganda, and Tanzania. While the use of remote sensing to examine hyacinth coverage of the lake is not new, this study utilized more current data with finer resolution for analysis. The objective was to examine change over time in weed coverage by comparing images from two different years. A second objective was to calculate the area of the water that has been colonized by the weed since its inception. It was hypothesized that the area of the lake would have reduced as more weed colonizes the water. **METHODS:** Image data with scenes covering the expanse of the lake were obtained from USGS Earth Explorer. Landsat 5 Thematic Mapper was used to select data from 1984 and 2009 limited to images taken during the day with less than 10% cloud cover. October 1984 and July 2009 images were chosen since the atmospheric conditions based on

seasonality are similar during these months. Product 1 files were imported into IDRISI, converted to raster files using the Landsat data archive import tool. Images were windowed to similar dimensions and mosaicking completed by coverage. Both standard and pseudo natural false color composites were obtained. Image change detection was done using normalization by regression. This included creating a multi-temporal false color composite, digitizing and rasterizing the vector mask, regression and normalization. Image subtraction was completed using time series technique. Reclass analysis was used to calculate area of the lake colonized. Using the frequency distribution of the DN values, 1984 images were classified into (0=water; 1=not water) while 2009 images were classified into 0=water, 1= water weed [mostly hyacinth], 3= not water or water weed). Histogram calculated pixel counts were used to approximate the area covered by water hyacinth in Km². **RESULTS/CONCLUSIONS:** Water hyacinth has greatly reduced the area of Lake Victoria. On the Kenyan side it has covered about 1450 Km² or about 50 square miles during the 25 year difference between 1984 and 2009. This estimated area does not differentiate hyacinth from other weeds in the region and thus may contain a few errors, however most weeds colonize only water area adjacent to the shore. Noise in the data caused by cloud cover may have also introduced errors in the analysis. Noise discriminating techniques like synthetic aperture radar (SAR) may be useful for further analysis.

72. ASSOCIATION BETWEEN PHYSICAL FIGHTING AND RISK FACTORS IN MIDDLE SCHOOL STUDENTS IN TENNESSEE: DATA FROM THE 2013 TENNESSEE YOUTH RISK BEHAVIOR SURVEY

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Physical fights among middle school students is a problem in our school systems, with 24.7% of students having been in a physical fight one or more times in 2013. The purpose of this study was to estimate the extent to which physical fights among middle school students in Tennessee was associated with demographic factors (age, sex and race) and to identify individual level factors that influence the likelihood of middle school students engaging in a physical fight. The 2013 Tennessee Youth Risk Behavior Survey (YBRS) data was used for this study, which is an annual cross-sectional school data collected by the National Center for Health Statistics of the Center for Disease Control and Prevention. A total of 5589 Tennessee Middle school students were included in the analysis. The outcome variable was physical fighting. Explanatory variables included demographic variables, life styles and health behavior risk factors. Odds ratios (ORs) and corresponding 95% confidence intervals (CIs) were reported. The analyses indicate that male students were more likely to be involved in a physical fight than the female students (OR 2.89, 95% CI 2.49-3.36) and white students were less likely to be involved in a physical fight than the non-White students (OR 0.50, 95% CI 0.43-0.58). For every one year increase in age, the relative odds of being involved in a physical fight increased by 9.4% (OR 1.09, 95% CI 1.02-1.18). Similarly, students who ever tried to commit suicide (OR 1.89, 95% CI 1.39-2.53), drink alcohol (OR 2.48, 95% CI 2.02-3.05) and smoke cigarettes (OR 1.95, 95% CI 1.56-2.44) were more likely to be involved in a physical fight than those who did not. Students who carried a weapon were more likely to be involved in a physical fight than those students who did not (OR 2.72, 95% CI 2.31-3.20). While Students who watched television for 3 or more hours per day were more likely to engage in physical fights (OR 1.20, 95% CI 1.04-1.39) than students who did not, students with school grades A and B (OR 0.58, 95% CI 0.49-0.68), feeling safe and secure at school (OR 0.73, 95% CI 0.62-0.87), sleeping eight or more hours per day (OR 0.80, 95% CI 0.69-0.92) were less likely to be involved in a fight in school than other students. Age, gender, race, smoking, alcohol, use of marijuana, sleeping time, school performance, school safety environment, suicide attempt and TV time were potential risk factors associated with physical fights among middle school students. Strategies to reduce physical fights among students in Tennessean middle schools are needed.

73. SOCIAL MEDIA USE AMONG PUBLIC HIGH SCHOOLS IN TENNESSEE: POTENTIAL PLATFORMS FOR PARENT-BASED HEALTH CAMPAIGNS

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Nearly two-thirds of American adults are users of some type of social media. Previous research on social media use in Tennessee (TN) indicated that 60% of adults were social media users; use was common among parents (76%) and more notably, Appalachian mothers (84%). While many studies have examined social media use at the individual level, organizational use of social media is infrequently discussed and seldom documented. Taken together, we wanted to examine social media as a space for health communication between parents and schools. This study examined social media use among public high schools in two regions of Appalachian TN. A non-experimental, cross-sectional study of Northeast and East TN public high schools' social media sites was conducted over a 1-month period (Nov-Dec 2015). School-affiliated sites associated with three different platforms (Facebook, Twitter, and YouTube) were coded for social media reach, presence, and interactivity. Reach refers to the number of people connected to the school through social media, presence refers to the existence of social media, and interactivity refers to frequency and types of responses from audience members. Schools were identified as East or Northeast based upon TN Coordinated School Health (CSH) distinctions. Demographic data for each high school were collected from the TN State Report Card, a compilation of school-specific information provided by the TN Department of Education. Data on geographic setting were drawn from the U.S. News & World Report. All data were analyzed using descriptive tests in SPSS (Version 23.0). A total of 88 high schools were included in the study. Thirty-three percent (N=29) of schools were using at least one social media application at the time of the study. Of these schools, 41.4% were using Facebook, 58.6% were using Twitter, and 10.3% were using YouTube. Among schools using at least one social media application, social media reach, presence, and interactivity were rather low. On average, schools using Facebook made less than one post per day (Mean=.41, SD=.28), and schools using Twitter posted nearly one tweet per day (Mean=.97, SD=1.27) during the month studied. Rural and urban schools did not significantly differ in social media use ($\chi^2=2.205$, $p=.155$). There was no significant association between CSH-defined region and social media use ($\chi^2=.608$, $p=.436$). Schools in which less than 50% of students qualified for free or reduced lunch were more likely to use social media than schools in which more than 50% of students qualified for free or reduced lunch ($\chi^2=6.415$, $p<.05$). Results of this study indicate limited use of social media by public high schools in Northeast and East TN, especially among schools with greater proportions of economically disadvantaged students. Additional training and resources are needed to emphasize the low cost and usability of social media to inform health campaigns involving parents and high schools in TN.

74. MARITAL STATUS AND SURVIVAL IN PATIENTS WITH UTERINE SARCOMA, 1993-2003

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Uterine sarcoma is a very rare form of uterine cancer, accounting for about 3 to 8% of uterine cancer cases. There are no screening tests for the disease. A female's survival depends on stage of cancer, type of sarcoma, her state of health and the treatment she receives. Studies regarding the relationship between a woman's marital status and her survival were not found in the literature. Therefore, the objective of this study was to explore this relationship using cases of uterine sarcoma from 1993 to 2003. Data were obtained from the Surveillance, Epidemiology, and End Results (SEER) Program and analyses were completed using SPSS. Subjects that were under the age of 20, had unknown marital status, cancers that weren't primary and cause of death not attributed to the cancer were excluded from the study. This left 2309 women. Married women accounted for 56.3% of the sample. In addition to this, 74.4% of the women

were white. More than half of the cases were localized or stage 1 and 61% of localized cases were seen in married women. However, about half of the distant (stage 3 or 4) cases were seen in single women. Although literature suggests that Carcinosarcoma is the most common type of uterine sarcoma, majority of the cases (39.5%) in this study were diagnosed with Leiomyosarcoma. Carcinosarcoma was the second most common type and was found in 27.5% of the cases. Also, in this study Leiomyosarcoma had a better overall survival for stages 1 to 2. Kaplan-Maier curves and Cox Regression models were used to compare survival rates for married women and unmarried (single) women. Unmarried women were categorized as women who were never married, separated, divorced and widowed. Survival rates of married women were also compared to that of women who were never married, separated, divorced and widowed. It was found that the average survival time for married women was 116.424 months (95% CI 110.739 - 122.108). The average survival time for single women was 87.677 months (95% CI 99.749 - 108.202). Also, when adjusting for age, race, stage and histology, single women had a decreased chance of survival compared to married women (HR 1.15 95% CI 1.04 to 1.28). The risk of death increased by 15% in single women. Marriage can be seen as a protective factor for uterine sarcoma survival potentially due to increased health seeking behaviors and the emotional support it provides.

75. EXPLORATION OF HIRING PROCESSES, SUPERVISION AND STAFF DEVELOPMENT AT NORTHEAST STATE COMMUNITY COLLEGE STUDENT AFFAIRS

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An exploratory study of the processes of hiring, supervision, staff development, and performance appraisal in Student Affairs at Northeast State Community College was done using process and integration questions that included information gathering about the following areas: (1) Leadership philosophy; (2) Teamwork building; (3) Supervision of Directors in Higher Education; (4) Supervising an ineffective staff person; (5) Motivating staff members; (6) Tips for performance appraisals; (7) Recruitment; (8) Selection; and (9) Orientation. The study was conducted in face-to-face interviews with Greg Walters, Dean of Student Development at Northeast State Community College, and Matt DeLozier, Vice President of Student Affairs at Northeast State. The study was conducted for educational purposes in the Educational Leadership and Policy Analysis Program at East Tennessee State University for the purpose of exploring best practices in, hiring, supervision, staff development, and performance appraisals. The interview questions are provided in Appendix A and B. Hiring was found to be based on relationships that were built on trust. A student affairs hiring timeline example was created from the study to be used for educational purposes. Orientation was informal and was conducted during various interactions with educational leaders at Northeast State. Synergistic supervision was demonstrated in the use of collaboration, communication, and the use of individual and unit objectives that align with the Northeast State Strategic Plans. Staff members were offered regular and ongoing professional development opportunities and followed the 70:20:10 process for individual objectives. Performance appraisals were conducted once a year using a standard form, and individual objectives were an important part of the evaluation process. The use of these practices focused on meeting both institution goals and individual goals with an emphasis on providing the needed support for success, retention, and completion of the students being served by Student Affairs. Further study can be done on the impact of professional development on the quality of student services, student success, retention, and completion.

76. CHILDHOOD SEXUAL ABUSE AND SEXUAL RISK BEHAVIORS AMONG COLLEGE STUDENTS IN APPALACHIA

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Childhood Sexual Abuse (CSA), along with other Adverse Childhood Experiences (ACES), has been linked to a range of adverse health outcomes among adults. However, there is paucity of research specifically studying CSA and sexual risk behaviors among adolescents. Even less is known for the population in Appalachia. The few researchers who study this topic have mostly focused on females or have failed to use advanced statistical techniques to generate evidence on causality. This research was undertaken to investigate the association between CSA and sexual risk behaviors of college students in Appalachia. College students enrolled in introductory psychology classes in the Appalachian region were administered an online questionnaire on CSA, ACES, and current sexual behaviors in 2015. Simple and multivariate logistic regressions were completed for CSA to predict illegal drug use before sex, use of condom during sex, and perceived risk of HIV. Age, gender, and other ACEs (physical, emotional, verbal abuse, substance abuse in family, family mental illness, and family incarceration) were considered as covariates. Only statistically significant covariates were included in the final model. All analyses were completed using STATA. Of the total 982 adolescents, 67% were female. The average age of the participants was 20 years. In the unadjusted model, CSA was significantly associated with illegal drug use before sex (OR 2.32, CI 1.46 - 3.68) and perceived risk of HIV (OR 2.19, CI 1.39 - 3.46). The association between CSA and illegal drug use before sex (OR 1.67, CI 1.03 - 2.73) was significant in the final model too. Further, based on the final model, CSA increased the odds of perceiving oneself at risk of HIV by 1.9 times (CI 1.19 - 3.03). Verbal abuse was also found to be significantly associated with illegal drug use before sex (OR 2.22, CI 1.55 - 3.19) and perceived risk of HIV (OR 1.8, CI 1.26 - 2.57). However, neither CSA (OR 1.02, CI 0.55 - 1.89) nor other covariates was associated with condom use among these adolescents. It is a noteworthy result and suggests the need of further investigation of the factors related to condom use among adolescents in order to understand the peculiar nature of this behavior. Finally, CSA was found to increase the odds of some risky sexual behaviors among college students in Appalachia. Consideration of this relationship can enrich the knowledge base required to design effective interventions targeted at sexual behaviors of adolescents. Additionally, further exploration can be useful to enhance the understanding of effects of other ACES like verbal abuse on sexual risk behaviors, and predictors of condom use among adolescents.

77. REMINDER CALLS TO PATIENTS WITH HISTORY OF NO SHOWS

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High no show rates can negatively impact a healthcare setting by reducing clinic productivity and impact patient outcomes because of missed opportunities for diagnosis, preventative vaccinations, and treatment. The East Tennessee State University (ETSU) Pediatric Clinic's current policy allows a patient three no show occurrences before the patient can no longer receive services from the clinic. The ETSU pediatric clinic has an overall no show rate of 13.1% which is identified as a target for change. The population served at the clinic are primarily economically disadvantaged families who may have a number of barriers to keeping scheduled appointments. The current protocol is voice recorded automated reminder calls but actual person-to-person communication with the guardian of the patient had not been researched on its effectiveness of improving patient no show rates. It was felt the social work interns could provide an added focus on addressing social barriers to accessing care. Social work interns of the ETSU Pediatric clinic called patients with history of two no shows or more in the past year to remind them of their upcoming appointment and vaccinations. The social work interns created a call script with prompts to inquire about reasons for missed appointments and barriers of maintaining their appointment in order to provide

assistance to resolve the identified barriers. It was hypothesized that by making contact with the patient and helping them rectify barriers such as transportation, the patient would be more likely to keep their appointment and the occurrences of no show appointments of the clinic would decrease. Data was collected weekly by reviewing electronic health records for no show appointments and recorded in a log that depicts compliance of the called patient in keeping their scheduled appointment. A total of 62 patient families were called over a five week period. Results indicate that an average of 88.8% of patient families called were present at their scheduled appointment. However, the clinic no show rate did not exhibit a statistically significant improvement. Overall this study showed that communication with patients presenting with a history of no shows does positively impact the likelihood of the patient to show for their scheduled appointment. Further research should examine the patient family perception of the intervention and other factors that may contribute to the no show rate.

✧ Natural Sciences ✧

78. SOL-GEL SYNTHESIS OF MODIFIED SILICA GELS CONTAINING INCORPORATED HETEROPOLYACIDS

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The present work reports results of systematic study of mesoporous materials based on silica gels with incorporated heteropolyacids. These materials have unique catalytic and adsorption properties due to presence of strong acidic sites on their surfaces. In particular, they might be used for adsorption of ions of radioactive isotope ^{137}Cs from contaminated soils and waters. The materials were synthesized by co-condensation of tetraethoxysilane (TEOS) with phosphotungstic or phosphomolybdic acids using sol-gel technique. Reactions were carried out in acidic media in ethanol/water solution. The following surfactants were used as templates: sodium dodecylsulfate, dodecylamine, trimethylstearylammmonium chloride, and Pluronic P123. The products were obtained at various pH, ratios TEOS/heteropolyacid, temperatures, reaction and aging times. Effects of various reaction conditions on the yields and structural characteristics of the products were determined. All samples were amorphous with BET surface areas in the range of 400-1100 m^2/g . Incorporation of heteropolyacids into silica gel slightly reduced BET surface areas as compared with pure silica gels. The best porous characteristics were achieved at the use of Pluronic P123, which was chosen for further studies. Adsorption properties of the materials and accessibility of adsorption sites were compared in selective adsorption of cesium ions from aqueous solution. Obtained results can be used in development of highly acidic porous catalysts and adsorbents.

79. IDENTIFYING THE ROLE OF TOBACCO GLUCOSYLTRANSFERASE SIP68 IN PLANT STRESS SIGNALING

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SIP68 is a tobacco protein found to interact with SABP2 in a yeast two-hybrid screening. SABP2 is an important protein in the salicylic acid-mediated pathogen defense pathway in plants. SABP2 catalyzes the conversion of methyl salicylate to salicylic acid. Salicylic acid is required for local and systemic acquired resistance. SIP68 was identified as a UDP-glycosyltransferase(UGT). Glucosyltransferases transfer glucose molecules from activated glucose donors like UDP-glucose to acceptor molecules called aglycones. A glycosylated acceptor molecule is called glucosides. Secondary metabolites are involved roles ranging from plant protection against pathogens, control of plant physical appearance, metal ion transport, plant-microorganism symbiotic agents, and also as sex hormones. The interaction between SABP2 and SIP68

raises the possibility of a regulatory role of SA on glucosylation of phenolics to mediate plant stress/salicylic acid signaling. The SIP68 gene has been successfully cloned and expressed recombinantly in *E. coli*, and *Pichia pastoris*. Purified recombinant SIP68 enzyme assays revealed the protein's ability to glucosylate phenolic aglycones such as kaempferol, quercetin, and naringenin. It, however, did not glucosylate salicylic acid. Our research aims to identify the role of SIP68's in SAR defense pathway/ other salicylic acid-mediated stress pathway including abiotic stress. Stable transgenic tobacco plants silenced in SIP68 expression have been generated through RNAi. These plants will be used for experimentation to identify SIP68 silencing will affect plant pathogen defense responses. We also will carry out abiotic stress analysis using these transgenic to assess the role of SIP68 in abiotic stress. Our research will help us better understand the role of glucosyltransferases in plant defense and the specific role of SIP68.

80. USE OF DRONE AND INFRARED CAMERA FOR A CAMPUS BUILDING ENVELOPE STUDY

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According to data from the U.S. Department of Energy (DOE), residential and commercial buildings are responsible for about 40% of total primary US energy consumption and 71% of total electricity consumption, at a cost of approximately \$400B annually. As the number of commercial buildings and floor space increases, business owners, industries, and government organizations are under tremendous economic and environmental pressures to reduce energy consumption and have more dollar savings. From the USDOE energy data book, the building envelope is responsible for about 25% of the total energy loss in all buildings, but can impact up to 42% of energy loss in residential buildings, and 57% of energy loss in commercial buildings. This "building envelope" generally refers to the building elements (walls, doors, windows and roof) that enclose conditioned spaces. The building elements serve as a medium through which thermal energy is transferred to or from the outdoor environment, and are significant sources of heat loss. This research is based on the campus building envelope study. This study provides a good qualitative and analytical understanding of the thermal performance of major building envelope elements, identifies major deficiencies and insulation problems, and helps in developing appropriate energy management project to improve building energy performance. In this study, infrared thermography (IR) was used to assess envelope performance of ten buildings on East Tennessee State University Campus. The ten selected building varies in location and usage (administration, lab/classes, residential/housing etc.). IR technology was selected because it provides a simple, fast, non-destructive, realistic, and reliable technology in determining the spatial temperature distributions of building envelope surfaces. Fluke TI25 infrared hand held camera was used to collect data on building element surfaces. Because most buildings on the campus are high rises, a Flir Vue pro lightweight infrared camera attached to ArduCopter 3DR Hexa-C Drone had to be used to capture data of high rise windows, wall surfaces, roof tops, and other difficult-to-reach areas. Data analysis and reports were carried out with "Smartview" and FLIR Reporter pro software. As a result of completing the above methodology, data analysis revealed annual energy loss, energy loss costs, insulation defects, and heat loss issues in each of the studied building. Cost-effective solutions were recommended to all problems detected to improve the long term energy efficiency of the buildings, and to contribute to sustainable campus infrastructure development.

81. COMPUTATIONAL STUDIES OF SPIN TRAPPING OF BIOLOGICALLY RELEVANT RADICALS BY NEW HETEROARYL NITRONES

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New heteroaryl nitrone spin traps have been suggested to act as therapeutic agents as well as free radical scavengers. In this work, the geometry optimizations and the single-point energies of the spin trapping reactions of new heteroaryl nitrones, a(Z)-(3-methylfuroxan-4-yl)-N-tert-butyl nitrone, 5,5-

dimethylpyrroline-N-oxide and *a*-phenyl-N-*t*-butylnitrone have been computationally studied using *ab initio* and Density Functional Theory methods. The effects of new heteroaryl (thiadiazoyl and furoxanyl) substituents on a parent nitron spin trap have been examined at the Hartree-Fock and second-order Møller-Plesset levels with the 6-31G*, cc-pVDZ, cc-pVTZ and cc-pVQZ basis sets. The results show that, new heteroaryl nitron spin traps are very stable as compared to the parent nitron spin trap. The thiadiazoyl substituted-nitrones are the most stable spin traps and 1,2,4 - thiadiazol -5-yl nitron is the most polar spin trap of 5.65 D. This is due to the electronic effects of new heteroaryl substituents on the parent nitron. In addition, the spin trapping of 5,5-dimethylpyrroline-N-oxide, *a*-phenyl-N-*t*-butylnitrone and *a*(Z)-(3-methylfuroxan-4-yl)-N-*t*-butylnitrone with •OH radical have also been studied and compared at Density Functional Theory and Hartree Fock methods with 6-31G* basis set. The spin trapping of *a*(Z)-(3-methylfuroxan-4-yl)-N-*t*-butylnitrone with •OH ($\Delta E = -370.19$ kcal/mol) is thermodynamically more stable than the spin trapping of 5,5-dimethylpyrroline-N-oxide ($\Delta E = -268.63$ kcal/mol) and *a*-phenyl-N-*t*-butylnitrone ($\Delta E = +1420.05$ kcal/mol) with •OH radical. This supports the experimental observations and the results indicate that, the spin trapping of *a*(Z)-(3-methylfuroxan-4-yl)-N-*t*-butylnitrone with •OH radical is a synergistic effect from the strong intramolecular hydrogen bonding interaction and the electronic effect. The double spin adduct of *a*(Z)-(3-methylfuroxan-4-yl)-N-*t*-butylnitrone with •OH radical, with $\Delta E = -441.53$ kcal/mol, is the most stable spin adduct thus far in this work.

82. CHARACTERIZATION OF A PUTATIVE LIPID TRANSFER PROTEIN AND ITS ROLE IN STRESS SIGNALING IN PLANTS

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Salicylic acid (SA) plays an important role in mediating plant defense responses to both biotic and abiotic stress. Plants respond to pathogen attack by producing high amounts of SA, which is converted to methyl salicylate; an important lipid mobile signal in plant resistance. Methyl salicylate is converted back to SA by the esterase activity of salicylic acid-binding protein 2 (SABP2) to trigger the systemic acquired response (SAR) in plants by increasing the endogenous level of SA in distal plant tissues. This whole process leads to the activation of signaling network through the NPR1 (non-expressor of pathogenesis-related 1) proteins. SA is required for both basal and SAR response in plants. RNAi-mediated silencing of tobacco SABP2 renders plants defective in inducing SAR. To learn more about this network involving SABP2, a yeast two-hybrid screening using SABP2 as bait resulted in the SIP-470 (SABP2 Interacting Protein-470), a putative lipid transfer protein. In an attempt to determine the role of SIP-470 in mediating stress responses in plants, Arabidopsis T-DNA insertion knockout plants lacking SIP-470 homolog was used for analysis. Mutant plants lacking SIP470 exhibit defective growth phenotype. Upon challenge with virulent pathogens, these plants show enhanced susceptibility indicating that they are compromised in basal resistance. The role of SIP-470 in SAR is currently being investigated using these mutants. These findings have ignited my interest towards further characterizing SIP470 and its functional role in tobacco plants. To further characterize the role of SIP-470, transgenic tobacco altered in SIP-470 expression is being generated. To silence the expression of SIP-470, stable RNAi lines are being generated. To overexpress SIP-470, an inducible expression is being generated. These transgenic tobacco plants in T2 generation will be tested for both basal and SAR resistance response. Expression of various defense genes in the SBIP-470 silenced and overexpressor plants undergoing biotic and abiotic stress will also be carried out using RT-PCR. In order to biochemically characterize SBIP-470 in its ability to bind to lipids, a binding assay was performed and it was discovered that SIP-470 binds to 2-p-toluidino naphthalene-6-sulfonate (TNS), a lipophilic fluorescent substrate. Fully understanding the role of SBIP-470 in the stress response of plants is likely to aid in the development of stress-resistant plants. This is likely to have a direct impact on food production and may aid in solving the food scarcity caused by yield losses due to plant diseases and abiotic stresses. This is significant to keep feeding the increasing world population.

83. FUNCTIONAL VALIDATION OF WRINKLED ORTHOLOGS IN AVOCADO OIL BIOSYNTHESIS

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Triacylglycerol (TAG) is a class of lipid molecules composed of three fatty acyl chains esterified to a glycerol backbone. In plants, TAG is synthesized in various tissues and serves as a carbon and energy source. Oil biosynthesis is well understood in oilseeds however how plants store oil in non-seed tissue is yet to be determined. In Avocado (*Persea americana*), a basal angiosperm, TAG is exclusively accumulated in mesocarp tissue and therefore is emerging as a model system to uncover underlying mechanisms of TAG biosynthesis in tissues other than seed. The mesocarp of Avocado fruit contains ~60-70% of oil by dry weight. Recent transcriptome studies revealed that the TAG biosynthesis is transcriptionally regulated in non-seed tissues. In seed tissues, TAG biosynthesis is regulated by many seed maturation factors directly or indirectly through downstream transcription factor WRINKLED1 (WRI1). Transcriptome studies revealed that in addition to ortholog of WRI1, orthologs for WRI2 and WRI3 were also highly expressed in avocado mesocarp during the period of oil accumulation. Currently, cloning of Putative PaWRI 1, 2 and 3 genes into a binary vector, followed by agrobacterium-mediated transformation to generate transient and stable transient lines, is underway. Transient expression of putative PaWRI 1, 2 and 3 genes, using tobacco leaf assay, are expected to enhance oil accumulation in leaf tissues. Stable expression of PaWRI 1, 2, and 3 in *Atwri-/-* is expected to restore oil accumulation in seeds. TAG content and composition will be determined by gas chromatography coupled with flame ionization detector. Functional validation of these orthologs is expected to reveal the preferred WRI isoform that likely participates in regulation of oil biosynthesis in avocado mesocarp. Additionally, this work may also elucidate the differences between regulation of TAG accumulation in seed and non-seed tissues and identify new targets to enhance TAG biosynthesis in plants.

84. *withdrawn*

85. EFFECTS OF PREDATION CUES ON METAL TOXICITY IN GAMBUSIA AFFINIS

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In aquatic environments organisms are subject to stressors which originate from both natural and anthropogenic origins. Traditional toxicology studies focus on a singular stressor and its effects on an organism. However, the severity of the effects on an organism often depends on various factors. Recent research has attempted to better reflect real-world conditions by examining interactions between multiple stressors, with a majority focusing on human-derived and abiotic factors. However, it has been shown biotic stressors, such as predator cues, have the ability to increase the lethality of pesticides in amphibians. These cues may interact synergistically with contaminants in other aquatic organisms. This study seeks to examine if predator cues influence the sensitivity of mosquitofish (*Gambusia affinis*) to copper. Alarm cues, chemicals released into the water when prey takes mechanical damage, and kairomones, chemicals passively released by a predator into the surrounding habitat were used. Group cohesion was recorded for shoals of *G. affinis* presented with alarm cue or a deionized water (DI) control to determine if the population of interest responded behaviorally to its presence. 96-hour acute toxicity tests were then conducted using paired bioassays to examine if alarm cues influenced copper lethality in fish at four different doses of copper (0, 0.25, 0.50 and 0.75 mg Cu/L). One bioassay consisted of a set of chambers containing *G. affinis* exposed to copper. Simultaneously, another set of chambers was exposed to copper and alarm cues together. Mortality was checked every 24 hours, and bioassays analyzed to determine if alarm cue presence affected fish survival. Mass-specific metabolic rates, measured via oxygen consumption, will also be examined in the presence of alarm cue to investigate underlying physiological mechanisms. Oxygen consumption will be measured via intermittent flow respirometry using a FireSting

O₂ meter in custom built 90mL chambers. In addition, 96-hour toxicity testing and oxygen consumption will be repeated using kairomones obtained from adult bluegill (*Lepomis macrochirus*). This project's results showed in the presence of alarm cue *G. affinis* did not express behavioral responses to alarm cue. Additionally, the presence of alarm cue did not have a significant effect on fish survival when exposed to copper. The expected results of remaining experiments are that as alarm cue is administered to chambers *G. affinis* respiration will increase. Furthermore, in the presence of kairomone, fish mortality will increase as well as oxygen consumption. By pairing toxicity testing with respirometry and investigating multiple stressors this project incorporates a more robust understanding of potential interactions in aquatic environments and produces results which are more applicable to organisms found in the field. This is vital for understanding anthropogenic influence in nature.

86. SYNERGISTIC EFFECTS OF COMBINED STRESSORS IN AMPHIPODS (*GAMMARUS MINUS*) AND ISOPODS (*ASELLUS INTERMEDIUS*)

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The field of ecotoxicology strives to understand the effects that human impact has on populations and ecosystems. A traditional method for determining the effects of anthropogenic stressors (i.e. pollution) is a single species toxicity test. However, this method can underestimate the true impact of a stressor by neglecting to consider natural stressors (i.e. predation) that can also induce a general stress response. The focus of the thesis was to determine the combined effect that predator stress has on thermal tolerance in isopods (Genus *Asellus*) and amphipods (Genus *Gammarus*). The initial goal was to define the “fight or flight” response of the organisms to predator cue. Prey organisms can assess predation chemically by means of two classes of chemical signals: predator kairomones or conspecific alarm cues. Kairomones are metabolic byproducts passively released by predators by which some prey are able to identify predators, whereas alarm cues are chemical signals that are released by injured conspecifics. In order to examine a behavioral response, organisms were exposed to both types of predator cues in trials to quantify activity and refuge use. Additionally, oxygen consumption was quantified in response to alarm cue by means of two methods. The first method was with BOD bottles, in which organisms were tested for response to three concentrations of alarm cue. Four treatments (control and three cue concentrations) were tested with three replicates of bottles containing organisms and three without (control for natural depletion from cue). Another method incorporated a FireStingO₂ fiber optic oxygen sensor, wherein flow through respirometry design was used to test response of individuals to alarm cue. The second goal of this study was to determine an acceptable thermal range to use in combined stressor lethality trials. Here, 96-hour Lethal Temperature 50 trials were used (the temperature which is lethal to 50% of the population in a given time period). The results of this study thus far indicate that both amphipods and isopods respond to alarm cue, whereas only amphipods respond to predator kairomone. Oxygen consumption trials also indicated that amphipods respond to alarm cue by increasing the amount of oxygen consumed. I have determined a thermal range at which to perform combined stressor trials for both organisms, and LT50 results suggest that isopods are much more tolerant to increased thermal conditions than amphipods. The goal of the current phase of this study is to determine how predator stress affects thermal tolerance with combined stressor lethality trials. My hypothesis is that the combined stress of predator cues will decrease thermal tolerance, as the organisms’ already elevated metabolic levels will surpass their energy budget even faster than it normally would. If this hypothesis is not disproven, it will contribute to literature that validates the effectiveness of combined stressor methods in toxicology.

87. GEOPHYSICAL SURVEY OF ROTHERWOOD, AN ARCHAEOLOGICAL SITE IN KINGSPORT, TN

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Rotherwood is a Mississippian (AD 800-1600) site on the Holston River in Kingsport, Tennessee. A geophysical survey consisting of ground penetrating radar and magnetometry was conducted on the site in July 2015. Ground penetrating radar is a geophysical method that sends radio waves into the ground and records reflections off of subsurface interfaces including archaeological features. The strength of each reflection and the time elapsed is used to reconstruct the the nature and depth of buried features. Raw data from the GPR was processed and analyzed using GPR-Slice software. Magnetometry is a technique that measures subtle changes in the magnetic properties of soil. Burned features, such as hearths and the remains of burned houses, have stronger magnetic fields than surrounding sediments and therefore show up as anomalies. ArchaeoFusion software was used to process and view the magnetometry data. The survey resulted in the identification of prehistoric hearths and a midden (prehistoric refuse deposit), and offers insight into daily lifestyles of the Mississippian period.

88. SYNTHESIS OF DIAZONIUM (PERFLUOROALKYL) ARYLSULFONIMIDE (PFSI) MONOMERS FROM PERFLUORO (3-OXAPENT-4-ENE) SULFONYL FLUORIDE FOR PROTON EXCHANGE MEMBRANE FUEL CELLS

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Perfluoroalkyl arylsulfonimide (PFSI) polymers are proposed as new electrolytes in Proton Exchange Membrane Fuel Cells (PEMFCs) for a better integration between the electrode and the electrolyte, when they are grafted onto carbon electrode by diazonium moiety. It is also expected that the PFSI polymer will enhance stability and proton conductivity and improve the efficiency of the catalyst of PEM fuel cells compared with the traditional perfluoroalkyl sulfonic acid (PFSA) polymers. 2-diazonium-4-(trifluoromethyl) perfluoro(3-oxapent-4-ene)benzenesulfonimide zwitterionic monomer (I) has been synthesized from perfluoro(3-oxapent-4-ene) sulfonyl fluoride through a 6-step reaction scheme. All the reaction intermediates and the final product were characterized using ¹HNMR, ¹⁹FNMR and IR.

89. BIOCHEMICAL CHARACTERIZATION OF A Cp-3-O-GT MUTANT P145T AND STUDY OF THE TAGS EFFECT ON GT ACTIVITY.

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Flavonoids are a class of secondary metabolites, the majority of which are present in glucosylated form. Glucosyltransferases catalyze glucosylation by transferring glucose from UDP-activated sugar donor to the acceptor substrates. This research is focused on the study of the effect of a single point mutation on enzyme activity, characterization of a flavonol specific 3-O-glucosyltransferase (Cp-3-O-GT) mutant- P145T, and further modification of the clone to cleave off tags from recombinant wild type and P145T mutant proteins in order to crystallize the proteins. Multiple sequence alignment and homology modeling was done to identify candidate residues for mutation. Cp-3-O-GT was modeled with a flavonoid 3-O-GT from *Vitis vinifera* (VvGT) that can glucosylate both flavonols and anthocyanidins. We identified a proline residue at position 145 of Cp-3-O-GT that corresponded to a threonine residue in VvGT and designed a Cp-3-O-GT-P145T mutant to test the hypothesis that that mutation of proline by threonine in Cp-3-O-GT could alter substrate or regiospecificity of Cp-3-O-GT. While the mutant P145T enzyme did not glucosylate anthocyanidins, it did glucosylate flavanones and flavones in addition to flavonols. This is significant because flavanones and flavones do not contain a 3-OH group. HPLC was performed to identify the

reaction products. Early results indicated that the mutant protein glucosylates naringenin at the 7-OH position forming prunin. Results are being used to revisit and refine the structure model. In other related work, a thrombin cleavage site was inserted into wild type and recombinant P145T enzyme and we are currently working on transformation into yeast for recombinant protein expression. Cleaving off tags is a pre-requisite to future efforts to crystallize the proteins. Solving the crystal structures will make a significant contribution to the structural and functional study of plant flavonoid GTs in general and Cp-3-O-GT in particular.

90. TOWARD THE SYNTHESIS OF HYDROXYTYROSOL POLYPHENOL
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Hydroxytyrosol, 2-(3,4-dihydroxyphenyl)ethanol, a naturally occurring polyphenol most common in olive tree (*Olea europaea*), is one of the most effective member of the polyphenols family, because of its remarkable antioxidant activity, its ability to inhibit oxidation of low density lipids (LDL), and its protection against DNA oxidative damage. Hydroxytyrosol, which is widely used in cosmetics and food supplements industries, can be purchased as an olive oil extract that contains low concentration of hydroxytyrosol besides other polyphenols. The price and low natural abundance of hydroxytyrosol make alternative synthetic sources very attractive. This research aims to develop a novel method for the synthesis of pure hydroxytyrosol from commercially cheap precursor such as catechol; this can satisfy the strong market demand and provide a more economical alternative source for this valuable polyphenol.

91. VEGETATIVE RESPONSE OF TEN ACCESSIONS OF ABELMOSCHUS ESCULENTUS (L) MOENCH. TREATED WITH SODIUM AZIDE

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Sodium azide induced effects were studied on ten accessions of *Abelmoschus esculentus* (L) Moench. during the 2012/2013 cropping period. The plant materials used for this study were accessions of okra (*A. esculentus*) collected from National Centre for Genetic Resources and Biotechnology (NACGRAB), Moor Plantation, Ibadan, Nigeria. The study was conducted as field potted experiments. Okra seeds of the ten accessions were pre-soaked in four different concentrations (0.0 %, 0.02 %, 0.03 % and 0.04 %) of sodium azide solutions for four hours prior to sowing. The seeds were then rinsed in running tap water 3 times before sowing. Soil chemical analysis was carried out for the soil used. Morphological and growth parameters recorded include germination, plant height, stem girth, number of days to first flower bud formation and flowering, number of leaves formed per plant, nature of stem, petiole coloration, stem coloration, leaf vein coloration and leaf shape. Higher percentage germination was recorded for untreated seeds as compared to their respective NaN₃ treated seeds for three accessions; CEN 001, CEN 086 and NGB/06/083. For other accessions NaN₃ treatments did not inhibit germination. Ten weeks after planting (WAP), 50 % of the accessions produced their highest plant heights significantly at 0.02 % NaN₃ treatment. They include NGB/06/083, NG/AE/98/011, NG/SA/JAN/102, NGAE -98- 011 and NG/AA/SEP/09/038. Only one accession profoundly exhibited delay in flowering. Variation in leaf shapes of adult plants were observed between control and treated plants for some accessions. However, new patterns of leaf shapes not previously reported by the IBPGR descriptor were observed in some accessions (NG/AA/SEP/09/039, NGAE -96- 012- 1, CEN 086 and NGB/06/083). The results suggest improvement of some of the plant characters and that the IBPGR okra descriptor for leaf shapes should be enhanced to incorporate the four patterns of leaf shapes recorded.

92. THE EFFECTS OF RESILIENT PRODUCERS IN CONNECTED HABITATS: AN AGENT BASED MODELING APPROACH

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Fragmented habitats have detrimental effects upon the species dynamics and overall coexistence between the species residing in a given habitat. On the contrary, connected habitat systems are beneficial for species survival as they not only provide means for better mobility, foraging grounds and refuge but also ensures repopulation of habitats after disasters. The producers are the major source of energy which is utilized by the primary consumers as well as secondary consumers alike in any habitat type. Resilient producers are necessary for survival of populations in habitats which have been exposed to natural or artificial disasters or recovering from such. Their robustness play a role in not only providing energy currency but also providing necessary habitat connections in the form of corridors. This research seeks to study the effects of resilient producers in connected habitats by varying the regeneration rate of produces in - silico with the help of minimalistic agent based model representing a tri - trophic habitat system. In this model, the main quantitative variable of the producers' is the regeneration rate. The producers are represented as the patches themselves in the model. The primary consumers (prey) and secondary consumers (predators) on the other hand have more complex life histories including reproduction rates, energy gain from the food and their migration rates. Targeted parameter sweeps allow to vary the regeneration rates and to study its effects upon the entire system. The result indicated that resilient producers indeed assist in facilitating the coexistence dynamics by sustaining the number of prey and predators. Interestingly, as the regeneration rate gets higher, the predators get extinct first which is followed by drastic decrease in the number of prey as well. This study could provide support for conservation studies which could allow wildlife conservationists, conservation biologists, highway designers, and community development planners to adopt certain ways of designing habitat corridors.

93. AB INITIO AND SEMI-EMPIRICAL CALCULATIONS OF CYANOLIGATED RHODIUM DIMER COMPLEXES

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Molecular modeling, using both ab initio and semi-empirical methods has been undertaken for a series of dirhodium complexes in order to improve the understand of the nature of the chemical bonding in this class of homogeneous catalysts. These complexes, with carboxylamidate and carboxylate ligands, are extremely functional metal catalysts used in the synthesis of pharmaceuticals and agrochemicals. The X-ray crystallography shows anomalies in the bond angles that have potential impact on understanding the catalysis. To resolve these issues, minimum energy structures of several examples (e.g. $\text{Rh}_2(\text{NHCOCH}_3)_4$, $\text{Rh}_2(\text{CO}_2\text{CH}_3)_4$, and $\text{Rh}_2(\text{CHO}_2)_4$) were calculated using Hatree-Fock and Density Functional Theory with the LANL2DZ ECP (Rh), and cc-pVDZ (all other atoms) basis sets using NWChem 6.3.

94. THE COMBINED EFFECTS OF LEPTIN AND COENZYME Q10 IN AMELIORATING OBESITY- INDUCED INFERTILITY IN FEMALE RATS

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Infertility is one of the major complications of obesity. Studies have shown that administration of leptin modulated the expression of B-catenin in the ovary and reversed obesity-induced infertility in rats. Coenzyme Q10 (CoQ10), an antioxidant, supplies the energy used for ovulation, oocyte and embryo development and prevents DNA damage that causes infertility. We hypothesized that leptin when combined with CoQ10 could greatly improve fertility. Twenty-one female Sprague-Dawley rats were used in this study and divided into five treatments groups. Group I rats was fed rat chow diet (RCD) while groups II to V were fed High-fat diet (HFD) for 14 weeks to induce infertility. Group I RCD and group II HFD control rats received 1 ml of saline intraperitoneally (i.p.) twice daily for 2 days, group III HFD rats received 1 ml of 100 µg of leptin i.p. twice daily for 2 days, group IV HFD rats received 10 mg/kg of CoQ10 i.p. for 2 weeks plus saline twice daily for 2 days. Group V HFD rats received 1 ml of 100 µg of leptin i.p. twice daily for 2 days plus 10 mg/kg of CoQ10 i.p. for 2 weeks. Estrous cycle was checked daily and food intake and body weight measured twice weekly before and after treatments. Fourteen days post treatment, all the animals were sacrificed. The blood and tissues were collected for analysis. The results show a significant decrease in food intake and body weight and regular estrous cycle restored in groups III and V rats. There was significant ($p < 0.05$) increase in spleen weight in groups IV and V. FSH level increased significantly ($p < 0.05$) in the leptin plus CoQ10 treated group while CoQ10 level was increased significantly ($p < 0.05$) in the leptin-treated group. B-catenin expression was decreased in group IV and V, suggesting that B-catenin expression may be downregulated by COQ10 administration. These results indicate that synergistic action of leptin and CoQ10 could delay the onset of obesity-induced infertility exhibited by the reduction of food intake and body weight. In conclusion, combinations of CoQ10 with leptin can improve fertility in obese infertile female rats and could provide a novel therapeutic strategy for the treatment of female infertility.

95. EFFECTS OF SEPSIS ON RENAL STRUCTURE AND SYMPATHETIC INNERVATION IN MICE

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The sympathetic nervous system (SNS) plays a vital role in the kidney by regulating renal vascular tone, as well as water and electrolyte reabsorption and renin secretion. The level of sympathetic nerve activation is a major determinant of renal blood flow and glomerular filtration rate (GFR), and this is known to increase in acute sepsis. Moreover, recent work has shown that sympathetic nerves undergo rapid growth in the spleen of septic mice. This study was done in order to investigate the effects of acute sepsis on renal morphology in mice and to test the hypothesis that upregulation of renal sympathetic innervation occurs in the septic kidney. Sepsis was induced in male ChAT-eGFP and C57BL/6 mice at 4-6 months of age by cecal ligation and puncture (CLP). Sham control mice underwent similar surgery without ligation or puncture of the cecum. Both sham and CLP mice received a subcutaneous injection of resuscitation fluid (1 mL lactated Ringers solution) after surgery. Mice were euthanized with isoflurane anesthetic at 16 h post-surgery and the left kidney was collected for histology. Paraffin sections from C57BL/6 mice were stained

with PAS, and images of the renal corpuscles were collected at 40X magnification using a microscope equipped with a digital camera and QCapture software. Stereo Investigator software was used to measure the area of the renal corpuscles' components (i.e., glomerulus and Bowman's capsule). ChAT-eGFP mice were used to evaluate sympathetic nerve density and screen for presence of non-neuronal cholinergic cells in kidney. Frozen, 100 µm longitudinal kidney sections of CLP and sham mice were immunolabeled for the sympathetic nerve marker, tyrosine hydroxylase (TH), and for eGFP to identify cholinergic cells. Images of stained sections were collected by confocal microscopy, and TH nerve density will be quantified using ImageJ software. Qualitatively there seems to be no difference between TH nerve fiber density in both CLP and Sham. After calculation of Bowman's space, CLP mice had a significantly smaller Bowman's space at 16 h post-surgery (CLP: 10674 ± 1017 ; Sham: 19721 ± 2284 , $n=3$ per group, $P<0.05$). Also, bubbly appearance in tubular cells was identified in CLP mice with their glomeruli appearing to have greater cellularity. These results indicate acute pathology. Many tubular cells were stained for GFP, suggesting they might have a cholinergic phenotype. They appeared more abundant in Sham mice especially in the cortex. Loss of GFP staining in CLP mice may be related to the bubbly appearance seen in tubular cells. We conclude that acute sepsis in mice causes pathological changes in the kidney but does not cause remodeling of sympathetic nerves. Diminished capsular space in CLP mice may indicate a decrease in glomerular filtration capacity. Further studies are needed to determine if tubular cells can make acetylcholine and the role of this mediator in renal pathophysiology.

96. MEDICAL STUDENTS PERCEPTION OF THE ROLE OF THE SPEECH LANGUAGE PATHOLOGIST IN HIV/AIDS INTERVENTION

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Introduction: An estimated 1.1 million people in the United States are living with HIV and an estimated 181,000 individuals are unaware of their infection. Important advances in drug treatment have helped manage the severity of symptoms, including highly active antiretroviral therapy (HAART). HAART has significantly reduced the death toll of people living with HIV/AIDS (PLWHA). However, HIV/AIDS continues to affect the central nervous system (CNS), therefore, negatively impacting the entire body. Consequently, speech, language, hearing, cognition, and swallowing is affected, which can result in a reduced quality of life (QoL). PLWHA experience communication-related disorders secondary to life-threatening medical complications. As such, primary health care providers may not be aware of the need for assessment of a patient's communication and language abilities. The team approach model for HIV/AIDS rehabilitation is critical for collaborating assessment and treatment goals for PLWHA. Team members need to work together with a common set of goals for PLWHA and to learn how to integrate one's expertise into their framework of care. Research recommends following an interprofessional collaborative approach to the healthcare of PLWHA. Medical practitioners play a key role in leading the healthcare team. However, there is a dearth of information and research on collaboration between medical practitioners and the SLP regarding this vulnerable population. This research aims to explore medical students' perceptions of the roles of both the medical practitioner and the SLP in addressing the healthcare needs of adult PLWHA. This investigation seeks to understand the roles of medical practitioners and SLPs in HIV-rehabilitation. **Methods:** Survey research was used to conduct the exploratory-descriptive study. The survey was divided into five sections: demographic information, personal experiences, role of SLPs and medical practitioners, communication disorders associated with HIV/AIDS, and interprofessional education. The survey was piloted by requesting a medical practitioner to complete and provide comments regarding whether the questions were appropriate to the aim of the study, the difficulty level of the questions, time it took to complete the survey, how to improve it, and any additional comments or suggestions. The final version was uploaded to an online survey tool and distributed to the students once IRB approval was granted through East Tennessee State University. **Results:** Results include participants' demographics, perceptions of the roles of medical practitioners and SLP's in treatment to PLWHA, communication disorders associated with HIV/AIDS, and interprofessional collaboration between both professions. Findings are compared to a similar study which nurse practitioner student's perceptions of the role of the SLP and team collaboration in treating PLWHA was explored regarding nurse practitioner student's perceptions of the role of the SLP and team collaboration. **Conclusion:** In conclusion, due to the

unique framework of healthcare required by PLWHA, interprofessional collaboration is imperative to maximize QoL in PLWHA. Results from the survey suggest a need for interprofessional education to promote the role of the SLP in assessing and treating communication and feeding disorders in PLWHA prior to newly qualified professionals entering the field.

97. SCAVENGER RECEPTOR A EXPRESSION IS INCREASED IN SEPTIC PATIENTS

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Sepsis is a severe inflammatory illness caused by overwhelming infections. It affects over one million people in America each year with a mortality rate of 30%. Currently there are no effective therapies for this disease other than providing general palliative care. Recently, we have shown that mice genetically deficient in Scavenger Receptor A (SRA) have a significantly increased rate of survival after experimentally-induced sepsis than normal mice. Additionally, normal mice showed an increase of neutrophil, monocyte, and macrophage SRA after experimentally-induced sepsis. Therefore we investigated the role SRA might play in human sepsis. We identified and enrolled septic patients with informed consent in this study. 37 patients with positive blood cultures within 7 days of enrollment and minimum two out of the four Systemic Inflammatory Response Syndrome (SIRS) criteria (fever, tachycardic, high respiratory rate, elevated white blood cell count) were enrolled. A blood sample was acquired from septic patients, labeled with an anti-SRA and phenotyping antibodies, and analyzed for SRA expression by flow cytometry. Blood from 27 healthy volunteers was used as a control. We found that SRA is significantly increased on blood monocytes from septic patients when compared to normal controls. To determine the mechanism for increased SRA expression in sepsis, an in vitro study was conducted on monocytes isolated from healthy volunteers' blood. Blood monocytes were isolated using magnetic antibody separation. These monocytes were cultured with Pam3CSK4, a toll like receptor 2 (TLR2) ligand (1ug/ml), ultra-pure LPS, a TLR4 ligand (0.1ug/ml), or a combination of Pam and LPS overnight. Cells were then removed from culture, labeled with anti-SRA antibody, and analyzed using flow cytometry. Similar to the results from the clinical portion of the study, an increase of SRA expression was seen after treatment with Pam, LPS, and both Pam and LPS over the control group, with the largest increase seen using just LPS. These in vitro results confirm that TLR ligands increase SRA expression on blood monocytes. This evidence shows that sepsis and septic mediators alter SRA expression, and confirm the clinical relevance of our previous murine studies suggesting that SRA may be a valid therapeutic target in sepsis.

98. THE ELICITATION METHOD FOR PAST TENSE VERB PRODUCTION IN CHILDREN WITH SPECIFIC LANGUAGE IMPAIRMENT AND TYPICAL LANGUAGE

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Regular (e.g., jumped) and irregular (e.g., fell) past tense verb acquisition in children with typical language development (TL) occurs between ages 3-5. In children with specific language impairment (SLI), acquisition of these forms is extended and errors in spontaneous conversation may even continue into adulthood. However, there is a lack of consensus as to whether probed or spontaneous language samples

give a more accurate representation of a child's linguistic skills. The first aim of this study was to determine if there were differences in regular and irregular past tense verb production accuracy between two Elicitation Methods: probed vs. spontaneous language sampling. The second aim was to determine if accuracy and error patterns differed between children with SLI and children with TL. The participants included 11 children with SLI (mean age: 5 years) and 20 children with TL (mean age: 3 years 6 months). Each participant received a battery of tests to determine language status. This battery included two elicitation methods for regular and irregular past tense: a probe and a spontaneous language sample. The Rice/Wexler Test of Early Grammatical Impairment probed past tense verb production using picture prompts and a standardized verbal routine. Additionally, a language sample was recorded in which participants told three thematically related stories provided spontaneous productions. The first two stories were read by the examiner first and the child was asked to retell it. The first story was presented in the present tense. The second story was presented in the past tense. The third story was made up by the child based on the pictures and the tense was free to vary. These stories provided the language sample that was then transcribed and coded for a statistical analysis of verb production. Within and between groups ANOVAs revealed statistically significant differences between the probe and spontaneous language samples, with the probe yielding higher accuracy for regular and irregular past tense verb production in both groups. There was no significant Group effect or Group by Elicitation Method interaction. Analysis of the types of errors produced revealed a statistically significant Group by Elicitation Method interaction. Post hoc analysis found for regular past tense verbs, children with SLI produced more stem-form errors than children with TL. For irregular past tense forms, children with SLI produced more stem form errors, while children with TL produce more overregularization errors. The observed pattern of errors is consistent with inclusionary criteria for SLI, the literature, and theoretical foundations. The results add to the literature about the accuracy of probe and spontaneous language sample elicitation methods.

99. ACADEMIC PREPARATION IN CLEFT PALATE FOR SPEECH-LANGUAGE PATHOLOGISTS: IS THE ICF-CY (WHO, 2007) ALIVE AND WELL?

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The purpose of this project is to determine inclusion of the ICF-CY in Cleft Lip and Palate (CLP) training curricula for Speech-Language Pathologists (SLPs). Survey research was conducted with CLP course instructors across the nation. Results describe the application of the ICF-CY in CLP courses at the graduate level. Recommendations for including the ICF-CY framework are made. Cleft Lip and Palate, one of the most prevalent birth defects in the US, affects 7,090 infants per year with an incidence of approximately 1 in 600 births (Center for Disease Control, 2006). SLPs require skills and competencies in assessing and treating CLP, however the academic and clinical preparation of SLPs regarding CLP remains a topic of concern. Training issues in CLP have been researched since the 1960's (Vallino et al., 2008). Sharp and O'Gara (2014) suggested discussing training programs regarding the core learning outcomes for entry-level preparation in resonance disorders. The International Classification of Functioning, Disability, and Health for Children and Youth (ICF-CY) (WHO, 2007) provides an important, holistic framework for children with CLP. The ICF-CY's interrelated components emphasize the factors influencing the activities and participation of children with CLP. Despite research recommending incorporation of the ICF-CY into SLP training curricula, the inclusion of the ICF-CY in CLP courses has not been explored to date as far as could be determined. The current study aimed to survey CLP graduate course instructors to describe the content of curricula and to determine the extent to which the ICF-CY is being included and applied in teaching assessment and intervention of CLP. A 35-item questionnaire was constructed to obtain information regarding academic and clinical training in the area of CLP in US graduate programs. Survey questions targeted demographic information regarding the program, course, and instructor. Survey questions also examined the inclusion of the ICF-CY framework into course content regarding assessment and intervention. The survey was administered via an online academic survey tool. The survey was distributed to the department chairs of ASHA accredited SLP graduate programs to be completed by training programs' faculty who teach the CLP (or related) course. 61 fully completed surveys were eligible

for analysis. An item-by-item analysis was performed to describe survey results. Results showed only 23% of respondents reported teaching a course exclusively related to CLP, which confirms concerns related to Vallino et al. (2008) and other researchers. The ICF-CY does not yet appear to be fully integrated into CLP coursework and in response to the question posed by the researchers, does not appear to be alive and well in US CLP curricula. A case is made for the ICF-CY framework to be incorporated into CLP curricula to provide future SLPs a holistic perspective of children with CLP and to extend their thinking about the impact of speech impairment associated with CLP. Including the ICF-CY framework in training will facilitate collaborative inter-professional care of children with CLP. Finally, the inclusion of the ICF components and their interaction into ASHA's most recent draft of the Scope of Practice in Speech-Language Pathology emphasizes the necessity of ICF inclusion in course curriculum to support provision of high-quality services.

100. RANDOM MUTAGENESIS OF RHODOCOCCCUS STRAIN KCHXC3 AND DETECTION OF MUTANTS THAT NO LONGER PRODUCE AN ANTIBACTERIAL COMPOUND PRESENT IN AGAR CULTURE EXTRACTS.

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The soil bacterium *Rhodococcus* is a member of the phylum Actinobacteria and is related to *Streptomyces*, which is known for its production of many secondary metabolites. Although not as well studied as *Streptomyces*, *Rhodococcus* also produces a variety of secondary metabolites like siderophores, pigments, and antibiotics. Recent genomic investigation of *Rhodococcus* has uncovered many silent gene clusters that appear to code for nonribosomal peptide synthetases (NRPSs) and polyketide synthases (PKS) of unknown function. Through previous work, our lab showed that *Rhodococcus* species strain KCHXC3 produces an inhibitory compound in agar culture extracts which displays prominent activity against several Gram positive and Gram negative species including the pathogens *Rhodococcus equi*, *Shigella dysenteriae* and *Pseudomonas aeruginosa*. Using the engineered *Rhodococcus* transposon vector, pTNR, the goal of this investigation is to screen random mutants of KCHXC3 for strains that no longer produce the inhibitory molecule. DNA recovered from such mutant strains can be used to identify a gene(s) required to produce this compound. A library of 1825 random insertion mutants were produced via electroporation then screened for production of the inhibitory molecule by a disk diffusion assay against *Shigella dysenteriae*. From this screening, 7 mutants which no longer produce the compound of interest were identified. Chromosomal DNA was isolated from each of the nonproducing mutants and the wild type parent strain and digested with the restriction endonucleases EcoRI or HindIII. Using this restricted chromosome DNA, future work will entail cloning and sequencing each of the 7 mutants to identify the gene that was interrupted by the transposon (insertional) mutagen.

101. EFFECTS OF BIOFEEDBACK ON VOCAL BEHAVIOR ON A CHILD WITH A UNILATERAL VOCAL FOLD LESION

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At any given time, 3-9% of the general population experiences a voice problem. The incidence of voice disorders in children can vary anywhere between 6 and 23%, yet, only 2-4% of the population are seen by speech-language pathologists for further assessment and treatment. Voice disorders have negative effects on the social, emotional, and physical functioning of the child. Unfortunately, there is little known about

the appropriate management of children with voice disorders. Depending on the nature of the voice disorder, different approaches, including behavioral voice therapy, vocal hygiene management, or medical intervention, are available. However, a concern with behavioral voice therapy is the ability of the child to transfer skills learned in clinic to an outside setting - limiting generalization and adaptation of the new behavioral approach. Biofeedback has been successfully used in adults with voice disorders to help generalize new vocal behaviors. Such data is lacking in the treatment of voice problems in the pediatric population. The current case study aimed to understand the use of biofeedback in an eight-year-old male who was diagnosed with a unilateral vocal fold lesion, who exhibited difficulty maintaining and generalizing his new vocal behaviors. It was hypothesized that the child would benefit from biofeedback and would maintain new vocal behaviors including the use of a safe and efficient voice pattern outside the clinic setting. Longitudinal data on vocal parameters including the pitch, loudness, and vocal fold vibration were obtained over a period of five weeks using an ambulation phonation monitor (APM). The APM uses an accelerometer attached to the sternal notch and measures pitch, loudness, and vocal fold vibration, which helps determine an individual's daily voice use pattern and thereby determines the appropriate biofeedback setting. The five week period included (a) a week of pretesting, (b) two weeks of biofeedback, (c) a week of post-testing immediately following the week of biofeedback, and (d) a generalization testing two months post-study. During the five-week period, vocal parameters were monitored for an average of 7-10 hours for 2-3 days each week. On weeks two and three, the child was provided with biofeedback on loudness levels based on his data from the pretesting week. Results indicated change in vocal parameters including loudness and vocal fold vibration patterns during the weeks of biofeedback. However, such generalization was not observed neither during immediate post feedback monitoring nor two months following the study protocol. Such data provide immediate effects from biofeedback on vocal behavior, however, motor learning principles, dose, and frequency of biofeedback will be discussed to further understand the long-term effects of biofeedback in children with voice problems.

102. CULTURED MILK LACTOBACILLUS RHAMNOSUS ISOLATE MODULATED THE PRODUCTION OF INFLAMMATORY CYTOKINES IN CACO-2 CELLS

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Probiotic microorganisms have been shown to confer health benefits on the host when administered in adequate amounts. In the gastrointestinal tract, probiotic microorganisms have been shown to promote host immunity and to regulate immune signaling pathways. The immune effects resulting from interactions between intestinal epithelial cells and commensal bacteria are strain dependent. This study used Caco-2 cell line to examine the effects of a *Lactobacillus rhamnosus* isolate from "amabere amarurunu" a Kenyan traditional cultured milk, on the production of pro-inflammatory cytokines (IL-8 and TNF- α) and anti-inflammatory cytokines (IL-10 and TGF- β) in enterocytes. The *L. rhamnosus* isolate was cultured overnight in de-Mann Rogosa Sharpe media. Live *L. rhamnosus*, its cytoplasmic fraction (CF) and filtered spent broth (FSB) were used as treatments on differentiated Caco-2 cell monolayer in transwells. After 6-36 hrs of co-incubation, cells were collected and lysed and cell supernatants were collected. Enzyme Linked Immunosorbent Assay was used to determine the cytokine concentrations in the cell lysates, apical and basolateral supernatants. Effects of the various treatments (PBS Control, MRS6AN, CF and FSB) on Caco-2 cell lysate levels of TGF- β were 14.5, 177.3, 165.4 and 118.9 ng/ml, respectively; of IL10 were 7.1, 44, 33.6 and 31 pg/ml, respectively; of IL8 were 200, 814, 1289.1 and 1270.8 pg/ml, respectively, and of TNF- α were 4.1, 27.6, 33.1 and 30.1 pg/ml, respectively. There were very low levels of TGF β , IL10, IL8 and TNF α cytokines in both the apical and basolateral supernatants. In conclusion, live *L. rhamnosus* isolate and its cytoplasmic fraction or spent media seemed to cause a higher production of anti-inflammatory TGF- β and pro-inflammatory IL8 cytokines by differentiated Caco-2 cells.

103. ELUCIDATION OF THE PATHWAY BY WHICH THE MINOR PILIN OPERON NEGATIVELY REGULATES ALGZ EXPRESSION IN PSEUDOMONAS AERUGINOSA

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Pseudomonas aeruginosa is an opportunistic pathogen, common causative agent of nosocomial infections, and is capable of surviving in inhospitable environments. In individuals with compromised immune systems, such as burn victims or those with cystic fibrosis (CF), infection by *P. aeruginosa* frequently leads to a fatal outcome. The *P. aeruginosa* AlgZ/R two-component regulatory system controls several virulence factors. AlgZ is a sensor protein and AlgR is a response regulator protein, and the genes which encode them are in an operon. While algR expression has been studied, less is known about the regulation of algZ expression, though Vfr is a known positive regulator of algZ gene expression. A previous study has shown that a mutation in the minor pilin protein PilY1 leads to an increase in the expression of the algZ gene, indicating a negative regulatory role. To investigate algZ gene regulation further, deletion mutants of several other members of the pilY1 operon were constructed, and it was found that a mutation in the minor pilin protein PilW also leads to a significant increase in algZ expression. This demonstrates that several products of the pilY1 operon are negative regulators of algZ expression. When a double mutant was made of PilW and the positive regulator Vfr, no change in the expression of algZ was noted, suggesting that Vfr is not the link between PilW and the regulation of algZ expression. To determine the mechanism for increased algZ expression in mutants of the pilY1 operon, a transposon mutagenesis screen was performed on the PilW mutant. One mutant in the screen has shown decreased algZ expression. Arbitrary PCR and sequencing were performed to identify the genes interrupted. Elucidating this pathway of regulation of algZ expression may lead to new potential drug targets and help in the treatment of *Pseudomonas aeruginosa* infection.

104. CLINICIAN ATTITUDE AND THE USE OF BEHAVIORAL PARENT TRAINING IN THE TREATMENT OF SCHOOL AGE CHILDREN DIAGNOSED WITH ADHD IN WESTERN NORTH CAROLINA

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Attention Deficit Hyperactivity Disorder (ADHD) is a prevalent and chronic neurobehavioral disorder that affects an estimated 6.4 million children in the United States (US). Due to the increasing prevalence, the responsibility to care for these children has shifted from psychologists and psychiatrists to primary care clinicians. Evidence-based practice guidelines (EBPG) were published in 2011 by the American Academy of Pediatrics (AAP) to assist with the delivery of high quality ADHD care. One of the expert recommendations is to use a multi-modal approach to treat school-age children diagnosed with ADHD. The evidence suggests that a combination of medication and behavioral parent training (BPT) is optimal for this patient population. The extent to which this recommendation has been adopted by primary care providers is not known. National survey studies suggest that there is wide variability in the treatment of pediatric ADHD. We set out to investigate the level of knowledge, agreement, adoption and adherence to the 2011 AAP guidelines found in primary care clinicians who serve the pediatric population in Western North Carolina. Using the theory of planned behavior (TPB), we created a survey to analyze clinician factors that influence intention to prescribe BPT to school age children diagnosed with ADHD. The results of this study will be useful in evaluating possible barriers to the adoption of EBPG for this patient population. Understanding the role of provider factors in clinical practice variation may lead to better interventions to improve uptake of EBPG, reduce variability in clinical practice, and improve patient outcomes.

Graduate Students: Doctoral Candidates

✧ Biomedical, Health and Natural Sciences ✧

105. SYMPTOMS AND QUALITY OF LIFE MEASURES AS PREDICTORS OF VESTIBULAR FUNCTION

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Dizziness/vertigo is one of the most common reasons that patients present to emergency departments, physician's offices, and outpatient centers in the United States and abroad, and represents a major financial and societal healthcare burden. Dizziness/vertigo can be a symptom of several different pathologies, and therefore, there is a large differential diagnosis for dizziness. One possible etiology for dizziness symptoms is vestibular (inner ear balance) dysfunction. Given this large differential diagnosis, a need for efficient screening exists as currently there are no standardized or systematic methods for the evaluation of dizziness across disciplines. Historically, the primary method of screening and triage is based on quality of symptoms (i.e., vertigo vs. lightheadedness vs. unsteadiness). Recently, this method of triage has been questioned as being unreliable and/or ineffective. The purpose of the current proposal was to examine whether patient's reported symptoms during a case history and responses on two established dizziness questionnaires (Dizziness Handicap Inventory, DHI and Vertigo Symptom Scale, VSS) predicted clinical vestibular diagnosis. A retrospective chart review of consecutive patients seen in the vestibular clinic from April 1, 2014 to October 24, 2014 was conducted. Inclusion criteria included a positive history of dizziness, vertigo and/or imbalance. Individuals were excluded if they had been asymptomatic for dizziness for greater than 12 months prior to their assessment or if patients did not complete both the DHI and VSS. Out of 215 charts, a total of 128 patients met the inclusion/exclusion criteria and were included in the study. Logistic regression was utilized to examine the predictability of group membership. Given the sample size and to increase the power of the logistic regression model, bivariate analyses were conducted to examine the relationship between individual predictor variables relative to quality of symptoms, symptom triggers, symptom duration, and responses on the standardized dizziness questionnaires (DHI and VSS) and the group diagnosis. Nine predictor variables were significant during bivariate analysis and were included in the logistic regression analysis. Overall, the logistic regression model accounted for 38% of the variance in the clinical vestibular interpretation. When examining the predictor variables further, several of the individual predictors contributed significantly. Examining the odds ratios of these predictors, we found that individuals reporting vertigo were 3 times more likely to be in the vestibular dizziness group than the non-vestibular dizziness group and those reporting busy visual environments as a trigger for symptoms were 7 times more likely to be classified as vestibular dizziness. Overall, this research study adds further evidence that qualitative assessment alone may be a less than ideal method of screening for vestibular dysfunction.

106. NORMAL REFERENCE INTERVALS AND INTRA- AND INTER-EXAMINER RELIABILITY OF THE VIDEO HEAD IMPULSE TEST

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The angular vestibulo-ocular reflex (VOR) ensures gaze stability during head rotations by generating eye movements that are equal and opposite to head rotation. The gain of the VOR (eye velocity/head velocity) for natural head movements, therefore, approaches unity in healthy individuals. The VOR has four main anatomic components: the semicircular canals (SCCs) and vestibular nerve in the peripheral vestibular system, the vestibular and ocular motor nuclei in the brainstem, and the extraocular muscles. The SCCs are positioned in three nearly orthogonal planes within the head thereby allowing for the detection of head rotation about any axis in space. The SCCs function as angular accelerometers in a push-pull fashion with two coplanar canals on each side of the head working together, i.e., left and right horizontal SCCs, the right anterior and left posterior SCCs or RALP, and the left anterior and right posterior SCCs or LARP. The observation or measurement of eye movement can aid in the detection and localization of vestibular pathology due to the relationship between the function of the vestibular sensory receptors in the inner ear and the eye movements produced by the VOR. The video head impulse test (vHIT) is a relatively new clinical test of dynamic SCC function that uses a high-speed digital video camera embedded in light-weight goggles to record head and eye movement during passive head rotations in the horizontal and vertical planes. An important precursor to the clinical use of a new diagnostic test is the evaluation of test reproducibility. If test reproducibility is poor, then the test is unlikely to be clinically useful. There are no published data concerning both inter- and intra-examiner reliability of the vHIT. The purpose of this study was to establish normal reference intervals and assess the test-retest reliability of the vHIT in young healthy adult participants using the Micromedical vHIT device, two examiners, and a prospective repeated measures design. Each examiner underwent five hours of training on the vHIT device prior to the initiation of the study. The vHIT was administered to each participant (n = 35) by each examiner on two different days. Inter-session interval ranged from 1 to 30 days and examiner order was alternated for successive subjects; canal-plane order was randomized. At each session, participants underwent head impulse testing in each plane resulting in the stimulation of each of the six SCCs. The dependent variable was VOR gain (eye velocity/head velocity) and the effects of examiner, session, eye, and SCC on the magnitude of VOR gain were assessed using repeated measures analysis of variance. The intra-class correlation (ICC) coefficient was used to assess intra- and inter-examiner reliability. The cut-offs (5th percentiles) for normal VOR gain were 0.76 (right and left horizontal SCCs), 0.68 (right anterior SCC), 0.70 (left anterior SCC), 0.69 (right posterior SCC), and 0.75 (left posterior SCC). There was no significant effect of examiner on VOR gain and the ICCs indicated fair-to-good inter- and intra-examiner reliability with better reliability for the horizontal SCCs than for the posterior and anterior SCCs.

107. BEHAVIORAL EPIGENETIC EVIDENCE OF INCREASES IN DOPAMINE D2 RECEPTOR SENSITIVITY AFTER NEONATAL QUINPIROLE TREATMENT IN RATS

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Prepulse inhibition (PPI) of the startle reflex is an operational measure of sensorimotor gating that is reduced in schizophrenia patients and has been shown to be related to increases in the dopamine system that exist in schizophrenia. We have developed a rodent model of schizophrenia in which increases in

dopamine D2 receptor sensitivity are produced through neonatal quinpirole (a dopamine D2/D3 agonist) treatment to rats, administered from postnatal days (P)1-21. This drug treatment produces long-term increases of D2 receptor sensitivity, similar to schizophrenia. The day after birth, male and female Sprague-Dawley rats were given a 1 mg/kg injection of either quinpirole or saline each day for 21 days. One subset of these animals were behaviorally tested on prepulse inhibition (PPI) that began testing on P30, referred to as first generation (F0). In a different group of rats, three female and male quinpirole-treated pairs from separate litters were bred. Their offspring (second generation rats, F1) were not treated in any way, and raised to P44 before behavioral testing initiated. All prepulse inhibition (PPI) testing was performed using chambers and software from Kinder Scientific (Poway, CA). Rats were individually placed in dome-shaped stainless steel enclosures within the chamber. Each enclosure measures the startle response in Newtons (N), and does not restrict movement. Rats were administered three different trial types defined as prepulse trials (three different auditory decibel levels: 73, 76, or 82dB), startle stimulus trials (120 dB), or no stimulus trials (no prepulse or pulse). Animals were tested for six consecutive days and given an ip saline injection 10 min before testing, followed by testing for another six consecutive days and given an ip nicotine (0.5 mg/kg free base) injection 10 min before testing. In one subset of generation F1 rats, at P60 after PPI was complete, animals were injected with a 0.1 mg/kg dose of quinpirole and observed for 60 min and yawning recorded. Yawning is a behavioral event mediated by the dopamine D2 receptor. Results revealed that neonatal quinpirole resulted in robust PPI deficits throughout the six days of testing in the F0 generation, regardless of the prepulse stimulus. Nicotine given during the final 6 days of testing alleviated the PPI deficits in the F0 generation. Interestingly, the F1 generation also demonstrated PPI deficits, but the impairment dissipated by day 6, and revealed only in males. Although nicotine improved PPI, they were not different than controls. Finally, F1 generation rats demonstrated a robust increase in yawning, not significantly different to increases in yawning as has been reported in the F0 generation. These data indicate that the dopamine D2 receptor is also sensitized in the F1 generation. Brain tissue is being analyzed for changes in the dopamine D2 receptor signaling pathway for epigenetic evidence of transmittal of changes in the dopamine D2 receptor.

108. BALANCING STRATEGY WITH PAIN

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The changing brain patterns caused by pain are similar to those of many mental conditions; understanding how pain changes involuntary responses will help elucidate control mechanisms and thereby aid in diagnostics and prevention. We analyzed the balancing data of people with chronic pain to determine how their control strategy differs from that of healthy people. Twenty people with chronic pain and thirty-five healthy people balanced on one foot on a force plate while performing different perturbation challenges. Unlike the healthy people, the balancing strategy of people with chronic pain is not dependent upon age, except in the standard balancing task. People with chronic pain fall into one of two categories for the standard task: random patterns of balancing or highly persistent balancing strategies for standard balancing. For perturbation tasks, people with chronic pain exhibited persistent balancing strategies at a young age.

109. EFFICACY OF OSTEOPOROSIS DIAGNOSIS USING DXA SCANS OF THE DISTAL RADIUS IN A GROUP OF MALE PATIENTS WITH OSTEOPOROSIS: A RETROSPECTIVE STUDY

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Osteoporosis is a disease characterized by low bone mineral density (BMD), which compromises bone tissue increasing fragility and susceptibility to fracture. It affects nearly 50% of women and 20% of men over the age of 50, and fractures resulting from osteoporosis cause significant morbidity and mortality. Therefore, patients with or at risk for osteoporosis should be identified before rather than after a fracture occurs. The gold standard in diagnosing patients with osteoporosis is dual X-ray absorptiometry (DXA). The purpose of this study is to evaluate the usefulness of assessing BMD at various parts of the distal radius (ultra-distal, mid-point, one third, and total) compared to the conventional sites (lumbar vertebrae and proximal femur) using DXA to diagnose osteoporosis. This was a retrospective study on 1,641 male patients over the age of 50 who had undergone bone densitometry (DXA scans) of at least one hip, lumbar vertebrae and distal radius. Ordinary regression and correlation analysis was used to assess the association between the lowest of the bone density scores of the hip or lumbar vertebrae and scans at the various sites on the radius. Comparing standardized scores from the radius method with the lowest standardized scores from the hip or lumbar vertebrae, a highly significant correlation was found, $R = 0.59$, $p < 0.001$ for the left UD radius, $R = 0.59$, $p < 0.001$ for left MD radius, $R = 0.54$, $p < 0.001$ for the left 1/3 radius, and $R = 0.60$, $p < 0.001$ for the total left radius. The results indicate that the left radius total is the most accurate in diagnosing osteoporosis in our study population. The results of this study can have far-reaching psychosocio-economic implications showing that DXA scans of the distal radius can be used to effectively diagnose osteoporosis by using inexpensive, low-technology, portable scanners. These findings are particularly relevant to the needs of the undeserved rural populations of Central Appalachia.

110. HEPATIC CELL METABOLISM REGULATION BY C1q TUMOR NECROSIS FACTOR-RELATED PROTEIN-3

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C1q tumor necrosis factor-related protein-3 (CTRP3) regulates a diverse number of biological processes and is an adipose tissue-derived secreted factor, or adipokine. Our previous work provided evidence that CTRP3 regulates hepatic glycometabolism in vivo. However, it is currently unclear whether CTRP3 acts directly on the liver or through a secondary pathway. To address this question, we utilized rat H4IIE hepatoma cells (an immortalized liver-like cell line), FLAG-tagged CTRP3 recombinant protein and a fluorescent-labeled anti-FLAG antibody. Immunofluorescence labeling established the specific binding of CTRP3 to H4IIE cells. Further, we also find that CTRP3 treatment causes changes to the oxygen consumption rate consistent with a shift of respiratory substrate from glucose to fatty acids. However, immortalized cell lines lack the physiological metabolism of an in situ hepatocyte. Thus, delving more

deeply into CTRP3 effects upon liver metabolism required primary mouse hepatocytes. To this end we have worked, successfully, to perfect the isolation and culture of adult hepatocytes; which will be described. Currently, we are using the primary hepatocytes culture to expand our knowledge about the effects of CTRP3 on liver metabolism. In conclusion, we have provided evidence to support the direct effect of CTRP3 on hepatic metabolism, and established a successful isolation and culture of primary mouse hepatocytes.

111. UTILIZATION OF EVIDENCE-BASED PRACTICE GUIDELINES TO IMPROVE HEALTH CARE PROVIDERS BREASTFEEDING KNOWLEDGE AND ATTITUDES AS A STEP TO INCREASE HEALTHY PEOPLE 2020 GOALS

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Breastfeeding is recognized as one of the most effective health prevention measures for both mother and infant with documented short- and long-term health benefits. However, statistics reveal suboptimal overall breastfeeding rates and paltry percentages of exclusive breastfeeding resulting in significant excess costs and preventable infant deaths throughout the U.S. Despite a recent rise in overall breastfeeding rates, inconsistent and insufficient provider knowledge concerning evidence-based breastfeeding guidelines, negative attitudes, and meager support continues to undermine breastfeeding exclusivity recommendations. Several studies have shown value in addressing provider knowledge and support for breastfeeding, but there remains a deficiency of studies observing the results of an educational intervention with a wide range of health care providers. The purpose of this study was to assess the self-perceived knowledge and attitudes of ETSU health care clinicians including physicians, Quillen College of Medicine (QCOM) residents, College of Nursing (CON) nurse practitioners, Doctor of Nursing Practice (DNP) students, and undergraduate nursing students before and after a formal educational intervention presented by a clinical expert using a pre- and post-test survey. The quasi-experimental study was conducted using volunteer participants at the ETSU DNP Intensive, ETSU CON undergraduate course orientation for NRSE 4570 and 4561, and QCOM Pediatric Grand Rounds. A validated pre-test and post-test survey tool entitled "Australian Breastfeeding Knowledge and Attitude Questionnaire" was used to assess provider knowledge and attitudes to determine the effects of improving breastfeeding knowledge and attitudes. Surveys were printed on paper, stapled together for linked participatory results, numbered prior to distribution, and completed anonymously. Directions following the pre-test instructed participants to complete the post-test following a 40 minute evidence-based oral presentation entitled "Breastfeeding: Evidence-Based Guidelines Every Health Care Provider Should Know." A total of 133 completed pre-test/post-test surveys were collected. Pre-test results show no statistical difference in evidence-based breastfeeding knowledge between the different health care providers. Paired sample 2-tailed test show statistically significant improvements in knowledge, attitudes, and roles among all participants following the educational intervention. As a result of completing the above procedure, it was determined that provider breastfeeding knowledge is insufficient. However, an evidence-based breastfeeding educational intervention will increase provider knowledge, attitudes, and their ability to serve as a supportive role for breastfeeding families. Completion of this project is a step to increase attainment of Healthy People 2020 breastfeeding goals.

112. NEUROGENESIS WITHIN THE DENTATE GYRUS AFTER CHRONIC THERAPEUTIC OR ABUSIVE DOSES OF METHYLPHENIDATE

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Attention Deficit Hyperactivity Disorder (ADHD) is a neurobehavioral developmental disorder and affects 11% of children ages 4-17 years old in the U.S. alone. Alarming, the number of children diagnosed with ADHD and the length of treatment are increasing. The most commonly prescribed drug to treat ADHD is

methylphenidate (MPH; Ritalin®). MPH is a psychostimulant that inhibits dopamine and norepinephrine reuptake, increasing the amount of these monoamines in the synaptic cleft. Studies indicate that an increasing amount of high school and college students are abusing MPH. Despite the increasing use and misuse of MPH, few studies have looked at the chronic exposure of MPH on the central nervous system. Neurogenesis or the “birth” of new neurons is known to be altered with the use of psychoactive medications; however, the effect of MPH on neurogenesis is not understood. Neurogenesis occurs throughout adulthood within the dentate gyrus of the hippocampus. The goal of this study is to determine the effects of chronic therapeutic or abusive doses of MPH on neurogenesis in the hippocampus. To investigate this, adolescent male Swiss-Webster mice received twice-daily intraperitoneal (IP) injections of MPH (1 or 10 mg/kg) or saline for 28 days. Two days after the final injection, mice received a single IP dose of 50 mg/kg 5'-ethynyl-deoxyuridine (EdU), a thymidine derivative that is incorporated into replicating DNA of dividing cells. In order to determine the rate of neurogenesis, mice were sacrificed and brain tissue was collected 1 day post-EdU. Additionally, in order to examine the survival of newly generated cells, some mice were sacrificed 4 weeks post-EdU injection. Sections were stained for EdU using a fluorescence imaging kit and then double-labeled for the neuronal marker, NeuN using immunohistochemistry. The ratio of Edu + NeuN double-labeled cells/ total NeuN cells were counted in both hemispheres and compared between the groups. Chronic therapeutic (1 mg/kg) and abusive (10 mg/kg) doses of MPH were found to increase neurogenesis. Interestingly, however, if MPH injections were not continued over the 4 weeks post-EdU injection, then the newly generated cells did not survive. In order to investigate the possible mechanism for MPH-induced neurogenesis increases, the levels of the neurotrophic factors, brain-derived neurotrophic factor (BDNF) and glial cell line-derived neurotrophic factor (GDNF), were investigated in the dentate gyrus of the hippocampus using ELISA-based assays. Surprisingly, no significant differences were found in the levels of BDNF or GDNF between the groups. Therefore, MPH must be increasing the rate of neurogenesis through another mechanism.

113. GENERAL PRACTITIONERS PERCEPTIONS OF BENZODIAZEPINE USE AND THE USE OF NON-PHARMACOLOGICAL TREATMENTS FOR ANXIETY

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Introduction: Anxiety is the human body’s natural reaction to stress and can help us to manage in stressful situations to an extent. Unfortunately, when anxiety becomes so intense that it begins to affect everyday life, it becomes problematic. Anxiety and anxious feelings affect everyone; however, anxiety disorders can last six months or more and can affect individuals’ everyday functioning. This powerful anxiety becomes excessive and debilitating and can occur concurrently with other mental and physical illnesses. Depression, bipolar disorder, and substance abuse can cause anxiety to worsen (Anxiety and Depression Association of America, 2010). When treating anxiety disorders with benzodiazepines, there is a potential for abuse if medications are prescribed incorrectly. The purpose of this project is to gather provider perceptions regarding prescription of benzodiazepines for anxiety in primary care and the use of non-pharmacological treatment interventions. The aim is to increase the use of non-pharmacological treatment interventions for the treatment of anxiety in primary care provider’s offices. **Methods:** Providers were surveyed using a previously established survey by Anthierens et. al. Providers were selected through convenience sample, letters of intent were sent to all primary care practices that were privately owned and only treated adult patients. Burke Primary Care agreed to participate. There were 12 providers from this practice who participated throughout. Providers wishing to participate completed an informed consent, followed by a pre educational survey, attended an educational presentation regarding non-pharmacological treatments, completed a post educational survey, and completed a six week post educational survey. **Results:** By providing in-services on non-pharmacological treatment methods, providers may be liberated from patients expecting to be prescribed benzodiazepines. This education will hopefully decrease the use of benzodiazepines to treat anxiety in primary care, thus decreasing the amounts that are abused.

114. EXTRACELLULAR UBIQUITIN DECREASES ADVERSE EFFECTS OF MYOCARDIAL ISCHEMIA/REPERFUSION INJURY IN MICE

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Background: Heart disease is the leading cause of death in the United States. In human myocardial infarctions, a combination of atherosclerotic plaque and clotted blood occludes an artery in the heart, prohibiting the supply of oxygenated blood to the myocardium and resulting in tissue death. Upon medical intervention the artery is opened and the blood is allowed to reperfuse to the myocardium. Reperfusion of the occluded artery is critical to survival and considered medically necessary. However, reperfusion of the previously ischemic myocardium is an injury in itself. In a mouse model, the ischemia-inducing occlusion is created surgically by suturing the left coronary artery to a piece of tubing on the epicardial surface and tying a knot tight enough to collapse the artery. Reperfusion is achieved by removing the tubing and subsequently, the suture. Ubiquitin (UB), a small molecular weight protein, is found in all eukaryotic cells. Intracellularly, the main function of UB is to regulate protein turnover via the UB-proteasome pathway. Previously, our lab has shown that sympathetic B-adrenergic receptor stimulation increases extracellular levels of UB, and extracellular UB ameliorates unfavorable increases in cardiac workload, function, and myocyte apoptosis in response to sympathetic stimulation. The objective of this study was to explore the potential for extracellular UB as a protective agent for myocardial ischemia/reperfusion injury. **Methods:** The study used 8-12 week male C57B16 mice. The mice were infused with UB (1 µg/g/h) or vehicle using micro-osmotic pumps 24 h prior to myocardial ischemia/reperfusion surgery. Hearts were then subjected to ischemia for 45 min followed by reperfusion for 3 days. UB infusion was maintained throughout the experimental period. Heart function was measured using echocardiography. Masson's Trichrome staining of the myocardial sections was used to measure infarct size. Hematoxylin and Eosin staining was used to measure the number of inflammatory cells. **Results:** Exogenous UB-infused mice exhibit sustained cardiac function 3-days post-ischemia/reperfusion in terms of ejection fraction and fractional shortening versus saline-infused mice. Infarct size measurement using Masson's Tri-Chrome demonstrated a lesser percentage of the left ventricle being permanently damaged in UB-infused mice versus the saline-infused mice. The number of infiltrating cells (neutrophils and macrophages) was also lower in UB-infused animals versus the saline-infused animals. **Conclusion:** These preliminary results suggest a novel role of UB in reduction of ischemia/reperfusion injury damage, reduction in inflammatory response, and preservation of heart function.

115. RECOGNITION OF INTERRUPTED WORDS BY LISTENERS WITH SENSORINEURAL HEARING LOSS

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Two recent studies have shown that the temporal locations of interruption patterns within words have a substantial influence on word-recognition performance. An interruption paradigm (10 ips, 50% duty cycle) using 10 sequential interruption patterns synchronized to word onset was applied to 70 monosyllabic words and studied on young adults with normal hearing (Hamm & Wilson, AAS, 2015). Two recognition patterns emerged for the words across the 10 onset conditions, flat and U-shaped. The current study replicated that study on 24 older adults with sensorineural hearing loss; an uninterrupted-word condition was added. Two sessions were required. Recognition performance on the 70 words uninterrupted was 91.0% with overall performance on the 10 interruption conditions 63.2% (range, 57.9%-69.3%) compared to 80.4% (range, 73.0%-87.7%) obtained earlier on the young adults. The best performances were at the extremes of the onset conditions and no dominant recognition patterns emerged. Comparing the two studies, most subjects

and words had poorer performances with the older subjects. The diversity of recognition performances by the older listeners on the 10 interruption conditions with each of the 70 words supports the notion that the term hearing loss is inclusive of processes well beyond the filtering produced by end-organ sensitivity deficits.

116. ALGU REGULATES TSSA1 EXPRESSION IN PSEUDOMONAS AERUGINOSA

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The pathogenic opportunist *Pseudomonas aeruginosa* colonizes most environments and host tissues. *P. aeruginosa* is capable of dominating its environment with the use of a virulence factor the type VI secretion system (T6SS). The T6SS is composed of several proteins that assemble into a needle-like projection used to attack other bacteria. The T6SS genes are located on a pathogenicity island (HSI-1) starting with *tssA1*. The genetic regulation of this locus is relatively unknown. We hypothesize that the sigma factor AlgU regulates HSI-1 based on bioinformatics analysis showing the presence of an AlgU consensus sequence. We performed RT-PCR to regionalize the transcriptional start site of *tssA1*. We then constructed a transcriptional fusion, *tssA1-lacZ*, and assayed wildtype PAO1 and *mucA22*, which lacks AlgU's antisigma factor MucA. To further confirm these results, we assayed the fusion in clinical isolates as well as strains overexpressing AlgU. In summary, we demonstrate that AlgU contributes to the expression of *tssA1* and elucidates the regulation of this system involved in the virulence of *P. aeruginosa*.

117. CHARACTERIZATION OF SIR2 LIKE DEACETYLASE FOR ITS ROLE IN STRESS

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Salicylic acid (SA) is an important plant hormone responsible for inducing various plant defense genes in response to pathogen infection thereby providing immunity to plant. Systemic acquired resistance (SAR) is an important mechanism by which plants protect themselves from subsequent infection by pathogens. SABP2 is a critical enzyme for inducing local resistance and SAR in tobacco and other plants. By its esterase activity, SABP2 catalyzes the conversion of methyl salicylate to SA. SIP-428 is a SABP2-interacting tobacco protein which show high similarity with SIR2 (Silent Information Regulator 2) like proteins. SIR2 enzymes exhibit NAD⁺ dependent deacetylase activity and catalyze the deacetylation of acetylated lysine residues post-translationally. AtSRT2, an Arabidopsis homolog of SIP-428 was shown to be a negative regulator of basal resistance and responsible for fine tuning of mitochondrial energy metabolism. A number of cellular and organellar proteins implicated in physiological and metabolic pathways were found to be acetylated which opens up the possibility for SIP-428 to play a vital role in plant physiology including plant immunity. Recombinant SIP-428 from tobacco when expressed heterologously in *E. coli* exhibited NAD⁺ dependent deacetylase activity. Interestingly immunoblot analysis using anti-acetyl lysine antibodies, SIP-428 itself was found to be acetylated. This raises the possibility of a post-translation regulatory mechanism that is likely to modulate the activity of SIP-428. To better understand the role of SIP-428 in plant physiology, we are taking two approach first one is, in vivo analysis where transgenic tobacco plant with altered SIP-428 expression (Silencing and Inducible overexpression of SIP-428) is being generated, and another is in vitro analysis of recombinant SBIP-428. We have already generated hairpin RNAi-silenced transgenic tobacco lines. SIP-428 silenced lines in T2 generation will be used for their response to biotic and abiotic stress response. SIP-428 overexpression transgenic lines are also being generated under the control of an inducible promoter. Once ready these transgenic lines in T2 generation will be used for biotic and abiotic stress response analysis.

118. ATAXIA-TELANGIECTASIA MUTATED KINASE INDUCES AUTOPHAGY IN MICE FOLLOWING MYOCARDIAL INFARCTION

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Background: Autophagy is a conserved physiological process in the body that functions to maintain homeostasis via degradation and recycling of dysfunctional proteins and even entire organelles. It is typically triggered by nutritional stress and/or growth factor deprivation and ultimately results in the packaging of cellular components into autophagosomes. These autophagosomes then fuse to lysosomes to be degraded. Although often associated with nutrient deprivation, autophagy has also been associated with human pathology, playing a role in conditions such as cancer. However, there is an emerging interest in the role of autophagy in cardiac remodeling, particularly following myocardial infarction (MI; heart attack). Ataxia-telangiectasia mutated kinase (ATM) is a 370 kDa threonine/serine kinase. Mutations in ATM cause a multisystemic disease known as Ataxia-telangiectasia (AT). AT heterozygotes, individuals with an ATM mutation in one allele, make up a substantial portion of the population (~1.4 to 2%). These individuals are spared from most of the symptoms of AT, but are more susceptible to ischemic heart disease. Although the role of ATM in cell cycle progression is well known, its role in autophagy is not completely understood. The present study aims to investigate the relationship between ATM and autophagy in the heart, particularly post-MI. **Methods:** MI was induced in ~4 month old wild-type (WT) and ATM heterozygous knockout (hKO) mice by ligation of the left anterior descending artery. The mice were sacrificed 4 hours following MI. For cellular analysis of autophagy, cardiac fibroblasts were isolated from WT and ATM knockout (KO) mice. Fibroblasts were treated with isoproterenol (ISO; B-adrenergic receptor agonist; a known inducer of autophagy) for 24 hours. Levels of microtubule-associated protein light chain 3-II (LC3-II) and phosphorylation of AMP-activated protein kinase (AMPK), markers for autophagy, were examined in the tissue and cell lysates using western blots. **Results:** Levels of LC3-II when normalized with LC3-I were significantly lower in hKO-MI versus WT-MI hearts (WT-MI, 0.94 ± 0.05 ; hKO-MI, $0.61 \pm 0.12^*$; $*P < 0.05$ versus WT-MI; $n = 3-4$). Likewise, levels of LC3II were significantly lower in hKO-MI versus WT-MI hearts when normalized to GAPDH (WT-MI, 0.78 ± 0.12 ; hKO-MI, $0.31 \pm 0.07^*$; $*P < 0.05$ versus WT-MI; $n = 3-4$). Phosphorylation of AMPK was lower in hKO-MI hearts versus WT-MI hearts (WT-MI, 0.73 ± 0.13 ; hKO-MI, $0.31 \pm 0.03^*$; $*P < 0.05$ versus WT-MI; $n = 3$). Cardiac fibroblasts isolated from KO heart exhibited decreased LC3-II level when normalized to GAPDH versus the fibroblasts isolated from WT heart. ISO treatment increased LC3-II levels in both groups. However, LC3-II levels stayed lower in KO fibroblasts. **Conclusion:** Although further investigations are needed to confirm our findings, these data provide evidence that ATM may play a role in the induction of autophagy in the heart following MI.

119. TWO ISOMERIC FLAVONOIDS HAVE A SYNERGISTIC EFFECT IN COLON CANCER WHEN USED IN COMBINATION WITH 5-FLUOROURACIL CELLS DUE TO INCREASED DNA DAMAGE.

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Purpose: The most commonly used chemotherapy for colon cancer, 5-fluorouracil (5-FU), only has a 10-20% response rate in patients. One method used to improve the effectiveness of 5-FU has been to add a secondary drug which has antineoplastic effects on colon cancer in vitro. Our lab has previously shown the

isomeric flavonoids, 5,7-dihydroxy-3,6,8-trimethoxy-2-phenyl-4H-chromen-4-one (flavone A), and 3,5-dihydroxy-6,7,8-trimethoxy-2-phenyl-4H-chromen-4-one (flavone B) to be two such compounds. **Methods:** CaCo 2 colon cancers cells were treated with flavone A or 5-FU in concentrations ranging from 5-80 μ M. Cells were also treated with flavone A (52 μ M) and 5-FU (5-80 μ M). After 48 hours, Thiazolyl Blue Tetrazolium Bromide (MTT) solution was added to each well and incubated for 3-4 hours. The formazan crystals that developed from mitochondria metabolism were dissolved with 0.1 N HCl in isopropanol and absorbance readings were taken at 590 nm. The percentage of survival was calculated compared to the control group. HCT 116 colon cancer cell lines were treated in a similar manner using flavone B (33 μ M for combination) instead of flavone A and cell survival determined after 72 hours. TUNEL assay (TdT-mediated dUTP nick end labeling) was performed as per manufacturer's instructions (Roche; Mannheim, Germany) using DAPI to counter stain the nuclei after 36 hours on the CaCo 2 cells treated with vehicle, flavone A (52 μ M), 5-FU (80 μ M), or combination. TUNEL assay was performed on HCT 116 cells treated with vehicle, flavone B (33 μ M), 5-FU (80 μ M), or combination after 48 hours. Comet assay for measuring DNA damage was performed as per manufacturer's instruction (Trevigen, Gaithersburg, MD) on CaCo 2 and HCT 116 cells 24 hours after same treatment as used for TUNEL assay. **Results:** Flavone A and flavone B show synergistic activity when used in combination with 5-FU with the Combination Index (CI) less than 1. The combination treatment of either flavone A or flavone B with 5-FU increases the induction of apoptosis after 36 or 48 hours versus individual treatment. After 24 hours, DNA damage caused by 5-FU is increased by the addition of either flavone A or flavone B as determined by the tail moment of Comet assays. **Conclusion:** The two isomeric flavonoids, flavone A and flavone B, increase the DNA damaging effect of 5FU causing a decrease in cell survival of CaCo 2 and HCT 116 cells treated with the combination therapy versus individual treatment.

120. AN ASSESSMENT OF PERCEIVED BARRIERS TO HEALTH CARE IN PALESTINE BY VOLUNTEER HEALTH CARE PROFESSIONALS ON MEDICAL MISSIONS WITH THE PALESTINE CHILDREN'S RELIEF FUND (PCRF)

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While developed countries are struggling to increase the quality of health care at reasonable costs, many underdeveloped countries are struggling just to provide essential health care services. In this context, refugee and other low socioeconomic status children in these underdeveloped countries are relying merely on health care services provided by charitable organizations. The target population of this project was the volunteer health care providers who have served the Palestinian children, as these children are most affected by the lack of health services. The purpose of this project was to uncover barriers to accessing primary and specialized health care services for children in the West Bank, Gaza, and East Jerusalem. The main focus was on volunteer doctors, nurses, and nurse practitioners who have been on medical missions to the West Bank, Jerusalem, and Gaza with the Palestine Children's Relief Fund (PCRF). A convenient yet representative sample of volunteer health care providers was surveyed to obtain their insights and perspectives on the unique challenges facing the delivery of basic health care as well as specialized pediatric medical and surgical services. The results of the questionnaire were analyzed using content analysis as well as descriptive statistics. It was found that the greatest barriers to health care for children of low socioeconomic status in Palestine include inadequate hospital infrastructure, checkpoints, lack of hospital supplies/equipment for surgery, and lack of qualified local providers in specialties such as pediatric neurosurgery, orthopedics, and cardiology. Children in the West Bank and Gaza were reported as having geographical and political barriers preventing them from traveling to East Jerusalem for specialized health care services. Based on the barriers identified and the feedback of the participants, an educational module will be created to help train future volunteer health care providers with the PCRF before they go on their first medical mission. The results will also be helpful in providing feedback to the PCRF to improve training for local providers and work with the Palestinian Ministry of Health to improve health care infrastructure.

121. DISCHARGE READINESS FOR FAMILIES WITH A PREMATURE INFANT LIVING IN APPALACHIA

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Advances in technology have increased survival rates for premature infants, over 30 percent since the 1980s, and infants experience extended stay in the Neonatal Intensive Care Unit (NICU). Stability and care for premature infants require extensive utilization of health resources, however infants are often discharged with unresolved medical issues, and experience long-term health complications. Parents require specialized skills and training in order to care for their infant at home, manage medical equipment, understand how to access out patient resources, and navigate multiple follow up appointments. Even though parents report feeling prepared for discharge, studies indicate they are often overwhelmed once home. Lack of parental preparedness leads to increase levels of stress, altered parental role, and difficulty transitioning to home. While parents with a premature infant experience difficulty coping and managing at home, families living in rural areas have additional challenges in caring for their infant at home. Access to care, increased travel to for appointments, lack of support, and limited specialized services for premature infants all create barriers for families living in rural and underserved areas. There is a paucity of research highlighting discharge readiness and transition to home for families with a premature infant living in Appalachia. The purpose of this study is to explore the perceptions of parents who have a premature infant and live in Appalachia, regarding discharge readiness from the NICU, and access to care. The research study is in the data collection and analysis phase. A qualitative interpretive phenomenology study is being conducted to bring insight and develop an understanding of how families perceive the discharge process, their ability to access health care resources, and cope at home after discharge from a NICU located in Appalachia. Results will shed light on challenges parents face while transitioning to home and barriers that limit access to care. Parents with a premature infant born at or below 34 weeks gestation, discharged from the NICU with one or more medical issues, and referred to the regional NICU Follow Up clinic are recruited. Semi-structured interviews are conducted to explore parents' perceptions around discharge and ability to care for their infant at home. Guiding questions used during the interview include the following, "please describe your experience being discharged from the NICU", and "tell me about your experience once home from the hospital and how prepared you felt". Data coding and analysis will reveal themes that reflect parents' experience and be used to develop a model of care for this population. New knowledge about discharge preparedness will help to identify parents' needs after discharge and focus on areas where follow up education and support are needed. Results will aid in development of educational programs for parents, medical staff, and outpatient providers. In addition, it will shed light on unique needs for families caring for a premature infant and how to overcome barriers living in rural communities.

122. NATIONAL LEVEL SYSTEM EVALUATION OF ANTITHROMBOTIC TREATMENT IN LONG-TERM CARE

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A system evaluation (SE) was performed on the quality improvement (QI) change project that was conducted at a long-term care (LTC) organization. The objectives were to meet the national policy requirements of: evidence-based practice (EBP) informatic patient education regarding oral antithrombotic options, risks, and shared-decisions (SD) with long-term residents. The goals included: (a) examine whether EBP education and SD met national policies; and (b) calculate the conversion and correlation with lab monitoring and costs to alternative therapy, which would suggest a choice was made. Ninety days post-QI project, a SE was performed using the Agency for Healthcare Research and Quality evaluation tool to examine concrete measurable data within the four parameters of Bielecki & Stocki's Systems Theory. Data analysis suggested that SD intervention through Informatic education made a significant change towards conservative choices, which was reflected in cost reduction ($p < 0.05$) of prescriptions and lab monitoring. The project endorsed SD in accordance with 2010 Patient Protection Affordable Care Act, Title III Section 3506 regarding LTC patient and/or surrogate engagement with SD.

123. IMPROVING METABOLIC MONITORING FOR PATIENTS PRESCRIBED SECOND-GENERATION ANTIPSYCHOTICS

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Second-generation antipsychotics (SGAs) are associated with increased cardio-metabolic risks including hypertension, central obesity, insulin resistance and dyslipidemia collectively known as the metabolic syndrome. Despite provider awareness of the potential risks as identified by the US Food and Drug Administration/Clinical Antipsychotic Trial for Intervention Effectiveness and the availability of consensus guidelines from the American Diabetes Association/American Psychiatric Association for monitoring patients prescribed SGAs, monitoring rates remain suboptimal. This represents a gap in the translation of knowledge to practice. My project seeks to improve metabolic monitoring for patients prescribed SGAs by increasing provider knowledge regarding the rationale for monitoring and their adherence to the consensus guidelines. A quasi-experimental pre/post research design was used to implement an evidence-based educational intervention for providers at eighteen community mental health center sites within an identified community mental health system. Each of the system's thirty-five providers was recruited for the project, participation was voluntary, and nineteen chose to participate. Prior to implementing the educational intervention, a retrospective review of three hundred and sixty medical records (twenty from each clinical site) was conducted to identify a baseline rate of provider adherence to six monitoring parameters (history, body-mass index, waist circumference, blood pressure, fasting glucose, fasting lipids) at recommended intervals (date of initial prescription and four, eight and twelve weeks thereafter) as identified by the guidelines, and surveys/tests were administered to assess attitudes/knowledge regarding the rationale for monitoring. Following the intervention, duplicate surveys/tests have demonstrated a modest increase in provider knowledge regarding the rationale for monitoring, and following a future retrospective review of three hundred and sixty medical records a notable increase in the rate of provider adherence to the guidelines is anticipated. These changes have the potential to improve quality of care and outcomes for patients prescribed SGAs, and to facilitate the translation of knowledge to practice.

✧ Society, Behavior and Learning ✧

124. SAVVY CAREGIVER PROGRAM: PROMOTING SELF-EFFICACY AND REDUCING CONTRIBUTING FACTORS IN THE DEVELOPMENT OF BEHAVIORAL AND PSYCHOLOGICAL SYMPTOMS OF DEMENTIA

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In an aging nation, dementia care is a costly and emerging major public health concern. Currently, in the United States, 5.2 million individuals have dementia with the possibility of triple that number being affected by the year 2050. Individuals affected by dementia develop a progressive dependence on informal caregivers in order to remain in the community with over 75% of persons with dementia being cared for in the home. Informal caregivers lack specialized training to serve in their role. As dementia progresses in the person with dementia, their caregivers experience increased depression, stress, anxiety, and health declines. Serving as a caregiver increases health care use and costs associated with depressive symptoms, compounding the health economic burden. Current dementia care models do not include a caregiver educational workshop in the standard patient care plan. The question being evaluated is whether attendance to a formal support program by informal caregivers results in improved self-efficacy and/or reduced stress burden associated with behavioral and psychological symptoms of dementia (BPSD) demonstrated by the person with dementia. Improving abilities of informal caregivers of persons with dementia was investigated through support program integration into a dementia care model at a capitated funds center. The Savvy Caregiver Program, an evidence-based six-week educational workshop was implemented with ten informal

caregivers attending. Weekly sessions focused on assisting caregivers in: managing daily life and strategies for achieving contented involvement, managing behaviors and use of Allen staging to aid with set-up and support needed, managing caregiver well-being through self-care, and managing resources. The quasi-experimental study utilized a pre- and post- test format to explore dimensions of self-efficacy, well-being, depression, and perception of BPSD demonstrated. Four self-report tools were collected, using the Revised Center for Epidemiologic Studies Depression Scale (CESD-R), Neuropsychiatric Inventory with Caregiver Distress Scale (NPI), Caregiver Well-Being Scale (CWBS), and Revised Scale for Caregiving Self-Efficacy. Statistical analysis utilized non-parametric Wilcoxon signed-rank testing (WSRT). Overall, there were improvements in scores on all four scales, but further research with additional workshops including more participants to increase the sample size would aid in validating depression and BPSD improvement findings as statistically significant. Caregiver support program attendance did result in statistically significant improvements in overall caregiver well-being ($p=0.028$) as well as dimensions of caregiver well-being related to activities of living ($p=0.046$). Statistically significant improvements were also evidenced in self-efficacy related to responding to disruptive patient behaviors ($p=0.035$). Overall health improvements cannot be measured in a time-limited study, but are associated with improved self-care and role fulfillment. Social support and coping strategies learned through caregiver education workshops, such as the Savvy Caregiver Program, can improve the abilities of the caregiver to cope efficiently with the disease demands. Improving caregiver function through implementation of educational workshops can be an effective augmentation for dementia care models.

125. TRENDS IN ENDOMETRIAL CANCER INCIDENCE AMONG ADOLESCENTS AND YOUNG WOMEN

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Endometrial cancer is the leading gynecologic cancer in the United States. Though it is typically a disease of older women, 2 - 14% of endometrial cancer cases occur in young women below 50 years. There is evidence of a rising trend in endometrial cancers for all women but variations between age groups have been poorly explored. This study describes trends in endometrial cancer incidence between younger and older women. Cancer cases with primary site listed as "Corpus and Uterus NOS" and diagnosed from 2000 to 2012 were selected from the National Cancer Institute Surveillance, Epidemiology and End Results (SEER) database which holds data for 18 population based registries in 14 states and covers 28% of the U.S. population. We split the 133,929 patients into a younger cohort aged 15 to 39 years (4,618) and an older cohort of women 40 years and older (129,311). Annual percentage changes (APC) and 95% confidence intervals were calculated by age group, race and cancer histology from age-adjusted yearly trends in incidence rates using SEER Stat. The APC was computed at a significance level of 0.05 using the weighted least squares regression method. Confidence intervals were derived with the Tiwari technique. Incidence rates were age-standardized to the 2000 US Standard Population. The annual percentage change in incidence for younger women (APC=4.0%; CI, 3.0% - 4.9%) for the specified time period was approximately 7 times that of older women (APC=0.6; CI, 0.2% - 1.1%). Among racial groups, annual percentage change in incidence was significant in young white women (APC = 4.3%; CI: 3.3% - 5.4%), older black women (APC: 2.2%; CI: 1.5% - 2.9%), and older Asian or Pacific Islander women (APC: 2.4%; CI: 1.8% - 3.0%). Endometrioid histology subtypes were increasing in younger women (APC: 3.8%; CI: 2.7% - 5.0%), while poorer prognostic type II subtypes were increasing in older women (serous carcinomas - APC: 3.7%; CI: 2.8% - 4.7%; malignant mixed Mullerian tumors - APC: 2.1%; CI: 1.5% - 2.7%). The data show that the rate of new endometrial cancer cases is growing faster in adolescents and young women than older women. Additional research into the complex interactions between race, age and risk factors such as obesity is warranted in order to mitigate the increasing rates of endometrial cancer in the US.

126. SUPPORTING THE CASE FOR A MATERNAL SOCIAL MEDIA CAMPAIGN TO REDUCE INDOOR TANNING AMONG TEENAGE GIRLS

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Indoor tanning (IT) is a preventable cause of melanoma, the deadliest form of skin cancer. Melanoma is one of the most common cancer types among adolescents and young adults in the U.S. It represents over 75,000 new cases annually and the death of one American every hour. IT is also associated with an increased risk for Non-melanoma skin cancer (NMSC), the most common cancer. Each year, more skin cancer cases are attributable to IT than the total number of lung cancer cases attributable to tobacco use. The International Agency for Research on Cancer (IARC) has established IT as a human carcinogen alongside arsenic and tobacco. Despite this substantial evidence, IT is still popular, with one 1 of every 3 white teenage girls indoor tanning every year, with rates increasing as they age. Mothers are a priority for intervention as most teen girls often initiate IT with their mothers and report doing so at an earlier age. Therefore a campaign that: informs mothers of IT risks, highlights the influence of permissiveness on their daughter's risk and provides them with effective messages to discourage IT, will be effective in reducing IT in teen girls. This mixed-methods study, as part of formative research for a National Cancer Institute-funded grant, assesses the acceptability of a maternal social media intervention to deliver a health communication program designed to reduce IT among teenage girls. Over a 7-month period from November 2013 to July 2014, mothers from communities in Central Massachusetts and Northeast Tennessee who had a daughter (14-17 years old) completed surveys on their demographics and use of the internet for health information. Data were analyzed using SPSS (Version 23). Descriptive tests were run to determine trends by age, education and income and to analyze patterns of Internet and social media use. Additionally, focus groups were conducted in Northeast Tennessee from October to November 2015 to elicit mother-daughter health communication patterns. Sessions were audio-recorded and transcribed, then analyzed using Nvivo. A total of 46 mothers were assessed [Survey: n=36, Focus group: n=10; average age=44 years]. 93.4% of the mothers reported frequent use of the internet/social media sites; Facebook was the most visited social media site (91.3%). All of the survey respondents reported searching the Internet for health information for themselves, and all except one had conducted searches related to their children. 64.9% reported confidence that social media sites are reliable sources of health information and two-thirds felt that the information could be trusted. Themes from the focus groups revealed that mothers were more likely to search the Internet for health information instead of asking other mothers and were more accepting of positively-framed prevention messages. This study validates the emerging efficacy of social media for health promotion campaigns and supports the proposed effectiveness of the social media campaign designed to reduce IT by teenage girls and prevent melanoma.

127. AN ANALYSIS OF MENTALLY UNHEALTHY DAYS IN FEMALE VETERANS

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New positions have recently become available in the military and will eventually lead to increases in the number of female veterans in America. These women are influenced by adverse childhood events (ACE), post-traumatic stress disorder, and other life-altering incidents. Some female veterans show positive mental health status, resiliency, and lead healthy lives, while others female veterans battle high rates of alcohol abuse, substance abuse, homelessness, and suicide. Uncovering factors that lead to a positive mental health status is a critical component towards implementing gender-specific strategies to help female veterans build resiliency and coping mechanisms. An analysis of the ACE module included from the 2011 and 2012 Behavioral Risk Factor Surveillance System (BRFSS) was used to build multiple linear regression models,

and evaluate prevalence of three ACE events. These negative sexual events included being touched sexually by another, being forced to touch another sexually, or being forced to have sex as a child. Female veterans show higher prevalence of negative sexual ACE events when compared to civilian women. The biggest difference was being touched sexually prior to the age of 18 with 19% of veterans reporting this experience, compared to 14% of civilian women. The multiple linear regression model analyzed self-reported mentally healthy days of women within the last 30 days. Female veterans had 0.59 ($p = 0.044$) fewer mentally unhealthy days than civilian women during a 30-day period. The three sexual ACE variables significantly predicted unhealthy days for female veterans and civilians. Women forced to have sex had 2.5 ($p = 0.000$) more mentally unhealthy days and 1.9 ($p = 0.000$) more mentally unhealthy days when forced to touch another sexually. Older age, additional education, and increased income were significant and lowered the number of mentally unhealthy days, while marriage led to an increase of 0.18 ($p = 0.005$) unhealthy days. Results indicated that female veterans had 1.35 ($p = 0.002$) fewer physically unhealthy days. It is noteworthy that female veterans are reporting a significant increase in mentally healthy days compared to their civilian counterparts, despite the higher prevalence of negative sexual ACEs. Further investigation is needed to discover the mental, behavioral, and demographic features that help some female veterans overcome the typical dose-response relationship between negative ACEs and unhealthy days. Evidence-based resiliency programs can then better assist female veterans who are struggling to survive.

128. BARRIERS TO HEPATITIS C INFECTION TREATMENT IN NORTHEAST TENNESSEE AND THE UNITED STATES

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Introduction: Hepatitis C virus (HCV) infection is the most common chronic blood-borne infection in the United States. Among the largest increases of incidence for HCV infection are reported in the Appalachian region. However, less than 30% of chronically infected persons are receiving the treatment. The aim of this study was to examine barriers to receiving HCV treatment for people in Northeast Tennessee and the U.S. **Methods:** Data for the U.S. were obtained from the National Health and Nutrition Examination Survey (NHANES) 2001-2012 ($n=238$ participants who completed the HCV follow-up questionnaire). Data for Northeast Tennessee were obtained from the National Electronic Disease Surveillance System (NEDSS) between January and June 2014 ($n=101$ chronic hepatitis C cases) and through telephone interviews. The Chi-square test and Fisher's exact test were used to examine the difference of demographics, risk factors of transmission, reasons for testing, and treatment barriers between HCV patients in Northeast Tennessee and the U.S. Logistic regression models were used to examine barriers to HCV treatment for the two samples. Odds ratios (OR) and 95% confidence interval (CI) were reported. **Results and Conclusion:** In the U.S., a greater proportion of patients with hepatitis C infection received treatment when compared with those in Northeast Tennessee (54.4% vs. 22.5%, $p<0.0001$). Demographics difference were observed between HCV infected persons in Northeast Tennessee compared to the U.S. A greater proportion of HCV infected persons in Northeast Tennessee were non-Hispanic Whites (44.3% vs. 93.1%, $p<0.0001$) but a smaller proportion were males (64.7% vs. 47.5%, $p=0.0032$). Only about a third (34.18%) of HCV infected persons in Northeast Tennessee were married compared to about half (49.2%) in the U.S. ($p=0.0022$). For sexual behavior, less cases had more than 5 lifetime sexual partners in Northeast Tennessee when compared with them in the U.S. (34.6% vs. 83.0%, $p<0.0001$). The top reason for HCV testing was doctor ordered in Northeast Tennessee and sick in NHANES participants. In Northeast Tennessee, patients without symptoms were more likely to not be treated than patients with symptoms (OR: 3.08, 95% CI: 1.10-8.60.). In the U.S., HCV patients without health insurance were three times more likely to not have the treatment than those with health insurance (OR: 3.38, 95% CI: 1.14-10.05). The top barrier to the treatment was cost issues in both NHANES (50.0%) and Northeast Tennessee (25.0%). The second treatment barrier was fear of side effect (43.3%) in NHANES and lack of specialist (23.7%) in this region. The proportion HCV-

infected persons receiving treatment was much lower in Northeast Tennessee than in the U.S. Lack of health insurance and cost issues are the most important treatment barriers in the U.S. In Northeast Tennessee, besides the cost issue, absence of symptoms and lack of specialist were also important barriers. Increasing insurance coverage and knowledge about HCV infection and treatment along with improved access to specialty care may be considered possible strategies for helping reduce barriers to the treatment of HCV.

129. THE USE OF ALTERNATIVE TOBACCO PRODUCTS AMONG SCHOOL-GOING CHILDREN IN NORTHEAST TENNESSEE AND THE ATTITUDES OF THE CHILDREN TOWARDS SUCH USAGE

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There is an uptake in the use of alternative tobacco products (ATPs) among youth in the United States; yet, research to understand the problem and inform policy initiatives is sparse. Given that up to 90% of regular tobacco users started the behavior before age 18 years and the high prevalence of tobacco use in northeast Tennessee, we aimed to assess ATPs use among youth to inform suitable tobacco prevention strategies. A school-based survey was conducted in two adjacent counties in Northeast Tennessee. Descriptive statistics were used to assess single and dual use of cigarettes, ATPs, and e-cigarettes. Chi-square test was conducted to compare prevalence of ATP users. Multivariable regression analysis was conducted to identify factors associated with ATPs use. Of 795 students aged 9-15 years, 5.2%, 8.1%, and 7.3% had tried cigarettes, ATPs, and e-cigarettes only, respectively. About 4.9% and 4.4% were dual users of ATPs and e-cigarettes and ATPs and cigarettes, respectively. About 8.2%, 8.4%, 7.2%, 6.0%, and 5.3% of students reported smoking was allowed in their homes, knew someone who uses smokeless tobacco products, lived with someone who uses e-cigarettes, owned branded tobacco items, and felt the pressure to smoke, respectively. Sex [OR=0.055, CI=0.012-0.249], grade [OR=0.55, CI=0.40-0.75], access to ATPs [OR=0.32, CI=0.23-0.44], positive attitude [OR=3.93, CI=1.80-8.57], ownership of brand items [OR=4.02, CI= 1.29-12.49] significantly increased the odds of ATPs use, compared to respective referent group. Attitudinally, 5.6% and 7.0% of ATPs users find it very easy to get tobacco products and think smoking is very harmful, respectively. ATPs and e-cigarette use is pervasive among school-going children in Northeast Tennessee. Thus, there is the need for enforceable and comprehensive school tobacco-free policies that include ATP and e-cigarettes. Additionally, there is the need for efforts to address access and exposure to ATPs and e-cigarettes outside schools.

130. EARLY CHILDHOOD ADVERSITY AND CHRONIC ILLNESS: AN EXAMINATION OF A HIGH-RISK FORENSIC INPATIENT POPULATION

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Individuals exposed to abuse, neglect, and household dysfunction during childhood are at increased risk of developing chronic illnesses including heart disease, cancer, and chronic emphysema. A relationship between early childhood adversity and health risk factors contributing to chronic disease such as smoking, obesity, and sedentary lifestyle has also been established in prior literature. Chronic conditions carry many negative consequences at both societal and individual levels and have been associated with significant financial cost, a decline in quality of life, and functional impairment. According to research, more than half of an average community sample has experienced at least one type of adverse childhood experience, including psychological, physical, or sexual abuse or substance abuse, mental illness, domestic violence, or criminal behavior within the household, with approximately 25% experiencing two or more. However, there is evidence that higher than usual levels of trauma exist in forensic inpatient samples, which may increase the odds of chronic disease development in this population. Despite this evidence, little research exists examining the prevalence of adverse childhood experiences in forensic mental health clients, as well as the relationship between trauma and chronic health conditions and risky health behaviors in this population. Archival data were collected from a forensic psychiatric facility in the Midwestern US. Inclusion criteria included admission since 2005, residence for at least one year, and discharge prior to data collection. A list of clients (N=182) meeting inclusion criteria was randomly generated by the facility's research coordinator. Medical, psychiatric, social services, and annual review reports as well as discharge summaries were coded by three trained research assistants. The sample was predominantly male (N=147; 80.8%) and Caucasian (N=101; 55.5%). The average admission age was 32.5 years (SD=11.6 years) and average discharge age was 40.5 years (SD=12.7). Reasons for initial admission include transfers from lower-security facilities for aggressive behavior, lack of competency to stand trial, direct admission from the state department of corrections, suicidality or self-harm behavior, and pretrial evaluation. All participants were civilly committed to the facility at the time of discharge. In this study, frequencies and descriptive statistics will illustrate the prevalence of adverse childhood experiences broadly and categorically within a forensic inpatient facility. Logistic regression will also be used to examine the relationship between adverse childhood experience and later chronic disease diagnosis. A hierarchical regression will also be used to evaluate to what extent risky health behaviors account for relationships between chronic diseases and adverse childhood exposures. Results may explain how trauma exposure may increase the likelihood of chronic illness among forensic mental health patients.

131. THE POOREST "STATE" IN AMERICA: THE HEALTH AND SOCIAL CONDITIONS OF AMERICA'S POOREST COUNTIES

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The pervasive impacts of poverty on health and well-being are widely recognized. It is equally well known that poverty is unequally distributed nationally. However, reporting state-level data can obscure extreme disparities that exist within each state, and across the Nation. A simple question was asked – What would

the Poorest and Wealthiest “states” in the United States look like if they were defined by median household income and not by geography? The “Poorest State” comprises the poorest two percent of counties (1/50 of all 3,141 counties in the United States) while the “Wealthiest State” is formed by the wealthiest two percent of counties. These two States were compared, using the independent t-test on SPSS version 21, across a wide range of parameters – including health outcomes, health behaviors, and social conditions. The Wealthiest and Poorest States were significantly different by most measures. Median household income is \$89,723 in the Wealthiest State, compared to \$24,960 in the Poorest State – barely above the United States Census Bureau’s 2014 poverty threshold for a family of four. Also of importance is that smoking rates are doubled and obesity is 50% worse in the Poorest State. Male and female life expectancy differ by 9.55 and 7.08 years, respectively. When comparing the current life expectancy of Poorest and Wealthiest States’ to projected and actual US life expectancies from 1910-2060 the Poorest State lags 40 - 50 years behind the Wealthiest State. Male and female life expectancy in the Poorest State would rank 123rd and 116th, respectively, on a list of all countries in the world – meaning the poorest counties in America have a lower life expectancy than over half of the countries in the world. This analysis frames the extreme socio-economic disparities that exist in the United States and their association with health and well-being, graphically displaying how state-level data tends to mask disparities at the county-level. Comparing the Poorest and Wealthiest States and to each other and to foreign countries highlights the vast differences that exist in the United States. The “state” of poverty in America is dramatic and deeply disturbing.

132. COLLEGE STUDENTS' EXPERIENCES OF CHILDHOOD ADVERSITY AND ADULT INTIMATE PARTNER AND SEXUAL VIOLENCE PERPETRATION: PREVALENCE AND IMPLICATIONS FOR INTERVENTION

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Early adverse experiences in childhood (e.g., abuse, neglect, and household dysfunction) have been linked to negative long-term effects on physical and mental health. Kaiser Permanente and the CDC surveyed adults in the community in the mid-1990s and found a strong and cumulative relationship between the degree of exposure to adverse childhood experiences (ACEs) and risk factors for negative outcomes in adulthood including higher risk for substance abuse and intimate partner violence. Also, criminal populations, particularly sexual offenders, report much higher rates of adversities than the general public. College students have a disproportionately high risk of intimate partner violence, rape, and other forms of sexual assault, and there is limited research on the characteristics of perpetrators and victims of sexual and intimate partner violence on campus, which could inform prevention efforts and our understanding of repeated victimization and the effects of cumulative experiences of victimization. Our sample consists of university students (N = 995; 69.2% female; M = 20 years old) who are predominantly Caucasian (84%) in the Southeastern US. An ACE total score between 0 and 10 was calculated for each participant by summing the number of Yes responses indicating experiences of childhood adversities. Regarding the prevalence of childhood adversities, 71% of the sample experienced at least one, and approximately 19% fell within the “high-risk” range of 4 or more ACEs, which is higher than the 13% of adults from the community who reported 4 or more ACEs in the original study conducted by the CDC. Thus, it appears that childhood adversities are widespread among college students in this sample. Regarding outcomes since turning 18 years of age, 2% of the sample admitted to engaging in coercive sexual behavior, 1% admitted to having sexual contact with someone who was not fully consenting, 1% had been arrested for a sexual offense, and 0.1% reported being a registered sexual offender. These behaviors were collectively considered sexual misconduct for the purpose of analyses. A logistic regression analysis yielded a significant model ($\chi^2 = 29.51$, $R^2 = 0.11$, $p = 0.000$) and indicates ACE Total Score ($\beta = 0.34$, $\chi^2 = 26.73$, $p = .00$) and gender ($\beta = -.85$, $\chi^2 = 5.80$, $p = .02$) predict sexual misconduct in adulthood. A second logistic regression analysis significantly predicted physical violence towards a partner as an adult ($\chi^2 = 55.52$, $R^2 = 0.13$, $p = 0.000$)

with significant effects from ACE total score ($\beta = 0.32, \chi^2 = 42.41, p = .000$) and gender ($\beta = 1.16, \chi^2 = 11.62, p = .001$). Our findings thus far support further investigation of how adverse experiences relate to violent or sexual perpetration among college students. Additional analyses will include the relationships between these outcomes involving perpetration in adulthood and different types of early experiences of adversity, length of victimization and substance abuse.

133. POLYPHARMACY AMONG PSYCHIATRIC INPATIENTS WITH SERIOUS MENTAL ILLNESS IN SECURE FORENSIC CARE

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Polypharmacy is broadly defined as the administration of more than one medication in a single patient, with the most commonly used definition indicating the concurrent use of five or more medications.

Polypharmacy occurs in most clinical settings, particularly inpatient settings and treatment settings for persons with chronic illness and the elderly. Reasons for receiving more than one medication include ineffective treatment with monotherapy, targeting specific but varied symptoms, treating two distinct but co-morbid illnesses, addressing unremitting symptoms, and treating extrapyramidal side effects. Research indicates that each medication added to the patient's regimen increases the likelihood of an adverse outcome, as well as the risk of adverse drug reactions, drug-to-drug interactions, cumulative toxicity, medication errors, patient non-compliance, patient morbidity, and patient mortality. The current study seeks to investigate the rates of polypharmacy and related characteristics predictive of polypharmacy within a forensic psychiatric setting. A total of 182 patients residing in a secure forensic psychiatric hospital were selected. The sample is predominantly male (80.8%, n=147) and majority Caucasian (55.5%, n=101), African American (40.1%, n=73), and Hispanic (2.2%, n=4), with a mean age of 43.5 (SD=13.2). Participants range from persons with at least one mental health disorder (100%, n=182) to persons with at least one chronic illness (74.5%, n=132). Of those currently taking medications, 99.2% have been prescribed more than one type of medication, with 93.1% of those individuals being prescribed four or more. Polypharmacy was observed in 91% of participants. Of those diagnosed with a mood or psychotic disorder, an average of 3.6 different types of psychotropic medications were prescribed. Co-morbidity of mental illness was predictive of polypharmacy trends, $F(1,181)=5.28, p<.05$. Additionally, individuals with at least one chronic illness also were subjected to polypharmacy practices, with rates increasing for those with more than one chronic illness. As a measure of onset and severity of symptoms, age at first hospitalization and age of onset of aggressive behaviors were measured, and, interestingly, both measures were predictive of polypharmacy within these patients, $F(1, 181)=13.45, p<.01$. Results indicate that perceived severity of symptomology, aggression, and complex health problems all contribute to polypharmacy practices among prescribing physicians. The high rates of polypharmacy observed are concerning because of the potential for increased aversive health outcomes. Understanding the predictive factors, rates, and trends of polypharmacy has valuable implications for the future treatment and rehabilitation of individuals residing in a forensic psychiatric setting.

134. FORGIVENESS AND SUICIDAL BEHAVIOR IN VETERANS: MEDIATING ROLE OF POSTTRAUMATIC GROWTH

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Suicide rates are higher in veterans compared to the general population, making up a disproportionate 22% of suicides reported annually in the U.S. One factor related to suicidal behavior among veterans is increased exposure to traumatic events. However, not all traumatized veterans engage in suicidal behavior, perhaps due to the presence of protective factors. One such factor, forgiveness (of self, others, and by God), conceptualized as a positive change in cognition, emotion, and behavior, toward a transgressor or transgression, may buffer against suicide risk by facilitating a “letting go” of experienced offenses, and by allowing individuals to respond to trauma in a meaningful way via posttraumatic growth (PTG). This premise has not been tested, however. We hypothesized that forgiveness and PTG would be positively related with each other, and negatively related to suicidal behaviors. We also hypothesized that PTG would mediate the association between forgiveness and suicidal behaviors, such that higher levels of forgiveness would be associated with greater PTG and, in turn, to less suicidal behavior. Participants (N=545; 70.1% male (n=382); 86.4% Caucasian (n=469), Mean Age=49.86, SD=16.78) were community-dwelling veterans who self-identified as having experienced a trauma, and completed the PTG Inventory, the forgiveness subscale from the Fetzer Multidimensional Measure of Religiousness and Spirituality, and Suicide Behaviors Questionnaire-Revised. Bivariate correlations and simple mediation analyses were conducted covarying age, sex, and ethnicity. Supporting bivariate hypotheses (p-values <.001), all dimensions of forgiveness were positively associated with PTG, and negatively associated with suicidal behavior. Also supporting hypotheses, in simple mediation analyses (5000 bootstrapped samples), the direct effect of forgiveness of others on suicidal behavior was reduced and fell out of significance when PTG was added as a mediator (DE=.2644, SE=.1464, p=.0717, IE 95% CI=-.0234 to.5523), indicating full mediation. The direct effects of forgiveness of self (DE=.4843, SE=.1439, p <.001, IE 95% CI=.2015 to.7671) and feeling forgiven by God (DE=.3058, SE=.1181, p=.009, IE95% CI=.0737 to.5380), were reduced, but remained significant, when PTG was added as a mediator, indicating partial mediation. Our results suggest that the relation between forgiveness and reduced suicidal behavior may be due, in part, to the impact of forgiveness on ability to enact growth-related change after a traumatic event. Forgiveness may involve addressing feelings of anger, guilt, and/or shame, allowing the individual to reclaim or modify important values that encourage personal growth. Our findings may have clinical implications. Promotion of acceptance and meaning (e.g., via ACT) to foster posttraumatic growth, and enhancement of forgiveness (e.g., via the REACH model), may constitute an important, multi-modal approach to reducing suicide risk in veterans.

135. PROJECTED MEAN CHANGE IN TEMPERATURE FROM 2000 TO 2050 IN THE CONTINENTAL UNITED STATES DUE TO CLIMATE CHANGE

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Introduction: During the 20th century the global mean temperature increased by 0.75°C and current climate change forecasts predict even greater increases throughout the 21st century. There are four Representative Concentration Pathways (RCPs) used to model future climate change based on present and future greenhouse gas emissions. The models range from best-case, full-emission control scenarios to worst-case,

unrestricted pollution, but all RCPs predict serious and detrimental consequences for the planet, including sea-level rise, ocean warming, changing infectious disease patterns, and increasingly frequent and severe natural disasters. While the United States is one of the countries that is least vulnerable to climate change, a drastic increase in mean temperature would still be a severe threat. This project sought to model the mean temperature change between 2000 and 2050 for the continental United States under two climate change scenarios - RCP 2.6, known as the best case, and RCP 8.5, the worst. Methods: Mapping and analysis were completed using the ESRI ArcGIS 10.3 software package. Current and projected climate variables were accessed through WorldClim.org, a publicly available climate database. Data were high resolution (1 km²) but, to control file size, was displayed as °C x 10. The current mean temperatures were averaged based on monthly data collected from 1950 to 2000, and interpolated for areas with insufficient observations. Data in the United States is subject to very little interpolation due to the high density of observation sites. Projected data relied on the Beijing Climate Center Climate System Model (BCC_CSM 1-1) because this model has been validated and performs as well as other generally accepted climate models. Calculations of mean temperature change were done as raster calculations then output was mapped. A US Census file of state boundaries was overlaid on the final maps to provide visual reference. Results: Under RCP 2.6, New England, the Great Lakes, the Appalachian Mountain Region, and the Rocky Mountain Region will all experience temperature increases in excess of 2°C. The coastal US will experience changes between 1°C and 1.4°C. Under RCP 8.5, New England, the Great Lakes, and the Rocky Mountain Region will see an increase of 3°C or more. The Southern Appalachian Mountain Region will increase in mean temperature between 2.5°C and 3°C. The Florida peninsula and the Gulf Coast of Louisiana will experience the least dramatic change but the increase will still be in excess of 1.5°C. Conclusion: Under the currently accepted RCPs, all of the US is projected to experience some increase in mean temperature by 2050, regardless of current climate change control and mitigation efforts. Under RCP 2.6, 25% of the US will see temperature increases of 2°C or more. If there are no mitigation efforts and climate change remains unchecked, 97% of the US will experience these 2°C increases, with 30% of those areas at or above 3°C. As this analysis demonstrates, failing to address climate change will have serious consequences for the entire continental US.

136. PREVALENCE AND TRENDS OF WEIGHT STATUS AND DYSLIPIDEMIA AMONG U.S. CHILDREN AND ADOLESCENTS FROM 1999-2012

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Obesity and dyslipidemia in childhood and adolescence are associated with atherosclerosis and cardiovascular diseases in adulthood. Early detection and treatment of dyslipidemia may prevent atherosclerosis formation and reduce cardiovascular diseases in later years. The prevalence of childhood obesity has tripled in the past three decades and the obesity epidemic has led to a larger population of children with abnormal lipids levels. This study aimed to examine the prevalence and trends of weight status and dyslipidemia among U.S. children and adolescents (6-19 years) from 1999-2012, and to examine the association between them in this period. A total of 19,395 non-pregnant children and adolescents were selected from the National Health and Nutrition Examination Survey (NHANES) 1999-2012. In accordance with the recommendation from Expert Panel on Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents, dyslipidemia was classified as any of the following serum lipid abnormality: high-density lipoprotein cholesterol (HDL-C) of less than 40 mg/dL, low-density lipoprotein cholesterol (LDL-C) of 130 mg/dL or greater, or triglyceride (TG) concentration of 130 mg/dL or greater. Body mass index (BMI) was used to determine weight status. Overweight (BMI 85th to <95th percentile), obesity (BMI =95th percentile), and severe obesity (BMI =99th percentile) were determined by the 2000 U.S. Center for Disease Prevention and Control growth charts. Chi-square test was used to compare the prevalence of dyslipidemia and weight status by demographic variables. Cochran Armitage Test for Trend was used to examine trends of both dyslipidemia and weight status by survey year. Multiple logistic regression analyses were conducted to examine association between weight status and dyslipidemia. Odds ratios (OR) with associated 95% confidence intervals (CI) were estimated. Overall, the prevalence of

obesity increased from 14.77% in 1999-2000 to 19.63% in 2011-2012 (P-trend<0.0001); while the prevalence of severe obesity increased from 4.40% in 1999-2000 to 6.83% in 2011-2012 (p-trend<0.0001). The prevalence of dyslipidemia decreased from 35.2% in 1999-2000 to 26.9% in 2011-2012 (p-trend<0.0001). Overweight and obese adolescents were more likely than normal-weight adolescents to have dyslipidemia (OR=1.71, 95%CI=1.42-2.06 and OR=2.95, 95% CI= 2.48-3.51, respectively). Severe obesity was associated with increased odds of high LDL-C (OR=2.09, 95%CI= 1.45-3.01), low HDL-C (OR= 5.11, 95%CI=4.24-6.15), high TG (OR=4.14, 95%CI=2.92-5.94) and dyslipidemia (OR=3.11, 95% CI=2.41-4.01). In conclusion, the prevalence of obesity and severe obesity increased, and dyslipidemia decreased among children and adolescent in the U.S. over study period. Weight status, measured by BMI, is associated with serum lipid abnormality. Reduction in weight in childhood and adolescence would control adverse lipids and subsequently would reduce cardiovascular diseases.

137. BEHAVIORAL FACTORS, METABOLIC SYNDROME AND SELF-REPORTED HEALTH STATUS IN AMERICANS AGED 40 AND OVER

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Metabolic syndrome (MetS) is an accumulation of heart disease risk factors with diabetes. MetS populations are six to eight times more likely to be diagnosed with heart disease and two to three times more likely to die from it. The aim of this project was to determine whether behavioral factors differ among metabolic conditions and self-reported health, and to determine the relationship between metabolic conditions and self-reported health. Data from the National Health and Nutrition Examination Survey (2005-2006) were used to identify cardiometabolic conditions with risk factors: Waist circumference, elevated blood pressure, triglycerides, glucose, and low high density lipoprotein cholesterol. Four elements of behavioral factors are smoking, alcoholic consumption, diet and physical activity. A series of weighted logistic regressions were used to determine whether behavioral factors differ among different metabolic conditions and self-reported health. Rao-Scott chi-square test was used to determine the association between metabolic factors and self-reported health. Behavioral factors were significantly associated with cardiometabolic condition and self-reported healthy status. Smokers were more likely to report fair/poor health status than non-smoker with odds ratio (OR) 2.21 (95% CI: 1.45, 3.35). Individuals who participated in light physical activity and fair/poor diet were more likely to have fair/poor health status compare to those involved in vigorous physical activity and excellent/ very good/good diet with OR= 5.45 (95% CI: 2.89, 10.28) and 3.16(95%CI: 1.97, 5.09), respectively. Individuals with fair/poor diet were more likely to have metabolic syndrome with OR=2.55 (1.69, 3.86) compared to individuals with excellent/very good/good diet. The aforementioned relationships remained significant after adjustment for demographics and socioeconomic status. Metabolic condition was significantly associated with self-reported health status (p<0.0001). Behavioral factors are important to improve quality of life and reduce cardiometabolic risk. A potential intervention strategy will be needed to encourage individuals to adopt healthier behaviors

138. GRATITUDE AND SUICIDAL BEHAVIORS: SERIAL INDIRECT EFFECTS VIA WELLNESS BEHAVIORS AND DEPRESSION

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Suicide is a significant public health concern in the United States, and is the second-leading cause of death on college campuses. College students may be at greater risk for suicidal behavior due to the high prevalence of psychopathology on college campuses and failure to practice health-promoting behaviors. The development of effective prevention and intervention strategies for suicidal behavior is dependent on

the successful identification of malleable risk and protective factors. One factor that may reduce suicide risk is gratitude, the tendency to appreciate the helpful actions of others and the positive in life, which is beneficially related to mental and physical health outcomes, including suicidal behavior. Gratitude may exert a direct influence on suicidal behavior, but may also indirectly reduce suicide risk via its influence on other factors, such as enhancement of wellness behaviors or reduction of depressive symptoms; however, this premise has not been examined. We hypothesized that gratitude and wellness behaviors would be positively related, and that both factors would be negatively related to depression and suicidal behavior. We also hypothesized that wellness behaviors and depression would mediate the relation between gratitude and suicidal behavior in a serial fashion, such that greater gratitude would be related to greater engagement in wellness behaviors and, in turn, less depression and consequent suicidal behavior. Our sample (N=433) was primarily White (n=349) and female (n=287), with a mean age of 21.6 (SD=5.68), and were recruited from a public university in the southeast region of the United States. Participants completed an online survey including: Gratitude Scale, Wellness Behaviors Inventory, Center for Epidemiologic Studies Depression Scale, and Suicidal Behaviors Questionnaire-Revised. Bivariate correlations and mediation analyses, per Hayes (2013), were conducted covarying age, sex, and ethnicity. In bivariate correlations, gratitude and wellness behaviors were positively correlated, and both were negatively correlated to depression and suicidal behavior ($p < .01$). In serial mediation analyses (5000 bootstrapped samples), the total indirect effect of gratitude on suicidal behavior was statistically significant when wellness behaviors (1st order mediator) and depression (2nd order mediator; 95% CI=-1.17 to -0.22) were included in the model. Our findings suggest that being grateful for the positive in life may increase motivation to take care of one's self via engagement in proactive wellness behaviors. In turn, this enhanced wellbeing may contribute to a reduction in depressive symptoms and, in turn, to less risk of engagement in suicidal behavior. Therapeutically bolstering gratitude, perhaps via positive psychological activities (e.g., gratitude journal), and enhancing engagement in wellness behaviors (e.g., via behavioral activation), may reduce depressive symptoms in college students and, in turn, suicide risk.

139. ASTHMA BASED EDUCATION FOR IMPROVING KNOWLEDGE AND CARE OF ASTHMATIC CHILDREN IN HEALTH CARE PROVIDERS

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Asthma affects millions of children each year. When children have asthma, this sickness not only affects them but their caregivers as well. There are many elements of asthma that can affect both the child and the caregiver's quality of life. Education of asthma and ways to improve this disease become vital points to cover when trying to improve their quality of life. Therefore it is imperative that providers have the knowledge to educate the child and caregiver of this disease and properly diagnose them. This author will utilize asthma education to improve provider's knowledge of this optimal treatment of this diagnosis. The population will include all providers at the East Tennessee State University nurse managed clinics that treat children. This will be discovered through a pre-test and post-test provider knowledge questionnaire performed at the clinics. Utilizing this plan will expectantly improve the provider's knowledge of this diagnosis and how to provide the best treatment for this disease. However, this project is still in the implementation phase and the results are pending.

140. FACILITATORS AND BARRIERS OF CLINICAL PRACTICE GUIDELINES ACCOMPANY PRESCRIBING VARIATIONS THAT MODIFIES RISKS OF PRESCRIPTION DRUG ABUSE

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Introduction: It is important to understand why practitioners do what they do with prescribing practice. Poorly monitored and carelessly prescribed benzodiazepines or opioids can be a danger to the patient and the community. Insight into professional intention may reveal principle weaknesses that perpetuate the

problems with utilization of clinical practice guidelines (CPGs) and thus problems with prescription diversion/abuse. Providers possess an integral role in the distribution of controlled substances and scheduled medications of high abuse potential. Likewise, these providers hold a key intervention point and potential to lessen prescription drug abuse. One important intervention in the reduction of prescription drug abuse is utilization of evidence-based CPGs. The effectiveness of CPGs depends, in part, on the extent of utilization or adoption. A providers' attitudes, beliefs, behaviors, and norms, exert influence over their intention and thus the degree of utilization of CPGs. An exploration of how providers implement or escape implementation of CPGs will help clarify barriers and facilitators to utilization. **Methods:** This capstone project is a quasi-experimental design that involves a pretest, posttest, educational intervention and lastly a survey questionnaire examining the providers' attitudes, beliefs, behaviors, and norms. Using the Theory of Planned Behavior (TPB), this capstone aims to elicit and explore undisclosed attitudes, beliefs, behaviors, and norms associated with the utilization of CPGs. The population is providers within the facilities of the James H. Quillen Veterans Affairs Medical Center (VAMC) that include physicians, pharmacists, nurse practitioners, residents, psychiatrists, and physician assistants. From this population of 300 plus providers the goal is to enlist at least 100 employees/individuals that will agree to participate in the capstone. This will be a convenience sample of those participants working within the VAMC and on campus at the James H. Quillen VAMC. The survey used for this project was pilot tested during the procedures associated with the original authors' research. Copyright permission was obtained to use the survey. Participation is designed to be anonymous. Data analyzed using SPSS software. A level of significance will be set for $\alpha = 0.05$. Descriptive statistics will be used with all items. Pearson, Chi-square, and Spearman will be used to develop correlations between the interval and ordinal data. **Results:** This capstone has the potential to reveal a wealth of information about how attitudes, beliefs, behaviors, and norms affect the intention to utilize CPGs. This author postulates that the capstone may identify differences in providers between genders, age, specialty, years of experience, comfort and confidence, level of concern about negative prescribing outcomes, self-efficacy, job related constraints, and the nature of interprofessional encounters. This is critical information for planning policies and protocols. This knowledge can be used to improve the integration of such evidence-based tools. This project completed the Institutional Review Board for both East Tennessee State University and the James H. Quillen VAMC, receiving an IRB approval, initial exempt.

Medical Students

141. REFRACTORY IMMUNE THROMBOCYTOPENIC PURPURA SECONDARY TO ACUTE CYTOMEGALOVIRUS INFECTION: A CASE REPORT

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Immune thrombocytopenic purpura (ITP) is characterized by decreased platelet counts secondary to excessive platelet destruction and reduced platelet production. Underlying viral illness is often believed to play a role in the pathogenesis, and specific viral infections such as Rubella, Varicella, Mumps, Epstein-Barr virus, and Cytomegalovirus (CMV) have been linked to ITP. In many cases, however, the etiology is never clearly defined. ITP typically responds to specific therapies such as intravenous immunoglobulin (IVIG), corticosteroids, intravenous anti-D, and splenectomy. And while the majority of cases respond to these standard therapies, some reports have described patients who remain refractory despite treatment. Recently, there has been increasing evidence in the literature that suggests CMV infection may be associated with ITP, particularly refractory ITP. To date, there have been 9 cases of severe, steroid-resistant CMV-associated ITP reported in immunocompetent adults. In this report, we present a previously healthy 19-month-old female who sought care for worsening bruising on the lower extremities, lower back, and head, all of which initially began as pinpoint rashes only weeks prior. Laboratory data at the initial hospital admission was significant for a platelet count of 7,000, but was otherwise unremarkable. Over the next four weeks, she received various treatment attempts including IVIG, Corticosteroids, and IV WinRho (anti-D immune globulin), all with minimal improvement in platelet counts. Bone marrow biopsy and various

molecular diagnostics including flow cytometry, FISH analysis, and chromosomal analysis were also obtained and failed to lend support for any diagnoses apart from the original interpretation of ITP. After an extensive literature search and discussion with the infectious disease team, viral load testing via PCR was initiated and found to be consistent with an acute CMV infection. Treatment for the refractory ITP secondary to acute CMV infection was then initiated with a strict regimen of Valganciclovir and weekly IVIG. Within weeks, the patient's ITP had completely resolved, and upon testing negative for CMV viral loads on multiple occasions, the patient was discontinued from Valganciclovir and IVIG therapies. Now, nearly nine months later, she continues to remain in remission of this disease process. In summary, we report a pediatric patient who displayed symptomatic, refractory thrombocytopenia, who was diagnosed with ITP and simultaneously found to have an active CMV infection. Thus, in refractory cases of ITP, we believe it necessary to maintain a low threshold in suspecting CMV infection as the underlying cause of thrombocytopenia.

142. ABDOMINAL DISCOMFORT IN AN ADOLESCENT FEMALE

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Introduction: Adnexal masses, including ovarian lesions, are uncommon and have an estimated incidence of 2.6 per 100,000 cases for adolescences less than 18 years of age. Approximately 57% of these cases are diagnosed as an ovarian cyst. Of those, the majority of cyst are less than 5cm and clinically managed. For cysts larger than 5cm, less aggressive surgical interventions are preferred to preserve ovarian function.

Case Description: A 15-year-old female presented to her pediatrician with a 6 month history of vague abdominal discomfort and unremarkable review of systems and medical histories. The exam noted an unimpressive protuberant abdomen in an adolescent of >95% for weight and 75-90% for height. Following diagnostic imaging, the adolescent was subsequently referred to Pediatric Hematology/ Oncology for further evaluation. Ultrasound imaging revealed a lesion measuring 40.3cm x 13.6 cm x 27.6 cm, extending from the xiphoid process downward into the pelvis, arising from the left ovary. The patient underwent surgical laparotomy requiring removal of the left ovary secondary to extensive size, loss of normal anatomy, and presumed loss of function. Pathology confirmed a 7 kg benign serous cystadenoma of the left ovary. The patient recovered well postoperatively and continues to have routine gynecologic follow up with regular menstrual cycles. Long term effects on fertility are yet to be determined but presumed low with one remaining functional ovary. Discussion: This case illustrates a rare presentation of an oversized ovarian cyst resulting in the inability of ovarian preservation. For most adolescents with cysts >5cm, intervention involves a spectrum of clinical management to less invasive surgical interventions with the ultimate goal of preserving this reproductive organ. Unfortunately, the literature is sparse regarding oversized ovarian cysts including epidemiology, time to presentation, implications for more aggressive surgical management, and long term effects of said intervention on reproductive health.

143. FAMILY PHYSICIANS' KNOWLEDGE OF AND COMFORT WITH PATIENTS' SEXUAL HEALTH CONCERNS

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Sexual health affects many aspects of patient health; however, it is often not addressed with patients, and research shows that sexual health is not emphasized in medical education. Primary care providers ought to be on the front lines of the integration of sexual health into patient-centered care. In rural areas, this responsibility often falls to family medicine physicians as patients do not have access to Ob/Gyns (obstetrician and gynecologist). The objective of this study was to assess the types and prevalence of sexual health concerns among patients in rural Appalachia and also to assess the comfort level of family medicine physicians in addressing and managing sexual health concerns. Sexual health was defined to include sexual wellness, infections, contraception, and sexual dysfunction. Participants included East Tennessee State University (ETSU) family medicine attending physicians (faculty physicians) and resident physicians at

three designated ETSU residency clinic sites. We designed and distributed an eighteen-question survey to residents and faculty physicians in order to evaluate how the recently emerging sexual health emphasis has translated to the practice of family medicine in East Tennessee. Of note in the data analysis, the majority of providers reported they feel at least moderately comfortable discussing sexual health with patients. However, when asked how frequently they address sexual health with patients, most providers reported that they do not frequently ask patients about sexual health concerns. Even though the American College of Obstetrics and Gynecology (ACOG) recommends long-acting reversible contraceptives (LARCs) as first-line contraceptives, less than half of providers recommend LARCs to patients. Additional exploration is needed to address why most family medicine physicians do not ask patients about sexual health as well as to determine if any regional barriers exist. This data also suggests that family medicine providers often do not have the means to recommend first-line contraception, likely due to lack of access and/or lack of knowledge regarding current recommendations. This study suggests that more emphasis should be placed on addressing sexual health and there is a need for additional training perhaps through educational workshops, or the distribution of educational brochures, or training in LARC placement.

144. CARDIOVASCULAR DISEASE ANALYSIS OF A HISPANIC MIGRANT POPULATION

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Purpose: Community Based Participatory Research Course is a two semester interdisciplinary course of medicine, nursing, and public health students from East Tennessee State University (ETSU). The purpose is to work with the migrant tomato farmers of east Tennessee and Rural Medical Services (RMS) to create a research project to improve migrants' health and well-being. Methods: First, students identified potential research topics based upon an understanding of the target community developed last semester. Then these ideas were presented to RMS. Over the summer, several group members traveled with RMS to tomato farms in Greene, Cocke, and Hamblen County during summer migrant field screening clinics to: Provide short surveys, translated into Spanish, to assess cardiovascular disease risk (CVD) based on United States Preventative Services Task Force (USPSTF) guidelines. The students Collect lipid panels on all at-risk patients and reconvened after summer break to evaluate the raw data taken from de-identified health screening intake forms. Conclusions: Higher BMIs were associated with higher LDL levels. No statistically significant associations were found between demographic variables and the risk of CVD. This could be due to a small sample size (n=63). Compared to CDC national data, a greater proportion of male migrants less than 40 years of age appear to have total serum cholesterol >200 mg/dL. Further studies are necessary to determine statistical significance.

145. DELTA-TOCOTRIENOL AND SIMVASTATIN INDUCE CYTOTOXICITY AND SYNERGY IN BRAF MUTANT SK-MEL-28 BUT NOT IN WILD TYPE BRAF SK-MEL-2 MELANOMA CANCER CELLS

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Targeting the mutant BRAF protein is an accepted approach to the treatment of metastatic melanoma. Potent and specific BRAF inhibitors like vemurafenib and dabrafenib are superior to chemotherapy in treatment of BRAF mutant melanomas which represent nearly 50% of all melanomas. Previous studies

have shown that certain isoforms of vitamin E and statins can have synergistic anti-cancer activity. We determined whether a combination of delta-tocotrienol (DT3), an unsaturated vitamin E isoform, and simvastatin, an HMG-CoA reductase inhibitor, can exert an anti-neoplastic activity on BRAF-mutated SK-MEL-28 and BRAF-wild type SK-MEL-2 melanoma cell lines and whether a differential effect would be evident. MTS assays were used to analyze cytotoxicity. SK-MEL-28 and SK-MEL-2 cells were cultured in MEM media containing 10% serum and plated in 96-well culture plates for 24 hours then treated with DT3 (0-40 μ M), simvastatin (0-5 μ M), or a combination and dosed again at 48 hours. SK-MEL-28 and SK-MEL-2 cells grown in 60 mm plates and were treated with DT3 at concentrations of 40, 30, 20 μ M, simvastatin at a concentrations of 20, 10, 5 μ M or dissolution vehicle as a control for 6 h. Protein concentration of cell lysates was measured spectrophotometrically (GLO Max Multi+, Promega), using a BCA protein assay kit. The samples were run in SDS PAGE and blotted onto nitrocellulose membranes. Membranes were incubated with antibodies against Hsp 70 (Enzo Life Sciences, Farmingdale, NY), Hsp 90 (Santa Cruz, Dallas, TX), pS6 and pBAD (Cell Signaling, Danvers, MA). Using MTS assay, we found that DT3 (IC₅₀ 38.8 μ M) and simvastatin (IC₅₀ 22.7 μ M) have cytotoxic effects on melanoma cell line SK-MEL-28, but on the SK-MEL-2 cells DT3 does not have an effect at the concentrations studied (10-40 μ M DT3) yet simvastatin (IC₅₀ 16.9 μ M) does have cytotoxicity. Further studies determined that combinations of these drugs display a synergistic effect on SK-MEL-28 by inhibition of pS6 and pBAD and subsequent apoptosis. However, these effects are not observed in SK-MEL-2 cells; treated SK-MEL-2 cells show over-expression of Hsp70 and Hsp90 suggestive of a rescue effect leading to lesser cytotoxic activity. The selective cytotoxicity observed in BRAF-mutated cells and not in wild type BRAF melanoma cell lines by both DT3 and simvastatin warrants further research into the potential therapeutic use of these combinations. This observation has added importance in the light of recent findings that show the acquisition of BRAF mutation is an early event in melanogenesis and hence these compounds may have a key role in chemoprevention approaches to melanoma.

146. DEVELOPMENT OF MULTIPOLAR CELL SHAPE IN MOUSE CORNEAL ENDOTHELIUM

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The corneal endothelium is a single layer of specialized cells that keeps the cornea transparent by pumping excess fluid out of the tissue. Adult endothelial cells are polarized and, from their basolateral surface, extend many pseudopod-like processes with ruffled borders. Thus, while extremely thin, these cells are geometrically very complex and exhibit a large surface to volume ratio. To gain clues about endothelial cell morphogenesis and the physiological significance of this unique architecture, we examined the timing of cell shape changes during tissue development. Using a compound transgenic strain of mice (P0-Cre; R26-Tomato), corneas were obtained at postnatal day 6 (P6), P8, P10, P14, P16 and P18. In animals with both P0-Cre and R26-Tomato genes (i.e., P0-Cre⁺; R26-Tomato⁺), the red fluorescent protein (RFP) Tomato is expressed by and completely fills the cytoplasm of most, but not all, neural crest-derived cells, including those of the corneal endothelium. In a separate group of mice without RFP expression in their endothelial cells, antibodies to the tight junction protein ZO-1 and neural cell adhesion molecule (NCAM) were used to view cell apical and lateral borders, respectively. Corneas were then fixed, flat-mounted and visualized by conventional fluorescence and confocal microscopy. Polygonal apical borders characterized endothelial cells at all time points. On the other hand, a transition from smooth to ruffled lateral boundaries was seen between P12 and P14, with membrane complexity increasing up to P18. By P14, cells expressing cytoplasmic RFP were also observed to extend multiple processes that radiated outward in the plane of the monolayer. Our results indicate that endothelial cell geometry undergoes a fundamental change around the time of eyelid opening. In this regard, the data suggest that attainment of complex cell shape, and the consequent increase in basolateral membrane, may be important for mature endothelial function.

147. SIMULATED MEDICINE IN ACTION: USING MEDICAL SIMULATION CAMPS FOR RURAL APPALACHIA HIGH SCHOOL STUDENTS TO IDENTIFY PERCEIVED BARRIERS TO MEDICAL EDUCATION

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Physician shortage in rural areas of the United States is an ongoing and worsening problem that manifests close to home, here in rural Appalachia. The best method for attracting physicians to underserved areas is to train individuals who grew up in the areas to become the next generation of physicians. However, due to many variables, it is known that significantly fewer high school students from rural Appalachia continue on to earn a doctoral level degree, compared with peers who grow up in other regions. The Simulated Medicine in Action (SMIA) Camp in the Center for Experiential learning at the Quillen College of Medicine was designed with the objective of increasing the number of rural Appalachian high school students who will go on to earn a medical degree. This is accomplished by introducing these rural Appalachian minority students to the profession of medicine, encouraging them to realize they are capable of attaining a medical degree, and addressing perceived barriers to medical education. Previous research has demonstrated that the SMIA camp is an effective tool in providing a unique experience to high school students, which allows them to clarify, and even increase, their interest in healthcare professions. While our program contains multiple facets, the focus of this study is the 2015 summer camp sessions when we began surveying participants about their perceived barriers to a medical degree and how the camp influenced their desire to become a physician. Twenty camp participants were given an identical survey the first and last day of our week-long 2015 camp. Camp participation was open to any regional high school student who had completed their sophomore, junior, or senior year. On the first day of camp, all participants indicated an interest in a healthcare profession, but only 65% of students indicated they were considering becoming a physician. On the fifth and final day of camp, 90% of students indicated they were considering becoming a physician. The most reported perceived obstacle was “it is too expensive,” with 55% of students indicating it as a barrier. Although this number remained unchanged from the beginning to the end of the week, students believed it was an obstacle they could overcome, as indicated by the average response to the prompt, “If I decide that I want to be a physician, I believe that I am capable of achieving that goal” with an average Likert scale (5=strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree) score of 4.7. It was concluded that the SMIA Camp is an effective tool for increasing interest in medical school among regional high school students already considering a career in healthcare. Although our camp is unsuccessful at altering perceived barriers, SMIA survey results demonstrate that there may be a threshold at which the desire to become a physician overrides the impact of perceived barriers. Further research and camp sessions will work to more specifically address the most common perceived barriers, in the overall effort to increase the number of students in rural Appalachia who will become physicians.

148. COMPLIANCE IS CONTAGIOUS: THE SPREAD OF A DOCUMENTATION STANDARD FROM THE PRE-OP CLINIC OUTWARDS.

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Introduction: The Perioperative Surgical Home addresses the fragmentation and high cost of the perioperative period by delivering coordinated care throughout the surgical experience. One core tenet of the Perioperative Surgical Home is standardization. Preoperative documentation is essential in perioperative care and has the potential to be standardized. Methods: We analyzed the implementation of a preoperative documentation standardization intervention in Vanderbilt’s Preoperative Evaluation Clinic (VPEC) and its impact outside of VPEC. This phased intervention consisted of clinician education with monthly feedback (Phase 1), followed by the development of a compliance dashboard and addition of this

metric into VPEC's Ongoing Professional Performance Evaluation system (Phase 2). Clinician adherence was measured within VPEC (primary adherence) and outside VPEC (secondary adherence), and chi-square tests were used to determine the effect of the intervention on clinical documentation. Clinicians outside VPEC were classified as adopters and non-adopters. Logistic regression was used to determine relative effect of clinician role and exposure to standard preoperative evaluations on adopting a preoperative documentation standard. **Results:** We analyzed 146,033 preoperative evaluations, 51,381 (35.2%) from VPEC and 94,652 (64.8%) from outside VPEC. Baseline primary adherence in VPEC was 0%, increasing to 44.7% in Phase 1 and 91.5% in Phase 2 ($p < 0.0001$). For non-VPEC clinicians, the baseline secondary adherence rate rose from 0.20% to 2.4% in Phase 1, and 12.8% in Phase 2 ($p < 0.0001$), with partial adherence increasing from 5.8% to 17.6%, and 36.0% by the end of the study ($p < 0.0001$). We found that the odds of adoption varied across clinician roles, with residents OR 2.9 95% CI (1.2, 7.3) and student registered nurse anesthetists OR 6.4 95% CI (2.2, 18.7) more likely to adopt the standard compared to attending physicians (baseline group) and certified registered nurse anesthetists OR 0.6 95% CI (0.3, 1.6). Exposure to standard preoperative evaluations had no effect on adopting standardized practices OR 1 95% CI (0.7, 1.3). **Discussion:** Primary adherence to a preoperative documentation standard was improved with the addition of electronic feedback. Of note, implementation of this system in our preoperative clinic had significant impact outside of VPEC, with substantial secondary adherence demonstrated. Trainee status was found to be a significant predictor of adoption of the standardized format. The implementation of documentation standards is a step toward establishing consistent processes as called for by the Perioperative Surgical Home.

149. OPIATES AND PREGNANCY FROM THE PATIENT'S PERSPECTIVE: A CASE STUDY

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Much focus has been given to the problem of Neonatal Abstinence Syndrome (NAS) in the Appalachian region over the past decade. There have been new databases developed by law enforcement and government agencies to track the incidence of NAS. Multiple political and advertising campaigns have been developed highlighting the need to address the issue of children born addicted to opiates. However, there is a severe lack of research directly involving patients who meet the definition or the long term implications of NAS. Furthermore, there is a wide degree of disagreement concerning what medical advice is the standard of care for treating these families. Our study involved an in-depth discussion with a mother whose baby was diagnosed with NAS. Her story highlighted the problems of conflicting medical advice from various providers, misconceptions about legal concerns, lack of reliable social support and health information, stigma of identifying as a pregnant woman dependent on opiates and a myriad of other concerns that caused this patient to feel as if making informed medical decisions was impossible. One example of this patient's frustration was her instruction to wean from opiates by one provider and then being told by another provider that weaning from opiates was dangerous to her baby's health. We spent extensive time exploring local resources, internet sites, medical literature and lay publications. It was concluded that the experience of the woman in our case study is most likely a common situation. There was a great deal of disagreement among experts in the medical community about what treatment options were optimal. Many of the local providers we interviewed admitted that they found this population to be frustrating and avoided working with them. We were given conflicting information about legal implications from different sources. We are currently conducting more quantitative research to corroborate our conclusion. However, such research is cumbersome as this vulnerable population is heavily protected by research review boards, are difficult to contact and tend to be guarded when asked to participate.

150. A RETROSPECTIVE ANALYSIS OF PREGNANCY AND BIRTH OUTCOMES ASSOCIATED WITH A PRENATAL CARE OUTREACH PROGRAM FOR HISPANIC WOMEN IN RURAL TENNESSEE

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Introduction: The importance of prenatal care is a well-established principle in the field of obstetric care. Inconsistent, poor and/or inadequate prenatal care is associated with a wide range of poor health outcomes including, pre-term labor, low-birth weight infants and maternal mortality. Hispanic women, specifically migrant/seasonal farmworkers, face a variety of barriers to early and effective prenatal care including: language barriers, poverty, transportation and frequent mobility. Northeast Tennessee has grown to include a robust Hispanic community. Rural Medical Services (RMS), a provider of primary care in rural Tennessee, has developed and implemented a prenatal care outreach program for the local Hispanic population. Through this program Hispanic pregnant women receive educational and clinical services ranging from prenatal education materials and at-home visits to translation services and Lamaze training. The purpose of the current study was to determine the impact of RMS' prenatal outreach program on the birth outcomes of regional Hispanic mothers. **Methods:** A retrospective medical file review using RMS electronic medical records as well as prenatal outreach program documents, including all patients that gave birth during 2013, was conducted. Independent variables included the mother's age and ethnicity, identification as migrant/seasonal worker, weeks of gestation at first prenatal visit, number of prenatal visits, and number of prenatal outreach visits/contacts. Dependent variables included infant's gestational age at birth (weeks), infant's birth weight (oz.), and APGAR scores. **Results:** In total, 213 women received care for pregnancies with expected due dates in 2013. Of those, birth outcomes data were available for 180. There was no significant difference in the incidence of low birth weight for infants of non-Hispanic and all Hispanic mothers (9.8% v. 4.3%; $p=.14$) nor was there a significant difference between Hispanic mothers who did not identify as migrant/seasonal farmworkers and those who did (5.1% v. 3.4%; $p=.66$). Likewise, there was no significant difference in the incidence of pre-term birth (<37 weeks) between non-Hispanic and Hispanic mothers (12.9% v. 8.5%; $p=.35$) nor was there a significant difference between Hispanic mothers who did not identify as migrant/seasonal farmworkers and those who did (6.7% v. 10.3%; $p=.47$). While the number of prenatal visits for Hispanic mothers was significantly correlated with birth weight ($r=.35$; $p<.001$) and gestational age at birth ($r=.40$; $p<.001$), the number of prenatal outreach visits was not significantly correlated with birth weight ($r=.16$; $p=.08$) or ($r=.15$; $p=.10$). **Conclusions:** The RMS prenatal outreach program has closed the prenatal care disparity gap between their Hispanic and non-Hispanic patients. However, there was no therapeutic advantage to an increased number of outreach visits, indicating RMS could standardize the program with a low frequency of visits.

151. ZYMOBAN-INDUCED SIRS RESULTS IN SEVERE HYPOTHERMIA AND MILD DEPRESSION OF CARDIAC DROMOTROPIC FUNCTION IN MICE

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Intraperitoneal (i.p.) injection of zymosan and cecal ligation and puncture (CLP) are commonly used in order to model SIRS in mice, but little is known about the effects of zymosan on cardiac function and body temperature. Furthermore, physiological changes caused by these two methods have never been compared. Accordingly, we measured rectal temperatures and ECGs from zymosan-treated mice and compared the results to data previously obtained from mice that had undergone CLP. We found that, unlike CLP, zymosan had no effect on heart rate. Also unlike CLP, i.p. injection of zymosan resulted in a sudden and sustained drop in rectal temperature ($31.617^{\circ}\text{C} \pm 0.638^{\circ}\text{C}$ at 1 hour post-injection and $28.833^{\circ}\text{C} \pm 2.626^{\circ}\text{C}$

at 24 hours post-injection). Finally, i.p. injection of zymosan resulted in minimal depression of cardiac dromotropic function. In order to determine whether the SIRS symptomology we observed in zymosan-treated mice was due to B-glucan's activation of the dectin-1 receptor and toll like receptor 2 (TLR2), we also treated mice with purified, particulate B-glucan. Mice treated with B-glucan did not experience significant hypothermia or any significant cardiac changes when compared with control animals, leading us to believe that other pattern recognition receptors likely play a role in mounting the innate immune system's response to zymosan.

152. QUANTITATIVE IMAGING ANALYSIS OF THE EFFECTS OF INFECTION ON WOUND HEALING IN DIABETES

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Chronic wounds affect 5 to 7 million Americans annually, generate healthcare cost in the billions of dollars, and result in over 80,000 amputations annually due to infections and other complications in diabetic and peripheral arterial disease patients. Biofilms on diabetic patient wounds often cannot be treated topically or systemically, which is why many patients must resort to amputation. The objective of this project is to determine the effect of wound infection on the rate of healing in normal and diabetic mice. In order to do this, we compared noninfected splinted excisional wounds with those infected with one of two common wound pathogens, *Pseudomonas aeruginosa* (PAO1) and methicillin-resistant *Staphylococcus aureus* (MRSA), in control and diabetic mice. We used a polygenic mouse model of diabetes (TallyHo/JngJ) that exhibits wound-healing complications similar to patients with type II diabetes. SWR/J mice were nondiabetic controls. We studied noninfected and infected groups of TallyHo/JngJ (noninfected n=8, PAO1 n=4, MRSA n=3) and SWR/J mice (noninfected n=8, PAO1 n=7, MRSA n=4). Wounds were inoculated with saline or a bacterial strain (PAO1 (8x10⁵ CFU/wound) and MRSA (4x10⁶ CFU/wound)). Wound closure was measured from digital images. Histology was performed on biopsy samples. Data was analyzed by ANOVA. The infection with PAO1 resulted in similarly delayed wound healing (p<0.01) in normal and diabetic mice as compared with controls over a 14 day period. The overwhelming PAO1 infection made comparative histology measurements difficult to perform. MRSA infected diabetic mice healed faster than their non-infected controls, and the infected normal mice healed significantly (p <0.05) faster than non-infected controls. The comparative histology results for the infected wounds of the diabetic mice did not have a significant difference from that of non-infected controls. The infected wounds of the normal mice had significantly (p <0.05) greater epithelial gaps, dermal gaps and granulation tissue areas than non-infected control groups. Wound healing was delayed with PAO1 infection in both normal and diabetic mice. MRSA did not inhibit wound healing but actually increased it in both normal and diabetic mice. Wound healing was not significantly delayed in diabetic mice. The effect of MRSA on wound healing is likely due to the differential activation of genes important for wound healing. Research reported was supported by National Institute of General Medical Sciences of the National Institutes of Health under award number R44GM099207.

153. METFORMIN SUPPRESSES SYNTHESIS OF PRO-SURVIVAL SPHINGOLIPID, SPHINGOSINE-1-PHOSPHATE, BY INHIBITION OF SPHINGOSINE KINASE-1, IN MCF-7 AND SK-BR-3 BREAST CANCER CELL LINES

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The antidiabetic drug, Metformin, may possess anti-cancer properties. Metformin has been shown to suppress proliferation of breast cancer cells primarily through activation of AMP-activated protein kinase (AMPK) and its suppression of downstream signaling pathways, such as mTOR, involved in cell replication. Other mechanisms may also play a role. Sphingolipids have a role in apoptosis and survival. Sphingosine-1-phosphate (S1P), a bioactive lipid mediator, promotes cell survival, proliferation, migration, angiogenesis, lymph angiogenesis, and immune response. S1P is involved in both intracellular and extracellular functions and regulates proliferation and survival. Blocking S1P synthesis inhibits cellular proliferation. Sphingosine kinase (SphK) is a lipid kinase that catalyzes formation of S1P from the precursor sphingosine. SphK is known to be upregulated in cancer cells, promoting tumor progression. S1P has a critical role in cancer progression and is considered a viable target for cancer therapeutics. Our previous studies show that metformin has an effect on the synthesis of pro-apoptotic ceramides. We hypothesized that metformin induces cytotoxicity by reducing levels of the pro-survival sphingolipid, S1P. Firstly, MCF-7 and SK-BR-3 breast cancer cell lines were treated with increasing concentrations of metformin, and cytotoxicity was determined by MTT cell culture experiments after 24 hours of drug exposure. Metformin induces cytotoxicity in these breast cancer cells at a lowest concentration of 2.5mM, and percentage cytotoxicity increases in a dose-dependent manner. We utilized liquid chromatography and mass spectrometry and determined that cellular S1P levels are decreased in MCF-7 cells treated with 2.5mM metformin when compared with the control group. Finally, we treated MCF-7 and SK-BR-3 breast cancer cells with metformin, SK I/II (a known SphK inhibitor), and an untreated control group for 2, 4 and 6 hours. The dose of metformin was 10mM, which was chosen from a dose-response curve using MTT assay. The dose of SK I/II was 20uM, chosen based on the IC50 given. All treatments were done using low glucose media. Using the lysates from the harvested cells, gel electrophoresis and western blots using antibodies to SphK and S1P were run. Our results showed that metformin decreased the cellular levels of SphK and S1P. Thus, metformin exhibits anticancer properties via inhibiting the production of pro-survival lipid S1P. This data suggests that the pro-apoptotic effect of metformin may be partly mediated through its disruption of synthesis of S1P in breast cancer cells. Further work is necessary to characterize the sphingolipid content of MCF-7 and SK-BR-3 cancer cells before and after metformin treatment.

154. THE EFFECTS OF VAGAL NERVE STIMULATION ON TRIMETHYLAMINE-N-OXIDE LEVELS IN A RAT HEART FAILURE MODEL

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Heart failure (HF) is a grave condition with significant morbidity and mortality. Despite advancements in pharmacotherapy and relevant treatments, HF continues to be a difficult condition to treat and prognosis remains poor. Vagal nerve stimulation (VNS) is an emerging therapeutic in HF. However, its mechanism of

action and systemic effects in HF patients are mostly unknown. Trimethylamine-N-oxide (TMAO), a gut derived metabolite of phosphatidylcholine, has recently been shown to be a better indicator of 5-year adverse events in HF than any other biomarker. We therefore investigated the effects of VNS on TMAO levels in a rat HF model. Urine samples were collected from three groups of rats: control, HF, and HF with VNS. The samples were acetonitrile precipitated and centrifuged. The supernatant was lyophilized, and LC/MS was used to determine TMAO concentrations from each group. Finally, TMAO concentrations were normalized to urine osmolality. Afterward, the percent change in TMAO levels from control were analyzed in both HF rat groups. TMAO concentration was marginally increased by 0.35% in HF animals vs. control, while HF+VNS showed decreased TMAO levels of 10.22% vs both control and HF groups. Overall, higher TMAO levels were observed in rats with HF. HF rats receiving VNS had decreased TMAO levels. The data from these preliminary studies indicate that reduction of TMAO may be one way in which VNS exerts its beneficial effects.

155. IMPROVING COPING STRATEGIES AMONGST CARTER COUNTY MIDDLE SCHOOL STUDENTS

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The ETSU Carter County rural research and practice cohort evaluated the needs of Carter County residents and stakeholders. Stress and maladaptive coping skills were identified as items of concern among community members and staff at Happy Valley Middle School (HVMS). Previous studies have demonstrated that during the school year, teens report unhealthy levels of stress. These levels of stress produce emotional and physical symptoms in similar proportions to adults, including feeling irritable or angry, nervous, anxious, or tired. By evaluating the concerns of the community along with findings of previous cohorts, formulating a health-promoting intervention was warranted. We designed, implemented, and assessed the effectiveness of an in-school health fair as a tool to address causes of stress, help-seeking behavior, and overall stress levels experienced by HVMS students. The health fair consisted of seven interactive booths that promoted healthy behavior and adaptive stress reduction techniques. Using a periodic inventory approach, the inter-professional team conducted a pre- and post-survey to measure the effectiveness of the intervention. Independent t-tests were used to analyze pre- and post-intervention differences in self-reported help-seeking behavior. The results demonstrated a statistically significant increase in the likelihood of seeking help for stress related to two of the five domains (i.e. emotional issues, physical health issues, school/homework, bullying, and family problems). The post-intervention survey found an increase in the likelihood of seeking help for stress related to physical health issues ($p < .05$) and family problems ($p < .05$). Despite the increase in help-seeking behavior, the frequency of students feeling stressed or overwhelmed from pre- to post-intervention increased ($p < .05$). This research shows that a health fair may be a beneficial tool in promoting help-seeking behavior among adolescents. Qualitatively, students were engaged with the presentations during the day. Additionally, this work has strengthened the existing partnership between HVMS and ETSU Rural Programs. Future work should refine behavioral interventions and better assess the long-term effectiveness of health fairs and their influence on responses to and perceived levels of stress. This study will serve as a foundation for future research to understand and address the community health concerns using a community-based participatory research model.

156. REPORTED HEALTH BEHAVIORS AND PERCEPTIONS OF HEALTH RESOURCE NEEDS IN NORTHEAST TENNESSEE

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It is well established that child and adolescent populations living in the Northeast Tennessee region rank poorly for many health behaviors at state and national levels. Research suggests that such health factors may be partly attributable to the built environment and lack of health-promoting community resources in the region. A survey was conducted with parents/caregivers of the Northeast Tennessee region to better understand child health behaviors, social determinants of health, and perceptions of community resource needs for supporting child and family health. The survey contributes to an ongoing needs assessment being conducted as part of the establishment of a new advocacy center within a regional hospital system. This community needs assessment aims to inform efforts to improve health and expand resources in the region. Anonymous surveys (n=50) were made available to parents/caregivers at two family community events in Northeast Tennessee during the summer of 2015. Questions used in the survey were adapted from the previously validated We Care survey, designed to assess perceptions of resource needs. The survey addressed 12 health behavior topics. More specifically, each topic on the survey included two questions: one question inquiring about the behavior itself and one question assessing the perceived availability of community resources serving the health behavior. The question format was closed-ended. For example, one survey item reads: Does your child consume sugary drinks on a typical day? Yes or No. The corresponding question regarding perception of resources reads: Do you think more resources are needed for helping children reduce sugary drink intake? Yes, No, or Maybe. The survey addressed the following topics: food security, eating fruits and vegetables, consuming sugary beverages, literacy, physical activity, screen time, general health status, breastfeeding, education level, injury prevention, smoking cessation, and social media use to obtain health information. The survey results showed that greater than 50 percent of respondents expressed a need for 10 of 12 community resources addressed in the survey. Moreover, descriptive statistics collected from the surveys demonstrated a high prevalence of child health behaviors associated with poor health outcomes. Some leading concerns elucidated by this survey include: 53.2% of respondents reported that their child consumes sugary drinks on a typical day, 50% reported that their child eats 3 or fewer servings of fruits and vegetables daily, and 28.6% reported that their child needed to visit a health care provider because of an injury during the past year. Our survey results highlight a variety of child health behavior concerns and demonstrate a failure to meet the national health recommendations in several areas. This data also provides important insights into the perceived need for community resources to address these health concerns. The information gathered through this community-based survey may help inform future research, educational outreach, establish priorities for the newly developed advocacy center, and improve community resources to promote positive health outcomes of children in the Northeast Tennessee region.

157. APOPTOSIS REPRESSOR WITH CASPASE RECRUITMENT DOMAIN (ARC) BINDS BAD AND BAX AND REDUCES AMYLOID-INCUCED APOPTOSIS IN THE B CELL

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Amyloid deposition occurs in the islets of greater than 90 percent of individuals with type 2 diabetes, and is associated with increased B-cell apoptosis and loss. During the process of amyloid-induced B-cell death, Bad and Bax localize to the mitochondria. ARC is a physiological inhibitor of apoptosis, which was recently demonstrated to be expressed in islets. In other cell types such as cardiomyocytes and neurons, ARC exhibits anti-apoptotic behavior in part by binding at its caspase recruitment domain the pro-apoptotic molecules Bad and Bax, thereby preventing their translocation to the mitochondria. We have previously

shown that adenovirus-mediated overexpression of ARC in human islet amyloid polypeptide (hIAPP) transgenic mouse islets reduces amyloid-induced B-cell apoptosis. As we have also demonstrated that Bad and Bax mRNA expression is increased under amyloid forming conditions in islets, we hypothesized that ARC reduces amyloid-induced B-cell apoptosis by binding the pro-apoptotic molecules Bad and Bax. Furthermore, we postulated that decreased ARC protein expression and/or increased Bad or Bax protein expression contribute to amyloid-induced B-cell apoptosis. To address these hypotheses, we examined protein interactions and expression in mouse islets under various experimental conditions. As wild type mice do not form amyloid, hIAPP transgenic mice that develop amyloid deposits identical to those in humans were used to study amyloid deposition. Isolated islets from hIAPP transgenic and non-transgenic mice were cultured for 144 hours in either low glucose (11.1 mM; control conditions) or high glucose (16.7 mM; amyloid-forming conditions). Protein lysates were used to analyze protein interactions and expression. Immunoprecipitation showed that ARC binds both Bad and Bax in isolated hIAPP transgenic mouse islets overexpressing human ARC. Immunoblot analysis demonstrated that ARC protein expression was not significantly decreased in islets under amyloid-forming conditions. Further, Bad and Bax protein expression were not significantly increased in islets under amyloid-forming conditions. These data suggest that the pro-apoptotic effects of Bad and Bax occur by mechanisms other than changes in their protein expression, with possibilities including alterations in Bad, Bax, and ARC protein interactions.

158. SUCCESSFUL TREATMENT OF GRANULOMA FACIALE WITH THE ADDITION OF ETANERCEPT TO METHOTREXATE THERAPY

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Granuloma Faciale (GF) is a rare cutaneous disorder of unknown etiology that is notoriously difficult to treat. The disease is confined to the skin, and even in disseminated disease, there is no reported systemic involvement. The differential for GF is broad and includes cutaneous T-cell lymphoma, sarcoidosis, erythema elevatum diutinum, discoid lupus erythematosus, and fungal or microbial infections. Although the clinical picture alone can be suggestive of granuloma faciale, definitive diagnosis must be made by biopsy of the lesion. Many therapies have been proposed to manage this difficult condition, but none have been very satisfactory. Recent therapies implemented to treat GF have included pulse-dyed laser, cryosurgery, topical Tacrolimus, phototherapy, dermabrasion, oral Dapsone, Clofazimine, and topical, oral, and intralesional steroids, each with guarded success rates. In this case report, we present a 74 year-old male who initially presented with a ten-year history of an eruption that began on his nose and spread to his forehead, consistent with multiple lesions of Granuloma Faciale. Initial treatments included topical and intralesional corticosteroids as well as a short trial of Hydroxychloroquine, followed by a trial of Dapsone; after little improvement with any these therapies, cryotherapy was attempted in order to reduce the prominence of the lesions. Two and a half years later the lesions of GF returned, and the patient was empirically started on Methotrexate. After only modest improvement at a four-month follow-up, Etanercept was added to the regimen on the premise that the inflammatory nature of his lesions would respond to a TNF-alpha blocking agent and it could add to the effects of the Methotrexate. Two weeks after the Etanercept was started, the patient showed considerable improvement with most of the lesions appearing as brownish-red macules. Nearly a year after starting Methotrexate therapy, the lesions have dramatically resolved to faded hyperpigmented macules. In summary, we report a patient who responded modestly to Methotrexate therapy but dramatically so with the addition of a limited course of Etanercept and has remained disease-free one year from initiation of treatment. We propose that further investigation should be done on the treatment of Granuloma Faciale with Methotrexate as well as other immune-mediated diseases of the skin.

Pharmacy Students

159. ACTIVE CONTENT OF VITAMIN D3 SUPPLEMENTS

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Introduction: Vitamin D (Vit D) deficiency has been a pandemic across the world for several years. Research shows that adequate levels of Vit D play a critical role in bone strengthening and reduces the risk of bone fractures.¹ Vit D deficiency can lead to a wide variety of diseases such as cancer, heart disease, rickets, osteomalacia, and osteoporosis.² In 2011, The Institute of Medicine committee suggested that persons with serum 25 (OH) D concentrations of less than 30 nmol/L are considered to be deficient. From a recent systematic review³, results of supplementation were inconsistent and though a general increase in 25 (OH) D was observed, it varied by age group and health status, baseline Vit D status, dose, duration, and assay used to assess serum 25-OH-Vit D. One conclusion that is not often considered to play a role in the variability of supplementation success could be the differences in supplementation quality. Since, over-the-counter (OTC) products do not conform to the quality standards required for legend prescription products this assumption needs further investigation. To test this hypothesis we looked at 13 different OTC Vit D3 supplements to determine their content using four different drug delivery systems (DDS). The purpose of this study is to verify the hypothesis that the variation in results of Vit D3 supplement studies is due to the variability of product content in the DDS used. **Methods:** Standard stock solutions were created from research grade Vit D3 diluted with methanol via the aliquot method to produce our 7 standard solutions and a standard concentration linear curve. Next was the extraction of content from each DDS. The prepared DDS were diluted with 100% methanol in either a 50 or 100 mL volumetric flask (VF). The tablets were crushed, the hard shell capsules opened, and the soft gel capsule contents were removed using a syringe prior to being placed into a VF. Once the content was extracted, the DDS contents were allowed to dissolve into solution by waiting 30-45 minutes and inverting each flask every 10 minutes before each sample was prepared for analysis. Analysis was conducted using a reverse phase HPLC analysis with 100% methanol as the mobile phase. **Results:** Each of the 13 DDS contained a labeled mass of 50mcg (2000 IU) of Vit D3 (except for product L which was labeled 2500 IU). Two of the DDS (B & J) had a mean > label; 2 (G & H) had a mean \approx 90% of label; 3 (D,E,F) had a mean of 70-79% of label; 3 (A,C,K) had a mean of <20% label; the remaining 3 (I,L,M) had means of 22-51% label. **Conclusion:** Of the 13 DDS evaluated, one type was not consistently superior as a supplement. Only 4 (B,J,G,& H) are even within acceptable range of label, leaving 69% as failing to provide adequate dosing. This proves our hypothesis of significant quality variants of commercial OTC products and the research variation seen with supplementation is likely a result of that product variation.

160. EFFECTIVENESS OF U-500 INSULIN IN AN INTERPROFESSIONAL PRIMARY CARE CLINIC

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Use of U-500 insulin is indicated for patients with type 2 diabetes (T2DM) that are severely insulin resistant, defined as insulin requirements exceeding 200 units per day. The increase in obesity and insulin-resistant T2DM in the United States has led to an increase in the use of U-500 insulin. Past studies conducted initiating U-500 insulin in severely insulin-resistant patients managed by an endocrinologist have shown an improvement in glycemic control. As of 2014, there was a shortage of 1600 endocrinologists in the United States. The State of Franklin Healthcare Associates (SoFHA) primary care clinic has a collaborative agreement between a physician and clinical pharmacist for diabetes management,

allowing for interprofessional care of patients. The objective of this study is evaluate the use and efficacy of U-500 insulin in severely insulin-resistant type 2 patients initiated by clinical pharmacists via a collaborative practice agreement in a primary care clinic without an endocrinologist. The retrospective chart search was conducted by NDC number to identify patients with U-500 insulin on their medication profile from January 1st 2008 through December 31st 2014. Subjects initiated on U-500 insulin by clinical pharmacists and treated for at least 6 months with at least one follow-up were included in the analysis. Subjects receiving U-500 insulin prior to the initial appointment or seen by an endocrinologist during the follow-up period were excluded. The primary endpoint was the change in hemoglobin A1C from initiation to 6 months later. Secondary endpoints included changes in weight, confirmed hypoglycemia and the number of pharmacist and primary care physician follow-up visits. Eighty-one eligible patients were identified. Forty-four patients (mean age \pm SD; 59 years \pm 10.8) were included in the analysis. Baseline HbA1C (mean \pm SD) was $9.7 \pm 1.6\%$ and decreased to $8.6 \pm 1.6\%$ after 6 months of follow-up, representing a reduction of 1.1% (95% CI, -1.6 to -0.6; $p < 0.001$). An increase in body weight (mean \pm SD, 6.7 ± 15.1 lbs, $p=0.005$) was observed. The frequency of confirmed hypoglycemia events was low with a mean of 0.8 events per patient. Number of follow-up visits with the clinical pharmacist and the primary care physician were similar during the 6-month period at 2.0 and 2.7 respectively ($p=.805$). In conclusion, initiation of U-500 insulin by clinical pharmacists collaborating with primary care physicians results in improved diabetes control in patients with severe insulin resistance. Our findings suggest this interprofessional partnership achieves glycemic outcomes comparable to U-500 insulin management in endocrinology practices.

161. RELIABILITY OF DRUG INFORMATION DATABASES IN IDENTIFYING DRUG-DRUG INTERACTIONS WITH ORAL ANTINEOPLASTIC AGENTS

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Oral antineoplastics (OAs) have become an emerging and rapidly growing field in cancer treatment. As with any chemotherapeutic agent, clinicians must be aware of potential drug interactions. Drug information databases are a common resource utilized to check for interactions between OAs and patient's home medications. A major concern with OAs is that they are usually taken at home as well as picked up at a pharmacy by the patient themselves. The objective of this study was to determine the reliability of these databases for identifying potential interactions with OAs in a real-world setting. Hospital records were used to identify patients with common malignancies (leukemia, sarcoma, colon, lung, thyroid, prostate, kidney and liver cancers) treated with OAs from 2013 to 2014. To be included patients must have started an OA during the study period and have adequate records to evaluate OA use as well as home medications. The patient's regimen is then entered into Drugs.com and Lexicomp™ interaction databases. In addition to documenting the number of interactions flagged by both databases, the severity of the interaction and disagreements between databases were analyzed. A major interaction was defined as either a "D" or "X" by Lexicomp™ and "major" by Drugs.com. As of this preliminary analysis, 407 of 876 subjects have been screened. Of the 407 screened, 9 patients (one patient with 3 different OAs) have been enrolled. Lexicomp™ flagged 34 interactions, of which 10 were major interactions. Drugs.com flagged 34 interactions, of which 6 were major interactions. Between the 2 databases there was only 60% agreement in flagging major interactions. These discrepancies are of concern in that clinicians hope resources they utilize are congruent with one another and allow them to practice in the safest manner in terms to avoid clinically significant drug interactions OA.

162. PHYLOGENETIC AND EXPRESSION ANALYSIS OF RAT ZN-16 PROTEIN ACTION IN SOMATOTROPH CELL LINES TO STUDY TISSUE-SPECIFIC TRANSCRIPTION OF THE GROWTH HORMONE GENE

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Growth Hormone (GH), also known as somatotrophin, is the most important hormone controlling somatic growth. Lowered expression of GH results in short stature, whereas up-regulation results in gigantism. GH expression is a classic model for the study of cell- and tissue-specific transcriptional control; it is present only in somatotroph cells of the pituitary. Zn-16 protein is likely the critical tissue-specific factor that acts in concert with Pit-1 to specify production of growth hormone in mammals. Zn-16 is a 3000 amino acid multi-zinc finger transcription factor; three of the 16 zinc fingers bind DNA in the GH promoter. We are assaying rat Zn-16 in three ways: 1) How does Zn-16 overexpression change GH expression in rat pituitary cell cultures? Expression clones of the entire 9000 nucleotide Zn-16 rat cDNA are being constructed for multiple N- and C-terminal fusions. Prior to use, the full-length clone must be validated to avoid PCR errors due to the length of the polymerization that invalidate or alter Zn-16 protein structure. DNA sequencing showed that the Gateway cloning sites are correct, and all regions studied thus far are accurate. 2) What rat cell line is the best for Zn-16 expression analysis? Previous studies primarily utilized rat GH3 cells, but this line also produces prolactin (PRL) and is therefore not a fully-differentiated somatotroph. We have previously used the purely somatotrophic rat MtT/S line, which expresses solely GH and has detectable GH Releasing Hormone (GHRH) receptor expression. A direct comparison of these two cell lines is being performed for the following: GH and PRL protein secretion and cellular stores; GH and PRL mRNA expression; effect of GH and PRL after stimulatory treatment with GHRH, Corticotrophin & Retinoic Acid in combination, and GH Releasing Peptide-6; and inhibitory effect on GH and PRL of Insulin-like Growth Factor-1. The goal is to determine which cell line would be the most responsive host for the Zn-16 constructs mentioned above. 3) What is the structure of Zn-16 in other species that express GH? Species selected included: *Caenorhabditis elegans* (roundworm), *Bos taurus* (cow), *Canis familiaris* (dog), *Danio rerio* (zebra fish), *Mus musculus* (house mouse), *Pan troglodytes* (chimpanzee), *Rattus rattus* (rat), and *Homo sapiens* (human). Sequences from these species were obtained using the NCBI BLAST-P database. Amino acids were aligned using MacVector. A phylogenetic tree was produced to show the relationship between the species compared. *Homo sapiens* matched *Canis familiaris* Zn16 by 89%, but was only 66% similar to *Pan troglodytes*. While most medicinal products are created using rats, *Homo sapiens* Zn-16 only shared 59% similarities with *Rattus rattus*. This analysis suggests that dogs might make more comparable hosts as compared to rats for future GH supplement production. Supported by grants from the National Science Foundation and the ETSU Research Development Committee.

163. STABILITY STUDY OF COMPOUNDED PYRIMETHAMINE ORAL SUSPENSIONS

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Pyrimethamine is an antimalarial drug that is commonly used to treat *Toxoplasma gondii* infections in HIV-positive patients. Supply issues have complicated access to pyrimethamine tablets. This research aimed to use a stability-indicating high performance liquid chromatographic (HPLC) method with ultra-violet (UV) detection for the beyond-use date determination of an oral suspension compounded from a bulk pyrimethamine powder and stored in amber bottles at room and refrigerated temperatures. Pyrimethamine, USP was obtained as a bulk powder from Medisca Inc. Six 2 mg/ml preparations of pyrimethamine oral suspension were prepared in an ORA-Plus®/ ORA-Sweet® vehicle. The compounds were prepared in

plastic amber bottles, with triplicate bottles stored at room temperature and in a laboratory refrigerator. Concentration of pyrimethamine was monitored in the preparations over a 30-day period using HPLC with UV detection at 280 nm. The concentrations of pyrimethamine in all samples of the compounded oral suspensions remained within 90 - 110% of label claim throughout the 30-day study. Additionally, the HPLC-UV method met stability-indicating criteria set forth in USP General Chapter <1225>. These data indicate that pyrimethamine can be compounded in a 2 mg/ml oral suspension using ORA-Plus®/ORA-Sweet® and stored at room or refrigerated temperature for at least 30 days. This research could allow hospitals to offer a lower-cost alternative to patients unable to swallow solid doses or who are unable to acquire Daraprim® tablets in a timely manner.

164. CLINICAL CHARACTERISTICS OF PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) WITHIN A RURAL FAMILY MEDICINE CLINIC

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Chronic obstructive pulmonary disease (COPD) is often under diagnosed, or disease severity is under emphasized in many patients with the disease. This may be the result of underutilization of resources such as diagnostic testing and patient symptom assessment tools. The purpose of our study is to evaluate the characteristics of patients with chronic obstructive pulmonary disease in a family medicine clinic and identify potential areas for practice improvement through patient and/or provider education. The study was approved by the Institutional Review Board on November 4, 2014. Patient records will be obtained from East Tennessee State University Family Medicine clinics electronic health record for those with a diagnosis of COPD from January 1, 2012 through May 1, 2014. Pertinent data to be collected include history of spirometry testing, documented smoking cessation education, vaccination status, documented symptom assessment scores, and current COPD therapy regimen. Clinic data will be compared to available national and regional data using descriptive statistics. Strengths and weaknesses within the clinical assessment of patients with COPD will be discussed with the clinic to target areas for practice improvement followed by pharmacist-driven clinical interventions. Our findings resulted in greater than 40% of patients that had underutilization of diagnostic testing and assessment tools, smoking cessation counseling, and influenza and pneumococcal vaccinations as per GOLD guidelines. As a result, there was a correlation between the increased number of COPD exacerbations and lack of diagnostic testing and proper assessment tools. In the future, we expect to begin Phase II of our study with presenting our results to the clinic providers for feedback and discussion.

165. PROMOTION OF NEUROGENESIS AND NEURONAL SURVIVAL WITHIN THE HIPPOCAMPUS BY LONG-TERM METHYLPHENIDATE THERAPY

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Methylphenidate (MPH; Ritalin®) is a central nervous system stimulant that is commonly prescribed for Attention-Deficit Hyperactivity Disorder (ADHD) and narcolepsy. For the indication of ADHD treatment, MPH is the top prescription for adolescents in the U.S. (ages 12-17). Consequently, an increase in misuse and abuse of MPH has also been shown in this population. Despite this significant increase in use, little is known regarding the long-term effects of MPH treatment on the adolescent brain. Previous work from our laboratory has shown that long-term treatment (4 weeks) with MPH results in an increase in the rate of

neurogenesis within the dentate gyrus of the hippocampus. However, the neurons formed under the treatment of MPH did not survive 4 weeks after the therapy's discontinuation. In this study, we investigate whether maintained treatment with MPH will influence the survival of the new cells within the hippocampus. In brief, adolescent male Swiss-Webster mice received twice-daily injections of MPH (1 or 10 mg/kg) or saline for 4 weeks. A 1 mg/kg dose was chosen as it lies within therapeutic range for MPH, where a 10 mg/kg dose was selected to mimic an abusive dose. Mice were then injected with a thymidine analog, 5'-ethynyl-deoxyuridine (EdU), which, subsequently, became incorporated into the DNA of dividing cells. Mice were then divided into two cohorts: 1) mice that would continue receiving injections (saline, 1, or 10 mg/kg MPH) and 2) mice that remained in standard housing without further injections. After 4 additional weeks, mice were sacrificed and brain tissue was collected via transcardial perfusion with 4% paraformaldehyde. The brain tissue was sectioned and stained using an EdU fluorescence assay and double-labeled with immunohistochemistry for NeuN, a neuronal marker. A ratio of EdU + NeuN double-labeled cells to total NeuN cells was calculated for each group and compared. Interestingly, MPH appears to promote the survival of the newly generated cells within the hippocampus, as indicated by higher EdU+NeuN/NeuN ratios found with continued drug treatment. In conclusion, this research indicates the effect of MPH on both neurogenesis and survival of new neurons in the hippocampus is contextual-dependent, relative to the continued presence of the drug.

166. THE PHARMACOKINETIC PROFILE OF "BATH SALTS" • IN MATERNAL BRAIN, MATERNAL PLASMA, PLACENTA, AND FETAL BRAIN

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The abuse of synthetic cathinones, formerly legally marketed as “bath salts” or “plant food”, is on the rise. Given the abuse of these compounds in women of childbearing age as well as case reports of use of these drugs by pregnant women, it is important to understand the potential risks these compounds might have on the developing fetus. Three common drugs of this type include methylenedioxypropylvalerone (MDPV), 3,4-methylenedioxymethcathinone (methylone), and 4-methylmethcathinone (mephedrone). This study was designed to measure the concentrations of MDPV, methylone, and mephedrone in four biological matrices in mice – maternal brain, maternal plasma, placenta, and fetal brain – following maternal exposure. Briefly, pregnant dams were injected intraperitoneally with 3 mg/kg MDPV, 5 mg/kg methylone, and 10 mg/kg mephedrone at E17.5 gestation. Intraperitoneal injections were chosen as they mimic pharmacokinetics of “snorting” and these drugs are commonly administered in this manner. Additionally, drug concentrations were chosen based on doses reported in DEA statistics. Mice were sacrificed and tissues were collected at the following times post-injection: 30 sec, 1 min, 5 min, 10 min, 15 min, 30 min, 1 hr, 2 hrs, 4 hrs, and 8 hrs. Blood samples were collected in heparinized tubes, centrifuged, and plasma was collected. All tissues were flash-frozen in liquid nitrogen and stored at -70°C until analysis. Samples were spiked with the deuterium-labeled analogs of each compound (MDPV-D8, methylone-D3, and mephedrone-D3) and then subjected to solid phase extraction using Clean Screen DAU columns. Drugs were measured using LC-MS/MS using a previously validated method from our laboratory. Ratios of parent drug (MDPV, methylone, or mephedrone) to their deuterium-labeled analogs were utilized to calculate concentrations following linear regression of a calibration curve ranging from 5 ng/mL to 100 ng/mL. Then, pharmacokinetic data from all matrices were subjected to non-compartmental analysis using Phoenix64/WinNonLin software. Interestingly, all three drugs reached significant levels in the placenta as well as the fetal brain. Therefore, the use of these compounds during pregnancy could indeed pose fetal risk; as such, further studies to investigate teratogenic potential of these compounds is warranted.

167. ADDITION OF LIRAGLUTIDE 3 MG TO LIFESTYLE MODIFICATION COUNSELING MAY REDUCE WEIGHT IN OBESE ADULTS WITHOUT DIABETES.

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Obesity is an excessive weight disorder that can lead to further health conditions such as stroke, heart disease, diabetes, and some forms of cancer. According to the Centers for Disease Control and Prevention, there are more than 78.6 million adults who are obese (defined as a body mass index [BMI] of ≥ 30), which equates to nearly one-third of the population in the United States. Obtaining a healthy weight can be very difficult with lifestyle changes alone, which raises the question, does the addition of liraglutide 3 mg daily reduce weight in obese adults without diabetes more than lifestyle changes alone? Between 2011 and 2013, 3,731 adults were enrolled in a double-blind, placebo-controlled, multi-center trial to assess the benefits of adding liraglutide, a glucagon-like peptide-1 (GLP-1) receptor agonist, to a reduced calorie diet and physical activity. The patient population included adults who did not have type 2 diabetes and who had a BMI of at least 30 or a BMI of at least 27 with concurrent dyslipidemia or hypertension. All patients were randomly assigned to receive liraglutide titrated up to 3 mg subcutaneously once daily (n=2,487) or placebo (n=1,244). The primary endpoints were the change in body weight, the percentage of patients that lost at least 5% of their initial weight, and the percentage of patients who lost greater than 10% of their initial body weight, as these reductions are reported to be associated with decreased complications due to obesity and an improved quality of life. After 56 weeks of treatment, the liraglutide group lost an average of 5.6 kg more than the placebo group (8.4 kg vs. 2.8 kg) which resulted in the liraglutide group losing 5.4% more than the placebo group (95% CI -5.8 to -5.0). Of the patients in the liraglutide group, 63.2% lost at least 5% of their body weight compared to 27% in the placebo group (odds ratio [OR] 4.8, 95% CI 4.1 to 5.6). In the liraglutide group 33.1% of patients lost at least 10% of their body weight compared to 10.6% in the placebo group (OR 4.3 95% CI 3.5 to 5.3). The most common adverse events associated with liraglutide were nausea (40.2%), diarrhea (20.9%), and constipation (20%). Serious adverse effects for both groups were low with the most common adverse effects being cholelithiasis (0.8% in liraglutide group and 0.4% in placebo) and acute cholecystitis (0.5% in liraglutide group and 0% in placebo). Liraglutide's mechanism of action is to increase insulin release and regulate appetite, which may help individuals successfully reduce total body weight and may serve to improve patient outcomes by reducing obesity-related complications and improving quality of life. Liraglutide has been shown to be effective for reducing weight, improving glycemic control, and may improve patient quality of life when used concomitantly with diet and exercise in obese patients without diabetes.

168. NEUROCHEMICAL OUTCOMES FOLLOWING INDIVIDUAL AND COMBINED SYNTHETIC CATHINONE EXPOSURE

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Synthetic cathinones, marketed as “bath salts”, are an emerging class of highly addictive designer drugs that can precipitate dangerous health effects when abused. DEA statistics and case reports indicate the three most commonly abused cathinones, 3, 4-methylenedioxypropylone (MDPV), 4-methylmethcathinone (mephedrone), and 3, 4-methylenedioxymethcathinone (methylone), are frequently found in combination with each other or with other illicit substances. Previous findings indicate that synthetic cathinones have analogous pharmacology to cocaine, the amphetamines, and MDMA. While much of the current “bath salt” research has focused on elucidating the individual drug mechanisms, this study aimed to determine the individual and combined effects of MDPV, mephedrone, and methylone on monoaminergic tone in various brain regions. For this study, Swiss-Webster mice were administered saline (control) or MDPV, mephedrone, or methylone individually or in combination at both low (1mg/kg) and high (10mg/kg) doses. Four groups were examined for each dose: 1) Acute individual cathinones; 2) Acute combined cathinones; 3) Chronic individual cathinones; 4) Chronic combined cathinones, and the following brain regions were

collected from each mouse: frontal cortex, striatum, nucleus accumbens, hippocampus, substantia nigra, and ventral tegmental area. High performance liquid chromatography (HPLC) equipped with electrochemical detection (ECD) was utilized to measure tissue concentrations of monoamines (DA, NE, 5-HT) and their metabolites (DOPAC, HVA, and 5-HIAA). A number of differences were noted amongst the groups. Generally, acute individual exposure to cathinones (group 1) increased DA, NE, 5-HT levels and decreased DA and 5-HT turnover in certain brain regions, and a dose-response relationship was observed. Following acute administration of MDPV, mephedrone, and methylone in combination (group 2), similar increases in monoamine levels and decreases in DA and 5-HT turnover were observed, but in many regions, the combination treatment showed an additive effect (greater decreases in turnover compared to individual cathinones). Interestingly, chronic exposure to individual cathinones (group 3) appeared to have the opposite effect, decreasing monoamine levels and increasing DA and 5-HT turnover in certain regions; however, while chronic combination treatment appeared to increase turnover as well, it did so to a lesser extent than individual chronic cathinone treatment. Taken together, these data suggest that synthetic cathinones individually function to decrease DA turnover within brain reward pathway when delivered acutely and to increase both DA turnover and 5-HT turnover in major serotonergic and dopaminergic targets, respectively, following chronic exposure. These data also suggest that combined administration of these drugs may intensify their associated neurochemical effects via a sustained increase in DA and 5-HT in various brain regions.

169. ACTIVATABLE SUBCELLULAR DELIVERY OF A MULTIFUNCTIONAL PEPTIDE TO THE SECRETORY ORGANELLES OF BREAST CANCER CELLS

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The development of some breast cancers are driven by the overexpression of HER2 (human epidermal growth factor receptor 2), a transmembrane tyrosine kinase receptor and a normal component of many cells. Current cancer therapies, such as the monoclonal antibody trastuzumab, target the extracellular segment of HER2, but these therapies are ineffective against cells in which HER2 is expressed on the apical membrane. The aim of this research was to inhibit HER2 by preventing its translocation from the endoplasmic reticulum and golgi apparatus to the cell surface. To accomplish this aim, a multifunctional peptide consisting of a cell penetrating peptide (to confer membrane permeability), an Igk leader sequence (to confer targeting to the endoplasmic reticulum and golgi apparatus), the HER2 binding domain of Mucin 4 (MUC4), and a KDEL sequence (to confer organelle anchoring) was designed. An additional polyanionic sequence was appended upstream of the cationic cell penetrating peptide, separated by a linker cleavable by a cancer-specific protease, matrix metalloproteinase 9 (MMP-9). It was hypothesized that only in the presence of the cancer-specific protease would the modular peptide be able to transduce the cellular membrane and sequester HER2 within the secretory organelles. SK-BR-3 breast cancer cells and normal breast epithelial cells were transfected with a mammalian expression plasmid coding for MMP-9, and then treated with the multifunctional peptide, which had been recombinantly expressed in *E. coli* and purified by affinity chromatography. Immunofluorescence and confocal microscopy were used to quantify subcellular localization of HER2 and the multifunctional peptide. Results showed substantial co-localization of the modular peptide within the golgi apparatus, with co-localization rates as high as 78.9%. Cellular selectivity was observed, with an 86% increase in intracellular accumulation of the modular peptide in cells expressing MMP-9 compared to non-MMP-9 expressing cells ($p = 0.06$). Target specificity was also observed in cells treated with the multifunctional peptide containing the MUC4 peptide compared to cells treated with the multifunctional peptide containing a scrambled sequence. MUC4-treated cells displayed over a 2-fold decrease in HER2 expression compared to the negative control, suggesting that the multifunctional peptide causes degradation of HER2. These results demonstrate that the drug delivery system described above possesses the capacity to reduce HER2 membrane expression in a cell-specific manner.

170. EFFECT OF GNAPHALIN ON CELL ADHESION PROTEINS IN PANCREATIC AND COLON CANCER LINES

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Gnaphalium gracile H.B.K is a species that belongs to the family Asteraceae. The genus Gnaphalium has worldwide distribution, with the greatest diversity of species found in the Andean regions of South America. Species of the Gnaphalium genus are advocated in the treatment of several different diseases, such as, skin infections, bronchial disorders, and cancer. In previous studies, Gnaphalin has been shown to exert cytotoxic effects on pancreatic (Panc 28, BxPc3) and colon (HCT 116, CaCo2, SW480) cancer cell lines. These cytotoxic effects were confirmed via TUNEL assay to induce apoptosis. After cells were dosed, cells were determined to lose adhesive properties. This study examined the mechanism of action of Gnaphalin, specifically how gnaphalin affects the expression of cellular cadherin and focal adhesion kinase (FAK). Cadherin plays an integral role in the formation of cell to cell junctions. FAK is a cytoplasmic protein tyrosine kinase involved in integrin-mediated signal transduction which influences cell migration and survival. Western blot assays were conducted to assess changes in activated FAK (pFAK) and cadherin expression in the cancer cells. Cells were grown to 75% confluency and dosed with 40 mM gnaphalin for 2 hours, 3 hours, and 4 hours. Cell lysates were analyzed via gel electrophoresis and proteins were transferred to a nitrocellulose membrane and probed with antibodies against pFAK and cadherin. The signal of the primary antibodies was detected using secondary affinity-purified immunoglobulins coupled to peroxidase and a chemiluminescent system and exposed on x-ray film. The intensity of the bands was estimated by digitizing the image (J- Image) from x-ray film. After subtracting the background, all band intensities were compared against control. Loss of pFAK and cadherin expression was confirmed in all cell lines dosed with gnaphalin. Results of our study indicate that gnaphalin exert its cytotoxic effect by interrupting cell-cell adhesion and cell-extracellular matrix interactions.

171. PHARMACY DESERTS: DISPARITIES IN PRESCRIPTION MEDICATION ACCESS IN WASHINGTON COUNTY, TN

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Prescription medications are commonly used to manage both chronic and acute diseases and conditions. A majority of prescription medications are obtained from community pharmacies. Research indicates disparities in medication access exist throughout the United States, and that decreased access is associated with increased overall healthcare costs. Several studies have examined relationships between healthcare access, including community pharmacy access, in urban areas across race and socioeconomic status. To our knowledge, no studies have been conducted regarding medication access in rural areas, such as Appalachia. The goal of this study was to examine the extent to which pharmacy deserts exist in Washington County, TN and whether access to pharmacies varies across county census blocks and tracts based on factors including poverty level, unemployment rates, public insurance, vehicle access, and drive time to local pharmacies. We defined pharmacy deserts as areas where access to a local pharmacy is negatively affected by access to transportation and poverty levels. The term “pharmacy deserts” is derived from the United States Department of Agriculture (USDA) definition of food deserts, which examines areas with limited access to fresh food. Census tracts are designated as low-access if more than 100 households did not own a vehicle. Census tracts are designated as low-income if 20 percent or more of the residents

had household incomes below the federal poverty level. Census tract data from 2009-13 were obtained from the United States Census Bureau's American FactFinder database. ArcGIS 10.3 was used to geocode Washington County pharmacies for spatial analysis. Network Analyst's Service Area Analysis tools were used to calculate a one-mile-drive-distance to each pharmacy. Location selection methods in ArcGIS 10.3 were used to identify disparities in prescription medication access in Washington County, TN. The pharmacy distribution within Washington County varies among census tracts. Eight census tracts have zero pharmacies, ten census tracts have one to five pharmacies, and two census tracts have six to eight pharmacies. Based on determinations of low-access and low-income, seven census tracts within Washington County are determined to be pharmacy deserts. Of these seven pharmacy deserts, five are located within city limits. The unemployment rate throughout Washington County was 4.3% in 2013, and five of the seven pharmacy deserts identified have unemployment rates higher than the county average. Public insurance is provided for 33% of county residents. Four of the identified pharmacy deserts exceed this percentage, with two of those exceeding 50% of residents with public insurance. The number of pharmacies located in these pharmacy deserts is minimal, with all census tracts containing zero to two pharmacies with the exception of census tract 620, which has six pharmacies. Limited access to pharmacies is apparent within Washington County due to several variables. In general, census tracts with high rates of poverty and low rates of transportation have fewer pharmacies, resulting in decreased access to pharmacies. Low access to pharmacies could prove problematic in accessing essential health care and medical expertise that pharmacists can provide, especially to patients who are on long-term therapies for chronic disease states.

Medical Residents, Clinical Fellows and Post-Doctoral Fellows

172. COMBINED 'T' AND 'B' CELL MALIGNANCY- SHOULD WE SCREEN FOR SECONDARY MALIGNANCY IN T-CELL MALIGNANCY?

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Introduction and Case: 53 year old male with history of psoriasis and folliculotropic mycosis fungoides ((MF) was seen in the oncology clinic for evaluation of progressive, painful cervical lymphadenopathy of 3 months duration. Per chart review, patient was diagnosed with psoriasis in 2005 after developing a rash on the back of his legs that spread over his entire body. After topical medications and narrow band Ultraviolet B radiation treatment failure he was started on Enbrel in 2010. Enbrel was continued at 50 mg twice a week until 2013 when new skin lesions appeared that were atypical for his psoriasis. Biopsies were obtained and demonstrated folliculotropic mycosis fungoides. He was sent to another medical center with plans to start therapy; unfortunately, he was lost to follow up and did not see a medical provider for 2 years. In April 2015, he was started on treatment with Psoralen and Ultraviolet A radiation (PUVA) and topical steroids. In October 2015, he presented to his primary care physician with complaints of a non-tender, right lateral neck mass that had progressively enlarged over the prior 2 months. CT scan in November 2015 demonstrated cervical lymphadenopathy predominantly on the right; in the right posterior cervical triangle, and supraclavicular regions. CT chest/abdomen/pelvis in December 2015 showed progressive cervical lymphadenopathy and a 5.5 mm right lower lung nodule. After FNA was non-diagnostic, an excisional biopsy was performed January 2015 which demonstrated classical Hodgkin's disease, nodular sclerosis subtype. **Discussion:** Mycosis fungoides comprise approximately 53% of cutaneous lymphomas. MF can histologically mimic benign skin conditions, posing a diagnostic challenge to the dermatologist. MF affects older individuals with a median age at diagnosis of 55 to 60 years and a male:female ratio of 2:1. It results from chronic antigenic stimulation that leads to uncontrolled clonal expansion and the accumulation of T cell helper memory cells in the skin. Diagnosis is confirmed by biopsy which usually

shows mononuclear cells with cerebriform nuclei infiltrating the upper dermis or forming intraepidermal aggregates. The increased risk Hodgkins or Non-Hodgkin's lymphoma in CTCL or small-cell lung cancer may point to unknown biological relationships between them. It is uncertain why patients with MF are at increased risk of developing second malignant neoplasms, especially lymphomas. It is possible that these second cancers are related to MF therapy. Alternatively, these patients may have a common underlying environmental factor or inherent predisposition to developing particular malignant neoplasms. Previous studies have shown that patients with advanced MF have impaired T-cell immunity with altered cytokines similar to that in acquired immunodeficiency syndrome (AIDS). These immunologic alterations may predispose these patients to development of a second malignancy, particularly Hodgkins and Non-Hodgkin's lymphoma, both of which are common in AIDS. Our case is unique because he had both T and B- cell malignancies. The strong association between diagnosis of CTCL and developing of subsequent lymphoma raises a valid question about the value of screening for secondary malignancies upon diagnosis of CTCL.

173. GLIOBLASTOMA MULTIFORME AND LENALIDOMIDE, A SIDE EFFECT OR FORTUITY?

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Lenalidomide was approved by the U.S. Food and Drug Administration (FDA) for treatment of newly-diagnosed multiple myeloma in 2006. Interim clinical trials addressing the safety of Lenalidomide revealed an increased risk of second primary malignancies in patients with newly-diagnosed multiple myeloma who received Lenalidomide. The new malignancies reported are acute myelogenous leukemia, myelodysplastic syndromes, and Hodgkin lymphoma. This is a case report of a patient for whom the second primary malignancy was glioblastoma multiforme, which was not reported by the clinical trials the U.S. Food and Drug Administration described in its 2012 warning about Lenalidomide. It was concluded that multiple myeloma patients treated with Lenalidomide may be at increased risk of glioblastoma multiforme in addition to the second primary malignancies reported by the FDA. It was concluded as well that more clinical trials need to be conducted about the potential second primary malignancies Lenalidomide can cause.

174. CAVITARY LUNG LESION WITH PULMONARY EMBOLISM: A CASE OF ACTIVE GRANULOMATOSIS WITH POLYANGITIS (WEGENER'S GRANULOMATOSIS)

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Introduction: Granulomatosis with polyangitis, formerly known as Wegener's disease, is an uncommon multi-system disease characterized by granulomatous necrosis of the involved tissues with small and medium vessel vasculitis. Although it typically affects upper and lower respiratory tract and kidneys, it can present in multiple different ways. Active disease is associated with increased incidence of venous thromboembolism. Early recognition and treatment is very important as it has high mortality without treatment. Case description: We present a case of a 33 year old female with a past medical history of Wegener's granulomatosis. She was diagnosed at age 12 after evaluation for chronic sinusitis and epistaxis and received treatment with methotrexate and prednisone. She was in remission for 17 years. Over the past year she experienced increasing dyspnea and persistent pneumonia. She had normal C-ANCA titers before hospital admission, but presented with acute hypoxic respiratory failure, bilateral pulmonary consolidation, effusion, and cavitary lung lesions with normal renal function. Initial impression was pneumonia and sepsis as she had previous episodes that had cleared by antibiotics. Further diagnostic workup revealed left lung consolidation with cavitation, elevated C-ANCA titers and Anti-PR3, and positive pulmonary embolism. She underwent bronchoscopy with biopsy of the right upper lobe lesion as well as CT guided FNA of the

left lung cavitory lesion, with pathologic exam revealing only necrotic tissue. Pan-sinus inflammation and thickening was also noted on sinus imaging. She underwent renal biopsy which was normal. Skin involvement and a vesicovaginal fistula were noted also during her hospitalization. She eventually underwent open lung biopsy which revealed necrotizing granulomatosis consistent with Wegener's, and immunosuppressant therapy was started. Conclusion: Active Wegener's granulomatosis does not always present with classical upper and lower respiratory tract and kidney involvement. Cavitory pulmonary involvement and pulmonary embolism with no renal involvement is described in this case. Internist should have high index of suspicion for granulomatosis with polyangitis as early and aggressive treatment can be life saving.

175. TUMOR LYSIS HIDING BEHIND SYSTEMIC INFLAMMATORY RESPONSE

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A 73 year old man with recent diagnosis of disseminated large B cell lymphoma and mild hypercalcemia presented with tachycardia. Vital signs: Temp 97.8 F, PR 133 beats/minute, RR 18 breath/minute, pulse ox 91% on O₂ @ 2lpm. EKG was consistent with sinus tachycardia. Physical exam was remarkable for bibasilar crackles and +2 bilateral leg edema. Labs were remarkable for calcium of 16.2 with ionized calcium of 6.4, total CK 26, intact PTH 10.5 (normal), PTH related peptide 13 (elevated), 1,25 vitamin D 102.7 (high), phos 3.0, potassium 5.4, uric acid 10.6, LDH 942. During his hospital course creatinine increased from 1.4 to 3.0. Of note patient was on prednisone 5mg/day and this was increased to 20mg/day three days prior to the admission. Hypercalcemia was treated with Zoledronic acid, and calcitonin. IVF was tried, but patient developed pulmonary edema. Due to this discrepancy of clinical volume overload in the presence of hypercalcemia and normal ejection fraction on 2D echo and on MUGA scan, volume status was studied using Cheetah NICOM testing. It repeatedly showed that patient had high cardiac output with reduced systemic vascular resistance and fluid responsiveness. These hemodynamic findings were consistent with Systemic Inflammatory Response Syndrome (SIRS). Patient was treated empirically with IV antibiotics with no change in hemodynamics. Subsequent blood cultures, urine cultures and sputum cultures were negative. Acute tumor lysis syndrome (ATLS), and multi organ dysfunction (MOD) were described in patients with hematological and solid tumors, it can start after therapy or, less frequently, spontaneously. SIRS can occur with ATLS with or without MOD in these patients. Data about this phenomenon is scant and mechanism of which is not well understood. Pro-inflammatory cytokines and metabolites release from tumor lysis is suggested as the mechanism behind this phenomenon. It is important to keep this in mind as patients with this syndrome often get a diagnosis of sepsis. That can have major impact on the treatment course of these patients. Making diagnosis of ATLS in our case was difficult. Due to high active vitamin D3 and high PTH-RP, this patient had high calcium level and normal phosphorus level which is opposite to what we usually see in patients with ATLS. 24 hour urine uric acid and urine creatinine is an important tool to make this diagnosis.

176. TRACHEAL COMPRESSION MIMICKING NEAR FATAL ASTHMA

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A 31-year-old female patient with a 15 pack-year history of cigarette smoking complained of three weeks of dyspnea and wheezing. She denied cough, hemoptysis, weight loss, and fatigue. She was diagnosed with asthma but had failed to improve on an outpatient trial of inhaled beta-agonist and oral corticosteroid. She subsequently developed severe respiratory distress necessitating intubation and mechanical ventilation. She was extubated 48 hours later but required emergent re-intubation due to wheezing and tachypnea. She was transferred to a tertiary facility where a high pitched expiratory central airway noise was auscultated. Her

calculated arterial/alveolar oxygen ratio was normal despite elevated peak inspiratory pressures. Computerized tomogram (CT) of the chest demonstrated a 6 x 5 cm right para-tracheal mass with compression of the tracheal lumen to 3 mm. CT-guided percutaneous needle biopsy established the diagnosis of adenocarcinoma of the lung. Discussion: Asthma is a common disease afflicting approximately 4-5% of the population of the United States. Rapid onset asthma accounts for approximately 1/5 of all fatal and near fatal crises that often require aggressive intervention and mechanical ventilation. During childhood the differential diagnosis in an otherwise normally functioning youngster is limited. However, new onset of asthma in adults should lead to a thoughtful and thorough investigation for other medical conditions that might cause similar respiratory symptoms. The clinical and laboratory analyses of our patient suggested that an alternative diagnosis should be considered. A primary lung cancer with compression the trachea was subsequently identified as the cause of her symptoms rather than bronchial hyper-reactivity. This case illustrates that a high index of suspicion for alternative diagnoses must be maintained when evaluating an adult patient who presents with clinical features suggestive of asthma, particularly if the patient presents with atypical symptoms or fails to respond to appropriate asthma therapy

177. SEVERE DISSEMINATED BLASTOMYCOSIS; TOTAL RECOVERY AFTER NEAR-DEATH

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Introduction: Most of the reported cases of Blastomycosis came from the Mississippi River, Ohio, Missouri and the Western margins of Lake Michigan. We are reporting a case of severe disseminated Blastomycosis which occurred in our area with excellent outcome. Case Presentation: A 45 y old Male with uncontrolled diabetes mellitus presented with worsening productive cough and shortness of breath. Two weeks prior to presentation, he started to have fever, productive cough and pleuritic chest pain. He was treated with Levofloxacin for left-sided pneumonia. His symptoms kept worsening and he developed pustular rash. On admission, he was tachycardic and tachypnic. He had decreased air entry bilaterally and diffuse crackles along with multiple pustules over his back, thorax and limbs. He mentioned that he had recently started a salesman job and that he had been visiting moldy and dirty homes. CT Scan showed areas of dense consolidation in both lungs. Broad spectrum antibiotherapy was started. Bronchoscopy showed yellow to green secretions. Pathologic examination showed thick-walled cells suggestive of Blastomyces. Treatment was switched to Amphotericin B. The patient deteriorated fast and developed acute respiratory distress syndrome requiring intubation. Sputum and skin cultures grew Blastomyces Dermatitidis confirming the diagnosis. The patient didn't show any signs of improvement for many days. CT Scan done 20 days after intubation showed improved aeration along with multiple hypodense lesions in the spleen. He was transferred to the floor 5 days later and treatment was switched to itraconazole for a course of 6 months. He was then discharged and is currently doing great. Discussion: Recent reports suggest that the area affected by Blastomycosis is expanding. The disease most commonly occurs in adults in 4th decade. It predominates in men. Low socioeconomic factors and concomitant diseases such as diabetes increase susceptibility. The presence of large amount of Blastomyces in tissues give rise to a late hypersensitivity reaction that causes tissue damage. Most cases are acquired by inhalation. The most frequent manifestations are cough, weight loss, chest pain, cutaneous lesions, fever and hemoptysis. The progressive severe form is characterized by the development of acute lobar pneumonia, high fever, weight loss, and ARDS. Mortality rate can be as high as 90%. The most frequent extrapulmonary form is cutaneous. Skin lesions have ulcerated or warty appearance. In some cases, subcutaneous abscesses can resemble panniculitis. Extrapulmonary blastomycosis can involve any organ. Treatment must be given to all patients with chronic pulmonary blastomycosis, severe disease, dissemination or immunosuppression. In severe pulmonary blastomycosis or dissemination, Amphotericin is indicated. Treatment duration must be prolonged or shortened according to clinical evolution. Amphotericin B must be followed with several months of triazole drugs. Conclusion: Blastomycosis must be suspected in patients with low socioeconomic status who present with respiratory infection not responding to classical treatment, even in nonendemic areas. Presence of skin lesions, even atypical in form of pustules, must increase the suspicion. Early treatment with Amphotericin for severe disease is crucial due to rapid development of ARDS.

178. APPENDICITIS DISGUISED AS MULTIPLE LIVER ABSCESS

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Pyogenic liver abscesses are rare (20 per 100000) but a life threatening condition. Early diagnosis is vital for prognosis. We describe a case of pyogenic liver abscesses with appendicitis in a patient with a peculiar history, physical and radiologic finding. A 41-year-old male with recent travel to Vietnam and Cambodia went to see urgent care for fever. Chest x-ray showed no pneumonia or effusion. Ultrasound abdomen showed enlarged liver, containing multiple cystic masses. No evidence of acute cholecystitis or cholelithiasis. CT abdomen showed multiple complex cystic masses, abnormal distal appendix and trace pericardial effusion. A decision was made to allow fluid to resolve before further workup and appointment was set for a week. Patient continued to have dark urine, bloating, weight loss, vomiting, nausea, belching, and shortness of breath. The shortness of breath worsened and went back to Hospital and a repeat CT showed innumerable large hepatic masses throughout the partially imaged liver. He continued to have right upper quadrant pain HIDA scan was normal. Two CT guided drain placed and which resulted in drainage of purulent material, which grew strep intermedius from both sites. Blood cultures and all other infectious workup including parasitic workup was negative. Patient was on antibiotics and still was spiking a fever. CT abdomen was repeated showed bilateral pulmonary emboli and acute appendicitis. Exploratory laparotomy was done and hepatic abscesses were drained, appendectomy and cholecystectomy was done sent home with antibiotics. Repeat CT a month later showed 2 residual abscesses within the liver both of which are smaller than prior exam and resolving areas. Most liver abscesses have an identifiable source outside the liver. The most common source being cholangitis secondary to extrahepatic biliary obstruction. Other causes such as inflammatory bowel disease, diverticulitis, and appendicitis can also seed to the liver via the portal venous system. Acute appendicitis is a rare cause in the Western world due to wider use of antibiotics while newer imaging modalities have helped with early diagnosis and reduction in morbidity/mortality. Our patient's travel history, lack of physical finding and non-convincing radiologic result led to a delay in the diagnosis of appendicitis. Our case features the importance of keeping a broad differential when approaching hepatic abscesses. A high index of suspicion should be given for appendicitis even in absence of obvious radiologic or physical findings in an effort to make an early diagnosis and improve outcome.

179. COMMON HOSPITAL MEDICAL CONDITIONS: A RESIDENT SURVIVAL GUIDE

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This project details the creation of an educational program for Family Medicine residents regarding the most common hospital conditions they will encounter during the course of their 3-year residency. The authors completed a comprehensive review of hospital records to create a list of the most common medical conditions seen in hospitalized patients. These conditions included: stroke, chest pain, atrial fibrillation, acute congestive heart failure, abdominal pain, gastrointestinal bleed, hepatic encephalopathy, alcohol withdrawal, seizures, chronic obstructive pulmonary disease, pneumonia, and systemic inflammatory response syndrome/sepsis. For each condition, authors researched management strategies. The educational presentation included, for each of the most common conditions, medical history for physicians to look for, physical indications of disease, which labs and imaging are appropriate to order to confirm diagnosis, and treatment plan. This project is an important contribution to medical resident education and represents ETSU's efforts to improve patient care.

180. PLEURAL EFFUSIONS AND ELEVATED TROPONINS - CARDIAC RELATED ? THINK AGAIN!

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Amyloidosis is an extracellular deposition of low molecular proteins in the form of fibrils. Amyloid has a characteristic pathological appearance, apple green birefringence with polarized light microscopy of congo red stained tissue. Clinical presentation is dependent on the location of deposition of the protein. There are different subtypes of Amyloidosis, Amyloid Light chain (AL) and Amyloid Associated (AA) disease with varied prognosis. AA amyloidosis occurs more in association with chronic diseases such as rheumatoid arthritis and chronic infections. AL amyloidosis presents clinically with heavy proteinuria, edema, hepatosplenomegaly or unexplained heart failure. A 69 year old lady with a history of Diabetes Mellitus was re-admitted to the hospital with shortness of breath and recurrent pleural effusions of several months duration. Her work up revealed evidence of congestive heart failure and elevated troponin levels. At cardiac catheterization a stent was placed in the left anterior descending artery. Renal dysfunction and elevated BNP levels were persistently noted. Echocardiogram showed diastolic dysfunction with a maintained ejection fraction (EF) of 50-55%, severe thickening of the ventricular muscle wall and interventricular septum suspicious for amyloidosis. Abdominal fat pad biopsy was positive for amyloid with classic congo red staining. Bone marrow biopsy was positive for congo red staining but negative for plasmacytosis (0.6% plasma cells). Serum and urine protein electrophoresis and immuno-fixation electrophoresis were normal. Quantitative Immunoglobulin levels were normal. She did demonstrate a mild abnormality in the serum free light chain ratio (1.75) with a high serum free kappa light chain. Skeletal Survey was negative for any osseous lesions. She initiated chemotherapy with CyBORd regimen consisting of Cyclophosphamide, Bortezomib and Dexamethasone but succumbed to congestive heart failure three weeks later. Amyloidosis can present with renal disease (nephrotic syndrome), cardiomyopathy (systolic or diastolic), gastrointestinal disease (hepatomegaly-splenomegaly), neurological abnormalities (peripheral or autonomic neuropathy), hematologic abnormalities (anemia or thrombocytopenia) and pulmonary disease (parenchymal disease, pulmonary hypertension). 10% of Multiple Myeloma patients have concomitant amyloidosis. A low threshold to diagnose Amyloidosis should be maintained while evaluating patients with unexplained symptoms. Biopsy of involved sites or abdominal fat pad with demonstration of concomitant monoclonal plasma cell dyscrasia clinches the diagnosis. The overall sensitivity of congo red staining is 57 to 85 percent with a specificity of 92 to 100 percent for primary (AL) or secondary (AA) amyloidosis. Light chain disease is the commonest monoclonal plasma cell para-proteinemia in AL amyloidosis. Rarely, in 2-3% of patients, a monoclonal plasma cell disorder is not evident. Early mortality is predicted by cardiac involvement, low serum albumin, higher serum creatinine, higher number of organs involved and elevated troponin levels. Treatment is aimed at infectious or inflammatory conditions in secondary amyloidosis (AA) and plasma cell dyscrasias in primary amyloidosis (AL). Treatment of AL amyloidosis involves hematopoietic stem cell transplant if eligible and/or treatment with melphalan, Bortezomib or lenalidomide based regimens.

181. DOUBLE WHAMMY PATHOLOGY-PROTEIN IN KIDNEY, LYMPHOMA IN MARROW

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Introduction: Waldenström's macroglobulinemia/ Lymphoplasmacytic lymphoma (LPL) is a distinct clinicopathological entity resulting from the proliferation of B lymphocytes that show maturation to plasma cells, constituting a pathognomonic bone marrow lymphoplasmacytic infiltrate, and that synthesize monoclonal IgM. Approximately 3% of the patients with WM develop immunoglobulin (Ig) M-related disorders, including immunoglobulin light chain (AL) amyloidosis. The non-specific symptoms of amyloidosis including fatigue, edema, and weight loss can be misleading to reach a correct differential diagnosis. Early diagnosis and appropriate treatment is key to prevent the organ damage. Case Description: A 78-year-old female presented with shortness of breath and decreased exercise tolerance. Examination

revealed right sided decreased breath sound with significant basal crackles. Her past medical history was significant for HTN, hypothyroidism, stress incontinence and recurrent right sided pleural effusions. Symptomatic effusions failed trials of diuretics requiring repeated thoracentesis showing transudative effusion. Chest x ray confirmed the presence of right sided pleural effusion. Abnormal labs included mildly decreased total protein, Macrocytic anemia, normal Iron, Vitamin B12 and folate levels. On further evaluation Ejection fraction is 50-55% with grade 1 diastolic dysfunction. Urinalysis positive for massive proteinuria. Renal biopsy with electron microscope findings consistent with AL (amyloid light chain) lambda light chain type with mild acute tubular injury. IgM level was very high 1554. Serum Lambda chains were elevated at 36.10 mg/dl. Serum electrophoresis showed increased 0.9 gm monoclonal para-protein identified as IgM lambda light chain. Urine analysis showed 5.1gm/24-hour protein of which 150 mg is monoclonal free lambda light chain. Serum viscosity was normal. Bone marrow biopsy was consistent with hypercellularity (85% cellularity) with involvement by a low grade B cell lymphoma (30%). Flow cytometry demonstrated a B cell lymphoproliferative disorder. Molecular study shows positivity for MYD88. Cytogenetics and FISH (IgH and MALT1) are negative. In light of the positive MYD88, finding in bone marrow is consistent with lymphoplasmacytic lymphoma. Patient was started on cyclophosphamide, bortezomib and dexamethasone regimen and rituximab due to concurrent findings of lymphoplasmacytic lymphoma on bone marrow. Lasix was given to keep volume status optimal to prevent congestive heart failure. Discussion: Amyloidosis should always be in high in differential in patients presenting with unexplained diastolic heart failure, nephrotic range proteinuria, peripheral neuropathy and cytopenia. WM/LPL is (WM) is also a relatively rare lymphoproliferative disorder characterized by the presence of lymphoplasmacytic cells in the bone marrow and IgM monoclonal protein in the serum. Secondary amyloidosis can be seen in approximately 3% of LPL and is exclusively due to amyloid light-chain deposition. Symptomatic amyloidosis in LPL is an indication for systemic therapy. A precise therapeutic algorithm for the upfront treatment of LPL with secondary amyloidosis remains to be defined given a paucity of randomized clinical trials in this uncommon association. Current expert consensus recommends frontline agents therapy with bortezomib, dexamethasone, rituximab, cyclophosphamide and consideration of auto-stem cell transplant.

182. CANAGLIFLOZIN INDUCED KETOACIDOSIS

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Canagliflozin (Invokana TM) is one of new oral antidiabetic medications that was approved by FDA in March 2013 for treatment of patients with D.M type II. The mechanism of action is inhibition of sodium-glucose co -transporter -2 protein (SGLT2) , which reduces renal glucose reabsorption and reducing blood glucose levels. A 47 year old male with past medical history of hypertension, morbid obesity was diagnosed with D.M type II after having Hgb A1C of 11 and negative Glutamic acid decarboxylase antibody. Patient was started on Invokamet for diabetes control, a week later patient presented to ED with complaint of shortness of breath, severe nausea and vomiting . Physical exam showed a gentleman in mild distress, heart rate of 114 BPM, with RR 30 and BP 115/80 and normal temp. Cardiac auscultation reveals tachycardia with regular rate, no m/r/g. Pulmonary auscultation reveals tachypnea with no wheezes or crepitations. Abdominal examinations shows obesity with no tenderness or guarding with positive BS. Extremities shows no edema. Neurological examination shows no focal deficits but showed sluggish response in conversation. CMP shows Na 119 , K 4.9 , Cl 78 , CO2 : 3 , BUN 28 , Cr 1.07 , BGL 292 Lactate 2.1 ,moderate acetone in blood and more than 80mg/dl in urine. CBC shows WBC 21.8 , Hgb 18.1 , Plt 306. ABG shows pH 7.10 , pCO2 7.1 , PO2 189 on RA. Ethylene Glycol and methanol levels were negative. Patient was admitted to the ICU and started on IV insulin drip in addition to aggressive fluid resuscitation. Patient condition improved markedly with resolution of acidosis and closure of wide anion gap. Patient was transferred to regular floor after and remained symptom - free till discharge. This case represents one of case series that have been reported across the country for Invokana induced ketoacidosis. In May 2015, FDA issued a warning that (SGLT2) inhibitors may lead to ketoacidosis, after searching FDA Adverse Event Reporting System (FAERS) database from March 2013 through June 2014, Janssen Research & Development performed an analysis of all events of metabolic acidosis using data from 17,596 patients, and concluded that DKA and related events occurred at a low frequency in the

canagliflozin type II diabetes program, with an incidence consistent with limited existing observational data in the general population with type 2 diabetes. With continuity of presentation of similar cases and the seriousness of presentation, further independent studies need to be done, to determine the risk of Ketoacidosis associated with (SGLT2) inhibitors and whether there are specific risk factors that should be included in the contraindications list of the drug information.

**183. PULMONARY NODULES "NOW YOU SEE THEM, NOW YOU DON'T"
REGRESSION OF METHOTREXATE INDUCED B CELL LYMPHOMA
WITH CESSATION OF IMMUNOSUPPRESSION**

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There is a known increased risk for the development of lymphoproliferative disorders in patients with autoimmune diseases on immunosuppressive agents. Common features of immunodeficiency related lymphoproliferative disorders include: (1) extra-nodal development (2) B-cell origin (3) Epstein Bar Virus (EBV) association. We present a case of Methotrexate-related, EBV negative Lymphoproliferative Disorder presenting with pulmonary nodules with subsequent spontaneous regression of pulmonary lesions within five months of methotrexate cessation. A reasonably fit seventy six year old female with a long-standing history of Rheumatoid Arthritis was undergoing a knee replacement evaluation when preoperative imaging revealed bilateral enlarging pulmonary nodules with a mass in the anterior mediastinum. CT guided biopsy of a pulmonary lesion was reported as a B cell neoplasm, revealing B lymphocytes with plasmacytic differentiation. The immuno-phenotype was positive for CD79a, CD138, CD45, Bcl-2 and negative for CD20, CD23, cyclinD1, CD56, and BCL-6 with weakly positive PAX5 and focally positive CD10. EBV in situ hybridization testing on the lung specimen was negative. PET imaging was completed showing multiple enlarging pulmonary lesions and soft tissue density of the anterior mediastinum, both, with modest FDG activity. Bone marrow biopsy was completed as part of lymphoma work-up and was unremarkable. Given the clinical scenario, atypical presentation and the absence of B symptoms, the possibility of methotrexate related Lymphoproliferative Disorder was considered and therefore, Methotrexate was discontinued. Five months after Methotrexate withdrawal, repeat imaging demonstrated spontaneous regression of pulmonary lesions and the anterior mediastinal mass. Methotrexate-related Lymphoproliferative Disorders (MTX-LPD) are a known entity and must be considered in patients on immunosuppressive therapy. There are less than fifty reported cases in the literature and the majority of them did demonstrate complete remission (usually in four weeks) with a minority of cases with partial remission or persistent disease requiring cytotoxic chemotherapy. No specific histologic subtype was predominant although Diffuse Large B Cell Lymphoma was commoner. Hepato- Splenic, CNS and Cutaneous lymphomas have been reported more often than Pulmonary lymphomas. Most patients had Rheumatoid Arthritis and received low dose or pulsed Methotrexate. Initial management includes discontinuation of methotrexate and observation. Methotrexate associated Lymphoproliferative Disorders (MTX-LPD) is recognized in the World Health Organization (WHO) classification under Immunodeficiency associated LPD's.

**184. CAN YOU IGNORE APGAR SCORES WHEN CONSIDERING INFANT
COOLING THERAPY?**

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Introduction: Newborns with severe birth asphyxia are at an increased risk for poor neurodevelopmental outcomes and even death. Infant cooling therapy is one neuroprotective intervention that has been associated with favorable outcomes in moderate cases of birth asphyxia. Purpose: Low APGAR scores at 5 and 10 minutes of life are more likely to be associated with birth asphyxia and are one of the indications for infant cooling therapy. Unfortunately, a patient with mild or moderate birth asphyxia may have normal

APGAR scores which can cause a practitioner to overlook possible birth asphyxia. In these cases, infant cooling therapy may not be initiated, thus affecting the long-term prognosis of the patient. **Case Report:** A 37 week late-preterm female infant was transferred from an outlying facility to the Niswonger Neonatal Intensive Care Unit (NICU) due to birth asphyxia. The mother of the patient had presented to the ER due to a seizure and had been subsequently intubated en route to the OR. Due to persistent fetal heart rate drops into the 50 bpm range, a stat C-section was performed. After delivery, the infant required resuscitation in the form of chest compressions and positive pressure ventilation. The infant's APGAR scores were 4, 6, and 8 at 1, 5, and 10 minutes, respectively. Despite these relatively reassuring APGAR scores, the patient's umbilical cord blood gas revealed a pH of 6.8 with a pCO₂ of 84 and a PO₂ of 44. She was placed on phenobarbital secondary to seizure-like activity which included chewing, hypertonia, and posturing. The mother's only significant medical problems are a positive urine drug screen for THC and amphetamines. Due to the patient's metabolic acidosis and seizure-like activity, the infant was deemed a candidate for infant cooling therapy. Prior to transport, the infant was started on a cooling protocol, which included bypassing the radiant warmer and being placed in an isolette without a heat source. Upon admission to the Niswonger NICU, the infant's body temperature was 33.7°C (92.7°F) and the infant was continued on an infant cooling protocol. On day one of life, the patient had an ultrasound of the head which showed decreased echogenicity of the brain suggesting diffuse cerebral edema/infarction. One week after birth, the patient had an MRI of the brain that revealed findings consistent with prior hypoxic injury involving both deep and superficial brain structures. An EEG additionally showed severe background abnormality. **Discussion:** Birth asphyxia is a leading cause of morbidity and mortality in the newborn period. Sometimes APGAR scores, as seen in our case, can erroneously lead to a missed diagnosis of birth asphyxia. When evaluating an infant for hypoxic injury, it is important for practitioners to pay close attention to a patient's umbilical cord blood gas, in conjunction with the patient's overall clinical picture, regardless of a patient's APGAR scores.

185. IMPROVING MEDICATION RECONCILIATION IN AN APPALACHIAN RESIDENCY TRAINING CLINIC

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Medication reconciliation is defined as the process of creating the most accurate list of all medications a patient is prescribed and comparing that list against the physician's admission, transfer, and/or discharge orders, with the goal of providing correct medications to the patient at all transition points within the hospital. It is estimated that medication errors lead to approximately 1.5 million adverse drug reactions per year. Approximately 20% of these errors occur during transitions of care. In an effort to improve quality of care and reduce medication errors, this research aimed to improve documentation of proper medication reconciliation during outpatient hospital follow up visits. For control data, a chart review of approximately 25 outpatients seen at the ETSU Bristol Family Medicine Clinic who have been recently discharged (past 6 months) from the hospital was performed. Questions as to current documentation included: 1) Is there documentation whether patients brought their medications with them to the outpatient follow up visit? 2) If there is documentation regarding the presence or absence of patient's medications, did the patient bring their medications to the visit? 3) Was the "med reconciliation" button present in our Allscripts EHR clicked during the visit to suggest medication reconciliation had been performed? After initial control chart review data was obtained, educational material was provided to resident physicians and attending physicians in both verbal and written form. At least 1 month after initial intervention, an additional 25 chart reviews will be reviewed to determine if documentation of medications are present/absent and if overall proper medication reconciliation has been documented. Data is currently being analyzed and will be completed shortly. It is expected that the educational intervention will significantly increase documentation of whether patients brought medications with them and if these medications (and doses) were the same as out discharge medication reconciliation sheet at time of discharge from the hospital. This research is of critical importance because it is theorized that improving medication reconciliation could lead to an overall lower rate of preventable hospital re-admissions after discharge.

186. IMPROVING SHINGLES VACCINE AWARENESS AMONG RESIDENTS IN AN APPALACHIAN FAMILY MEDICINE CLINIC

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Shingles is a viral infection that results in painful rashes on the skin. It is caused by the varicella-zoster virus, the same virus that causes chicken pox; therefore, anyone who contracted chicken pox is at risk of manifesting shingles. Shingles affects up to one million Americans per year. Shingles is painful but not typically harmful, although it can occasionally result in serious complications, particularly for elderly patients. The shingles vaccine represents the best method to reduce the likelihood of shingles-related complications for carriers of the varicella-zoster virus. The objective of this study was to assess the level of resident knowledge regarding when it is appropriate to administer the shingles vaccine, both before and after attendance at an educational training session. It was hypothesized that the education would lead to increases in resident knowledge. Residents at the ETSU Family Physicians of Bristol clinic were first given a survey about the shingles vaccine, which included questions assessing their knowledge of vaccination guidelines and recommendations, as well as questions regarding their current practice regarding the shingles vaccine. Participants then attended an educational session on the shingles vaccine, which focused on recommended age for administration, as well as indications and contraindications for giving the vaccine. Finally, a second survey was administered to residents, which tapped the same domains as the original questionnaire. The pre- and post-education surveys were analyzed with a t test to determine if resident knowledge and practice changed significantly. Sixteen residents completed the pre-test, while 11 completed the post-test. Analysis revealed no significant differences between pre- and post-test scores. This indicates that the residents possessed adequate knowledge of the shingles vaccine even prior to the attendance at the educational session. This research acted as a valuable assessment of the quality of the clinic's training and practice regarding shingles vaccination.

187. METHADONE, A MAGIC PILL OF THE MODERN ERA CAUSING DRASTIC QT PROLONGATION SYNDROME- TORSADES!

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Introduction: Methadone is increasingly used in palliative medicine services as an inexpensive and powerful agent in the treatment of chronic pain. There has been increasing evidence in recent years about the arrhythmogenic potential of methadone by prolongation of the QT interval and by induction of the potentially fatal Torsades de Pointes (TdP). In this article the impact of this adverse effect on the palliative medicine patient population will be analyzed. Case Presentation: 56 year old white female who presented to the Emergency Department with altered mental status. She became increasingly lethargic and had respiratory failure and was intubated. She received a single dose of propofol for sedation and the staff noted the immediate onset of a rapid, wide complex tachycardia with waxing and waning amplitude. Propofol was discontinued and the dysrhythmia resolved. Torsades de Pointes was diagnosed and her corrected QT interval was 0.6ms which decreased to 0.4ms over the next few hours. A complete history was obtained from the patient's brother and it was found that she was a patient at a federally licensed methadone clinic for prior IV drug abuse; her daily dose was 260mg of oral methadone. A significantly lower dose of methadone was given via NG tube (20mg) with recrudescence of torsades and methadone was discontinued altogether. Withdrawal symptoms were subsequently noted and low-dose buprenorphine was given (0.3mg parenterally) with recrudescence of torsades. A later dose of IV fentanyl resulted in

several hours of alternating torsades with a normal sinus rhythm. Overdrive pacing with parenteral lidocaine was finally efficacious after failure of amiodarone to control the aberrant rhythm. Ultimately the patient was diagnosed with congenital QT prolongation and discharged to a non-medical drug rehab program.

188. METASTATIC PANCREATIC DUCTAL ADENOCARCINOMA PRESENTING AS PLEURITIC CHEST PAIN

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The most common presentation of pancreatic cancer is weight loss, anorexia, abdominal pain, epigastric pain, dark urine, jaundice, nausea, back pain, diarrhea, vomiting, steatorrhea, or thrombophlebitis. A case of metastatic pancreatic cancer presenting solely as pleuritic right-sided chest pain, causing splinting and shortness of breath with a drop in oxygen saturation is reported here. The patient was thought to have an acute bronchitis, treatment of which did not resolve the patient's complaints. A pulmonary embolism was suspected by an ER physician in a different hospital, and whereas diagnostic imaging revealed no pulmonary embolism, it showed multiple liver lesions. Subsequent workup revealed these masses to be metastatic lesions from a previously undiagnosed pancreatic ductal adenocarcinoma. The pleuritic chest pain is due to pleuritic irritation related to bone metastasis, as further workup proved. It was concluded that malignant tumors continue to have atypical presentations and that more research needs to be conducted regarding the presentation of pancreatic cancer.

189. PULMONARY INSUFFICIENCY WITH BUNDLE BRANCH BLOCK: COMMON COMPLICATIONS OF TETRALOGY OF FALLOT REPAIR IN ADULTS

Dr. Manar H Jbara, Dr. Gilbert Badr, Dr. Yasir Taha, Dr. Kais Al-balbissi.
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Introduction: Tetralogy of Fallot (TOF) is a complex cardiac congenital abnormality that includes VSD, pulmonary stenosis, overriding aorta and right ventricular hypertrophy. Recent advances in surgical procedures for TOF have increased the survival rate for patients with this congenital abnormality and it not uncommon to see adults with history of repair. Common complications of TOF repair include pulmonary insufficiency and bundle branch block. In such cases, surgery to correct the pulmonary valve regurgitation and pacemaker implantation for widened QRS is recommended. TOF is not as uncommon in adults as in previous decades and Internists need to be aware of the possible complications that can arise from repair. Case description: We present a 32 year old male with history of Tetralogy of Fallot repair in childhood, with no cardiology follow up for several years, who presented to the hospital with colitis and blocked P waves in the setting of high vagal tone from nausea and vomiting. ECHO revealed severe pulmonary regurgitation and right bundle branch block with a QRS duration of 160 msec on EKG. He denied any chest pain, shortness of breath, palpitations, dizziness, orthopnea, paroxysmal nocturnal dyspnea or leg edema. He was in sinus rhythm and he was treated for colitis. He will follow up with the cardiology service and be referred to a tertiary cardiology center to address his complex cardiac abnormality. Conclusion: Long term prognosis after surgical correction of Tetralogy of Fallot is excellent and has increased the survival of patients with this abnormality, but there is a risk of cardiac complications. Common complications from surgery can arise in adulthood and internists need to be aware and know of the possible complications, including pulmonary insufficiency and bundle branch block. Pulmonary insufficiency requires surgical correction, and pacemaker/ICD will need to be discussed in those patients with QRS > 180 msec.

190. STABILIZATION OF NEONATAL ACUTE ABDOMEN, A CASE REPORT

Dr. Erin Majchrzak, Dr. Colette Lauhan, and Dr. Shawn Hollinger, Department of Pediatrics, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

We report the case of a female neonate born at 36 weeks gestation who, on initial exam in the delivery room, was noted to have abdominal distention, and bruising. Other than oxygen saturation of 88%, vital signs were stable. Physical exam was significant for increased abdominal girth, firmness, and ecchymosis over the right lower quadrant and suprapubic regions. Skin exam showed petechiae on the eyelids, pallor of the trunk, and acrocyanosis. Patient was noted to be hypotonic. Immediate stabilization included oxygen via nasal cannula. An abdominal X-ray, bedside blood glucose, CBC and CMP were all obtained. The blood glucose read at less than 10 mg/dL and patient was given a 2 mL/kg bolus of D10W. The abdominal X-ray showed no gas past the stomach. Lab results showed hemoglobin 9.3 g/dL, platelet count $146 \times 10^3/\mu\text{L}$, AST 625, and ALT 162. Coagulation studies showed PT 22.6 seconds, PTT 37 seconds, and INR 2.0. The patient was diagnosed with anemia and presumed intestinal obstruction. A repeat abdominal X-ray was unchanged, and a gastrografin enema showed termination of contrast at the transverse colon. The patient was taken for exploratory laparotomy due to increasing abdominal girth and distress and found to have malrotation with presumed antenatal volvulus of the midgut. A Ladd's procedure was performed to alleviate the volvulus. The patient had necrotic bowel removed and was left with only 14 centimeters of viable intestine, with ileocecal valve intact. Intestinal malrotation is present in one of 6000 births and resulting volvulus is one of the most common complications. However, in utero volvulus associated with malrotation is exceedingly rare. Management of malrotation is primarily surgical. A complication such as a volvulus makes the operation emergent. Loss of intestinal length is the most important predictor of long-term outcomes in patients with surgical resection of the small bowel. In the setting of short bowel syndrome, feeding and nutrition become a primary concern for the neonatologist, and subsequent pediatrician. Nutrition strategies, both via TPN and enteral feeds, should be discussed in a team-based setting with the neonatologist, gastroenterologist, nutritionist, speech pathologist, and surgeon. A team-based approach to treatment and close monitoring of growth are necessary for appropriate infant care.

191. ONCE UPON A TIME-CHILD ABUSE PREVENTION

Dr. Erin Majchrzak, Dr. Lindsey Bull, Dr. Debra Mills, Dr. Karen Schetzina. Department of Pediatrics, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Child abuse is a problem in Tennessee and the U.S. as a whole. In the U.S. in 2014, there were 3,248,008 investigated cases of alleged child abuse and 702,208 substantiated cases. In Tennessee, there were 94,657 reported cases and 11,695 substantiated cases. Child abuse is a societal problem with long-term health impacts and is associated with increased cost for case investigations and treatment. ETSU Pediatrics, in conjunction with Niswonger Children's Hospital and the Children's Advocacy Center (CAC), sought to hold an event to enhance awareness across Northeast Tennessee. A literature review was conducted to evaluate effective ways for community outreach in preventing child abuse and neglect. Multiple prevention programs, like FRIENDS, as well as evidence based articles, like "Creating Community Responsibility for Child Protection: Possibilities and Challenges," and "Child Maltreatment Prevention: Toward Evidence-Based Approach" were reviewed. After the research was complete and several meetings were held, members from the committee created an abuse awareness event using public awareness campaigns. Flyers were handed out to potential participants and interviews were conducted with various news stations and papers. Sign ups were held in clinic and online prior to the event and attendance was counted at the event. Studies indicate that early intervention and learning are effective in increasing awareness for children, especially in high-risk populations. Those that had parental involvement, public awareness campaigns or community events for any period of time showed improved parent-child interactions, improvement in child safety and an increase in reports of suspected abuse with a decrease in maltreatment. "Once Upon a Time" was designed to introduce the importance of discussing and preventing abuse in our community through a safe and fun environment. The local CAC's motto: "every child should be safe in his or her own castle" was selected as a theme for the event. The Once Upon a Time event is now held yearly during child abuse

awareness month. Participants partake in a parade and several activities to promote healthy active lifestyles and child abuse awareness. There is a "Dare to Share" station in which all participants pledge to talk openly about child abuse by placing their handprint on a banner. Children are encouraged to dress up as their favorite fairy tale character and enjoy a day promoting the safety of all children. There were 220 participants and 50 volunteers, including medical providers, ETSU student organizations and community organizations at the 2015 event. This was an increase from 150 participants in the inaugural year. The majority of people who signed up for the event participated in the pledge at a "Dare to Share" station. A third annual event is planned for 2016, with data collection to take place to further investigate demographics, health literacy and understanding of child abuse in the community.

192. IMPROVING EMERGENCY ROOM THROUGHPUT TIMES AT AN APPALACHIAN REGIONAL MEDICAL CENTER

Dr. David Marconi, Dr. Jessica Visser, Dr. Greg Clarity, and Dr. Patricia Conner. Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

The Centers for Disease Control have reported that the average national wait time for emergency rooms is 30 minutes, and the average time to actually receive treatment is 90 minutes. The measurement of time between the decision to admit by the ER Physician, and the time the patient moves from the ER to an inpatient bed is referred to as "ER throughput time". The objective of the present study is to reduce ER throughput time through the presentation of an educational training program directed toward Family Medicine residents rotating at the emergency room of an Appalachian regional medical center. This study involved the administration of a survey about the ER throughput times to participating residents. The questionnaire focused on knowledge questions regarding ER throughput time as well as questions about practice behavior on this topic. Residents then attended an educational training session detailing methods to reduce ER throughput times. The residents also completed a second survey to determine if there was a significant change in their knowledge and behavior regarding ER throughput time. Additionally, aggregated wait time data was transmitted from ER staff to researchers, in order to compare pre- and post-education throughput times. Data is currently undergoing analysis. It is expected that the education will have led to statistically significant increases in resident knowledge and statistically significant decreases in ER throughput times.

193. IMPROVING IDENTIFICATION OF YELLOW FLAGS IN ACUTE LOW BACK PAIN IN AN APPALACHIAN RESIDENT TRAINING CLINIC

Dr. Nayef Sayegh, Dr. Muhammad Khan, Dr. Amanda Stoltz, and Dr. Patricia Conner. Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

One way to examine the spine is by using the biopsychosocial model. The aim of using this model is to identify patients who are likely to develop chronicity and disability. Yellow flags indicate psychosocial factors that increase the risk of work loss. In addition, yellow flag screenings are useful in acute low back pain and there are no clear indications of their use in sub-acute or chronic low back pain. However, evidence has shown that targeting yellow flags does seem to have a better outcome rather than ignoring them. The objective of this study was to assess the level of resident knowledge regarding "yellow flags" in acute low back pain before and after attendance at an educational training session. This research involved giving residents a survey about yellow flags in acute low back pain. The questionnaire focused on measuring participants' knowledge of yellow flags. Participants then attended an educational training session on the topic of yellow flags. Finally, a second survey was administered to determine if participant knowledge significantly increased due to their attendance at the educational program. The data is currently in the analysis phase. It is expected that the educational session will have led to a statistically significant increase in resident knowledge regarding yellow flags in acute low back pain.

194. IMPROVING MATERNAL OXYGEN DELIVERY FOR INTRAUTERINE FETAL RESUSCITATION AT AN APPALACHIAN REGIONAL MEDICAL CENTER

Dr. Angel Turner, Dr. David Marconi, and Dr. Patricia Conner.

Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

During delivery, a fetus is monitored via fetal heart tracing. Patterns of the fetal heart tracing can give some indication to the current status of a fetus. Tracings are classified in to two basic categories, reassuring and non-reassuring. Non-reassuring tracings require an intervention to prevent detrimental effects on a fetus. Based on the severity of the non-reassuring tracing there are conservative and aggressive management strategies. Treatment options include but are not limited to: observation, maternal repositioning, oxygen administration, holding or decreasing Pitocin, intrauterine infusion, and caesarian section. This project focused on improving procedures for the conservative treatment measures, specifically maternal oxygen delivery for a non-reassuring tracing. Two independent literature reviews were performed to identify the proper use and guidelines for oxygen delivery during intrauterine fetal resuscitation. Guidelines were taken from the American College of Obstetricians and Gynecologists. Guidelines are as follows: maternal oxygen delivery should be through a non-rebreather mask with intent to increase fetal oxygenation, and the non-rebreather mask should have a full oxygen reservoir and set to a minimum of 10L per minute flow rate. Maternal oxygen delivery during resuscitation was directly observed to be suboptimal according to hospital policy and practice. Maternal oxygen was being administered via a non-rebreather mask, through a saline humidifier bottle. Furthermore, it was noted that the non-rebreather device was not properly prepared for patient use. Proper use of a non-rebreather requires that the oxygen reservoir be filled prior to use and the flow rate set to a minimum of 10L titrated up to 15L based on pts respiratory rate and depth of respirations to ensure that reservoir insufflates completely between each respiratory cycle. Review of hospital system policy for clinical staff, to include, medical, nursing and respiratory therapy, also showed a discrepancy when compared with current medical guidelines. It was determined that lack of adherence to national guidelines and standard of care resulted in the improper use of device which could be detrimental to patients. The following were outcomes based on the results of the study: humidification removed; no longer titrating non-rebreather down; minimum flow rate is set at 10L; hospital system wide policy change for nursing; and updated training for nursing staff. This study was of critical value as it identified and corrected a hospital issue that could have had detrimental effect on patient outcomes.

195. EFFICACY OF IMPLEMENTING A TRANSITION OF CARE CLINIC IN AN APPALACHIAN FAMILY MEDICINE CLINIC

Dr. Joey Watson¹, Dr. Larissa Bossaer, PharmD², and Dr. Amanda Stoltz¹.

¹ Department of Family Medicine, Quillen College of Medicine, and

² Department of Pharmacy Practice, Gatton College of Pharmacy,
East Tennessee State University, Johnson City, TN.

Improving the patient's transition of care (TOC) following hospitalization to the outpatient setting is a QI initiative that was implemented at the ETSU Family Physicians of Bristol in 2014. The aim of this initiative was to provide better quality of care for our patients and reduce readmission rates. During the previous QI initiative, medication changes were identified as the most important issue during TOC. Similar efforts as to the ETSU Family Physicians of Bristol's TOC clinic have shown decreased hospital utilization within 30 days of discharge by 30% and reduced hospital utilization among participants who frequently used hospital services. Previous research also found that patients experiencing a work-up error (defined as the PCP not adequately following up on a work-up recommendation by the inpatient provider) were six times more likely to be readmitted within 3 months of the patient's first post discharge outpatient visit. The objective of the present study was to determine the effects of an ongoing intervention designed to improve quality of care and minimize hospital reutilization after discharge. A chart review was executed to compare the following for 6 months prior to and 6 months status post implementation of transition of care clinic for patients of similar demographics, co-morbidities, and number of medications: (1) 30 day and 3 month readmission rates, (2) whether PCP received discharge summary within 7 days, (3) adequately followed up on work-up recommendation by inpatient provider, (4) types of interventions performed at hospital follow-

up visits, and (5) number and type of adverse events. It was hypothesized that all factors would see significant improvement 6 months post-TOC implementation. Eighty-nine patients were included in the pre-TOC chart reviews, while 43 patients were included in the post-TOC chart review. The 30 day readmission rates were .82 (pre-TOC) and .19 (post-TOC), and the 90 day readmission rates were 1.39 (pre-TOC) and .53 (post-TOC). PCP received discharge summary within 7 days 36% of the time pre-TOC and 98% of the time post-TOC. Providers followed up adequately 25% for pre-TOC and 95% for post-TOC. In the pre-TOC chart review, it was found 22% of patients were lost to follow up, while only 2% of patients were lost in the post-TOC chart review. Compared to pre-TOC, post-TOC hospital follow-up visits consistently had hospital discharge summaries received by the clinic, medication changes reconciled including catching mistakes in the hospital discharge MAR, and adequately addressed recommended follow-up items from the hospital. This project demonstrates the tremendous improvement in patient outcomes that can result from implementing a transition of care clinic.

196. INHERITED QUALITATIVE PLATELET DISORDER MASQUERADING AS VON WILLEBRAND'S DISEASE- A PLATELET STORAGE POOL DISEASE

Nagabhishek Moka, Syed Zaidi, and Koyamangalath Krishnan.

Department of Internal Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Introduction: Inherited qualitative platelet disorders are rare causes of symptomatic platelet type bleeding. Patients with qualitative platelet defects may have normal platelet counts. Defective platelet function can result from deficiencies in the number of granules, granule content or failure of normal secretory mechanisms upon stimulation. Bleeding manifestations typical of qualitative platelet defects include unexplained severe mucosal or bleeding following invasive procedures. **Case Report:** A 56 year old female with history of easy bruising and multiple bleeding episodes since childhood requiring repeated blood transfusions presented to the hematology clinic for further evaluation. Most of her bleeding episodes were spontaneous lower GI bleeds. In addition, she had severe bleeding episodes that resulted after minor surgical procedures. She was diagnosed with probable von Willebrands disease in her teens and given DDAVP (desmopressin) and recombinant Factor VIII for multiple procedures including tooth extraction and colonoscopies with no excessive bleeding noted. She also required several packed red blood cell transfusions which resulted in hepatitis B and hepatitis C. Her physical examination was unremarkable for any cutaneous or mucosal bleeding. Relevant laboratory data revealed hemoglobin 12 g/dl, MCV 78 fl, platelet count 141K/cu mm. Her coagulation tests revealed normal PT, APTT, fibrinogen and factor VIII, von Willebrand antigen. Platelet aggregation studies showed ADP aggregation of 93%, collagen aggregation of 89%, arachidonic acid aggregation of 79%, ristocetin aggregation of 101%, collagen ADP closure time of 135 seconds, collagen ATP release was low at 0.3 nm, and epinephrine aggregation was low at 15%. Her ADP secretion was low at 0.2%, collagen secretion was 0%, epinephrine secretion was 0%, arachidonic acid secretion was 0.12%. Normal aggregation of platelets to the platelet agonists ADP, collagen, epinephrine and arachidonic acid and poor release of collagen, ATP and epinephrine is indicative of a platelet release defect categorized as a storage pool disorder. **Conclusion:** Platelet storage pool disorder a subcategory of Inherited qualitative platelet defects are a heterogenous group of bleeding disorders associated with abnormalities in content of intracytoplasmic platelet granules leading to defects in production, secretion or release of these granules. They manifest mainly by mucocutaneous bleeding and sometimes cause severe bleeding. These disorders are extremely rare and manifest a high variability in laboratory tests such as impaired aggregation in response to different agonists and abnormal platelet secretion induced by several platelet agonists. Given the rarity of the disorder, diagnosis is often missed and can be difficult. Once von Willebrand disease, the most common diagnosis associated with mucosal bleeding has been excluded, the patients should be evaluated for platelet dysfunction. Further testing includes evaluating platelet aggregation with various agonists, calcium flux or secretion studies, protein biochemistry, electron microscopy and flow cytometry. Approach to treatment include counselling that mucocutaneous will be common and can be serious, and can occur in the event of trauma or surgery. There is very little literature on their management; however, donor platelets in addition to antifibrinolytics can be given during major surgery or major bleeding episodes. DDAVP can be recommended for minor surgeries and procedures.

197. A CASE OF IMATINIB CAUSING HYPERGLYCEMIA

Dr. Fady Tawadros¹, Dr. Ghulam Murtaza¹, Dr. Manar Jbara¹, and Dr. Mailien Reed Rogers².

¹ Department of Internal Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

² Veterans Affairs Medical Center, Mountain Home, TN.

Imatinib is a type of targeted chemotherapeutic agent used in treatment of multiple malignancies including CML and GIST. It acts through inhibition of tyrosine kinase enzyme. Imatinib use has been described in some studies to improve glycemic control and even resolution of diabetes mellitus condition. It was hypothesized that imatinib has this effect by acting on cell signaling and protein phosphorylation involved in insulin metabolism. However, hyperglycemia was mentioned to be a very rare complication of imatinib. We describe a 70 years old male with no previous diagnosis of diabetes who is being treated with Imatinib for GIST. He comes to the hospital with polyuria, polydipsia and dizziness and was noted to have high blood glucose of 689 mg/dl with no acid-base disorder on diagnostic workup. He took extra doses of imatinib for few days mistakenly before coming to the hospital. vital signs: Pulse 102, Pulse Ox 99, Respirations: 16, Blood Pressure 158/96, Temperature 98.3 F. Physical examination showed dry mucosa, ejection systolic murmur on cardiac examination, clear lungs, benign abdomen and no edema on extremities. Imatinib effect on protein phosphorylation and cell signaling has been described to cause improvement in diabetic patients but was also found to have hyperglycemic effects in other patients. Further studies and research is needed to determine the full effects of imatinib on glucose metabolism. Patients and physician should be aware of the potential complications involving glycemic control upon starting Imatinib.

198. POSTERIOR MEDIASTINAL LEIOMYOSARCOMA , RARE TUMOR IN UNUSUAL LOCATION

Dr. Fady Tawadros, Amanda R. Armstrong, and Dr. Devapiran Jaishankar.
Department of Internal Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Introduction: Posterior mediastinal masses comprise a wide variety of benign and malignant lesions. Neurogenic tumors represent more than 60 % of the lesions. Leiomyosarcoma arising from the mediastinal soft tissues, unassociated with neighboring structures, is extremely rare. Case Report: An eighty nine year old female with a remote history of lumpectomy and radiation for breast cancer presented with increased food regurgitation over 6 months along with shortness of breath and chest pain of 3 days duration. CT chest revealed a posterior mediastinal mass measuring 4.3 x 6.4 x 7.3 cm. Intraoperative frozen section during video assisted thoracoscopic surgery revealed a spindle cell cancer. An open thoracotomy was performed and the tumor was resected entirely. It was noted that the tumor was adherent to the esophagus but did not appear to be arising from it. Initial pathology report was positive for Leiomyosarcoma and negative for Schwannoma as confirmed with a second opinion from Mayo Clinic pathology. The patient was diagnosed with stage III leiomyosarcoma after further imaging studies revealed no metastatic disease. Discussion: While leiomyosarcoma is the most common histological type of soft tissue sarcoma accounting for 23.9 % of cases, the incidence of posterior mediastinal leiomyosarcoma is very rare. The literature contains a few sporadic individual case reports and a series of patients by Moran et al. Although most of the cases present with radiographic or endoscopic evidence of compression and displacement of mediastinal structures, during surgery they are found not to be attached or directly involving or invading the airways, great vessels or esophagus. The origin of these tumors within the mediastinum remains a subject of speculation and three possibilities have been put forward in the literature. Firstly, leiomyosarcoma may arise from hypertrophic smooth muscle derived from splanchnic mesoderm that has become displaced during embryonic development. The second possibility noted that LMS can be a parasitic tumor of the esophagus that has detached from the wall during development. The third possibility considers an origin from small vessels within the mediastinal soft tissues. The standard of care in resectable non metastatic disease is surgery. The benefit of adding postoperative radiotherapy boost has not yet been evaluated in a randomized clinical trial and recommendations for adjuvant radiation are usually made in the setting of large tumors, positive

margins or high histologic grade. Randomized studies of adjuvant chemotherapy in resectable sarcoma showed widely conflicting results regarding benefit. Further studies are needed to define the role of adjuvant therapy following complete resection.

199. ACUTE PULMONARY EDEMA IN THE SETTING OF REGADEONSON MYOCARDIAL IMAGING STRESS TEST

Dr. Manar Jbara and Dr. Kailash Bajaj. Department of Internal Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Introduction: Lexiscan (Regadenoson) stress test is a type of myocardial perfusion imaging study used to evaluate patients with suspected or known coronary artery disease. Regadenoson induce maximum myocardial blood flow through vasodilation. Its safety profile and ease of use has made it widely used and excellent choice for coronary artery disease risk stratification. Minor side effects have been reported with its use and most resolve spontaneously within minutes. We report a case of severe respiratory distress and desaturation developed after Lexiscan stress test. CXR showed bilateral pulmonary infiltrates and subsequent ischemic workup was not significant. Acute pulmonary edema in the setting of Lexiscan PET stress test was thought the most likely reason for this patient severe shortness of breath. More studies might need to be done and further attention need to be applied to the adverse events associated with Lexiscan test.

Case report: 57 years old female with cardiomyopathy of unclear etiology with EF 30-35%, paroxysmal atrial fibrillation, hypertension, and OSA, COPD, Diabetes mellitus and morbid obesity was undergoing PET Lexiscan nuclear stress test in an outpatient setting as part of ischemic workup when she suddenly developed severe respiratory distress with desaturation into 30%. Her home medications include Amiodarone, Coumadin, Carvedilol, Lasix, inhalers and Insulin. She was put on 10 L of oxygen and 10 mg IV aminophylline was administered. She was rushed to ER and while on route, her saturation improved to 70s. she was initially bradycardic in the 40s to 50s but then it improved to normal range. Physical examination showed irregular heart rhythm with no murmurs and Bilateral crackles were noted with no evidence of bronchospasm. Initial blood pressure was documented as 257/127 with repeat of 140/115. She was then put on Bipap with 100% oxygen and lasix 80mg IV was administered. Her Labs showed ABG: PH 7.28, PCO2 50.8, PO2 188 on 100% O2 with Bipap, negative Troponin, BNP 1741, Diffuse bilateral infiltrates on CXR. EKG demonstrates sinus bradycardia rate 50 with LBBB. Stress test imaging was suboptimal with inferolateral and inferior segments not included on rest study. Perfusion defect noted in inferolateral segments and felt to be partially seen on rest favoring myocardial scar. She was admitted to ICU and gradually improved with Lasix and BIPAP. Cardiology was consulted for her and Pulmonary edema with elevated BNP were concerning for severe coronary artery disease. Echocardiogram didn't show significant changes in EF from previous one. Coronary angiography was then scheduled which showed incidental anomalous left circumflex origin from right coronary cusp with no significant obstructive coronary artery disease. Patient's general condition including her breathing improved and she was discharged after few days from admission. Conclusion: Side effects with Regadenosone are reported to be of minor clinical significance. These side effects include shortness of breath, headache, flushing, dizziness, chest and abdominal discomfort. Most of these events resolved spontaneously within 15-30 minutes. AV conduction abnormalities and bronchoconstriction have not been reported. Studies for side effects of Regadenosone has been conducted on relatively small population and therefore we need more studies to reliably assess the frequency and relationship of the severe adverse events to Lexiscan.

2015 ASRF Award Winners

Poster Presentations

Undergraduates

Arts and Humanities

First Place:

Rachel Lay

Faculty Sponsor: Dr. Martha Michieka

LINGUISTIC LANDSCAPE OF MAIN STREETS IN BOSNIA AND HERZEGOVINA

Biomedical and Health Sciences

First Place:

Abigail Hughes

Faculty Sponsor: Dr. Christopher Pritchett

EFFECTS OF T6SS ON THE OVERPRODUCTION OF ALGINATE TO PROMOTE MUCOIDY AND THE MICROBICIDAL EFFECT OF T6SS ON OTHER PSEUDOMONAS

Second Place:

Samantha Dunlay

Faculty Sponsor: Dr. Jonathan Peterson

CTRP3 PREVENTS ETOH TREATED HEPATOCYTE APOPTOSIS

Natural Sciences

First Place:

Elizabeth Williams

Faculty Sponsor: Jeff Knisley

GENERALIZING FRACTAL INTERPOLATION WITH QUADRATIC SCHEMES

Second Place:

Nathaniel Hancock

Faculty Sponsor: Dr. Thomas Jones

EFFECTS OF SUB-LETHAL LEVELS OF CADMIUM ON BEHAVIOR IN THE SPIDER ANELOSIMUS STUDIOSUS

Social and Behavioral Sciences

First Place, Group A:

Ashley Brown

Faculty Sponsor: Dr. Matt Palmatier

PREDATORY AGGRESSION AS A PHENOTYPIC MARKER FOR THE MOTIVATION TO OBTAIN NICOTINE IN RATS.

Second Place, Group A:

Alexis Booth

Faculty Sponsor: Dr. Jill Stinson

EFFECTS OF ADVERSE CHILDHOOD EXPERIENCES ON HIGH RISK INPATIENTS CRIMINAL BEHAVIOR

First Place, Group B:

Kristen Leedy

Faculty Sponsor: Dr. Russ Brown

THE SYNERGISTIC EFFECTS OF METHYLPHENIDATE ON THE BEHAVIORAL EFFECTS OF NICOTINE

Second Place, Group B:

Crystal Jobe

Faculty Sponsor: Dr. Stacey Williams

EXAMINING INFERTILITY AS A STIGMATIZING CONDITION TO UNDERSTAND NEGATIVE PSYCHOLOGICAL OUTCOMES OF INFERTILITY

First Place, Group C:

Haley Wise

Faculty Sponsor: Dr. Jameson Hirsch

NEGATIVE LIFE EVENTS AND SUICIDAL BEHAVIOR IN COLLEGE STUDENTS: CONDITIONAL INDIRECT EFFECTS OF HOPELESSNESS AND SELF-COMPASSION

Second Place, Group C:

Megan Morton

Faculty Sponsor: Dr. Eric Sellers

UTILIZING VISUAL ATTENTION AND INCLINATION TO FACILITATE BRAIN-COMPUTER INTERFACE DESIGN

Graduate Students, Master's Candidates

Biomedical and Health Sciences

First Place:

Amber Ward

Faculty Sponsor: Dr. Bert Lampson

USING GENOMICS TO INFER THE IDENTITY OF AN INHIBITORY COMPOUND

Second Place:

Jocelyn Aibangbee

Faculty Sponsor: Dr. E. Daniels

ANTIBIOTIC SUSCEPTIBILITY, PLASMID ISOLATION AND CURING OF SOME FOODBORNE PATHOGENS

Natural Sciences

First Place, Group A:

Tesha Blair

Faculty Sponsor: Dr. Hugh Miller

THE APOPTOTIC AND INHIBITORY EFFECTS OF PHYLLOQUINONE ON THE U937 CELL LINE

Second Place, Group A:

Michelle Bradburn

Faculty Sponsor: Dr. Andrew Joyner

TORNADO RETURN PERIODS IN THE SOUTHEASTERN UNITED STATES: WE'RE NOT IN KANSAS ANYMORE

First Place, Group B:

Joseph Osazee

Faculty Sponsor: Dr. A. Shilabin

FRAGMENT-BASED DESIGN AND EVALUATION OF PYRROLO[2,1-C][1,4]BENZODIAZEPINE DERIVATIVES AS NOVEL NON- β -LACTAM β -LACTAMASE INHIBITORS

Second Place, Group B:

Preethi Sathanantham

Faculty Sponsor: Dr. Celia McIntosh

STRUCTURE FUNCTION ANALYSIS OF FLAVONOL SPECIFIC GLUCOSYLTRANSFERASE FROM CITRUS PARADISI

Social and Behavioral Sciences

First Place, Group A:

Leigh Kassem

Faculty Sponsor: Dr. Gregory Rocheleau

STRAIN, SOCIAL CLASS, AND CRIME: A LONGITUDINAL ASSESSMENT

Second Place, Group A:

Carrie LeMay

Faculty Sponsor: Dr. Jill Stinson

SEX OFFENDERS WITH & WITHOUT INTELLECTUAL DISABILITY: CLINICAL, BEHAVIORAL, & CRIMINAL CHARACTERISTICS

First Place, Group B:

Casey Morrell

Faculty Sponsor: Dr. Megan Quinn

ANALYSIS OF STROKE GEOGRAPHICAL DISPARITIES IN TENNESSEE

Second Place, Group B:

Crystal Robertson

Faculty Sponsor: Dr. Andrew Joyner

GEOSPATIAL ANALYSIS OF THE RELATIONSHIP BETWEEN FOOD ACCESSIBILITY AND HEALTH RISK BEHAVIORS IN TENNESSEE

Graduate Students, Doctoral Candidates

Biomedical and Health Sciences

First Place, Group A:

Makenzie Fulmer

Faculty Sponsor: Dr. Douglas Thewke

THE EFFECTS OF TYPE-2 CANNABINOID RECEPTOR DEFICIENCY ON LATE STAGE
ATHEROSCLEROSIS

Second Place, Group A:

Serena Allen

Faculty Sponsor: Dr. Brooks Pond

ALTERATIONS IN BRAIN TISSUE NEUROCHEMISTRY FOLLOWING CHRONIC 'BATH SALTS'
EXPOSURE

First Place, Group B:

Jessica Slade

Faculty Sponsor: Dr. Rob Schoborg

CO-INFECTION OF BALB/C MICE WITH CLAMYDIA MURIDARUM AND HERPES SIMPLEX VIRUS-2
(HSV-2) SIGNIFICANTLY REDUCES HSV-2-INDUCED MORTALITY AND VIRAL SHEDDING

Second Place, Group B:

Xia Zhang

Faculty Sponsor: Dr. Chuanfu Li

ENDOTHELIAL CELL HSPA12B PLAYS A CARDIOPROTECTIVE ROLE IN SEPSIS INDUCED
CARDIAC DYSFUNCTION VIA THE RELEASE OF MICRORNA CONTAINING EXOSOMES

Social and Behavioral Sciences

First Place, Group A:

Curtis Bradley

Faculty Sponsor: Dr. Matt Palmatier

INTRAVENOUS SELF-ADMINISTRATION OF CAFFEINE IN RATS

Second Place, Group A:

L. Carter Florence

Faculty Sponsor: Dr. Joel Hillhouse

PREVENTION OF SKIN CANCER AND PREFERENCE FOR TANNING LOCATION

Honorable Mention, Group A:

Carrie LeMay, stand-in for Laura DeLustro

Faculty Sponsor: Dr. Jill Stinson

SEX OFFENDERS WITH & WITHOUT INTELLECTUAL DISABILITY: CLINICAL, BEHAVIORAL, AND
CRIMINAL CHARACTERISTICS

First Place, Group B:

Andrea Kaniuka

Faculty Sponsor: Dr. Jameson Hirsch

NON-SUICIDAL SELF INJURY AND SUICIDAL BEHAVIOR IN COLLEGE STUDENTS: CONDITIONAL
INDIRECT EFFECTS OF SUBSTANCE ABUSE AND THWARTED INTERPERSONAL NEEDS

Second Place, Group B:

Daniel Owusu

Faculty Sponsor: Dr. Hadii Mamudu

REGIONAL DIFFERENCES IN SECONDHAND SMOKE EXPOSURE AMONG NEVER-SMOKING YOUTH IN LOW- AND MIDDLE-INCOME COUNTRIES

Medical Students and Pharmacy Students

Biomedical and Health Sciences

First Place, Group A:

Alexander Hicks

UNIQUE VITAMIN D ANALOGUE FOR THE INHIBITION OF NFKB IN TREATMENT OF OSTEOARTHRITIS

Second Place, Group A:

Pooja Jagadish

Faculty Sponsor: Dr. Don Hoover

EFFECTS OF GTS-21, A SELECTIVE ALPHA-7 NICOTINIC ACETYLCHOLINE RECEPTOR AGONIST, ON HEART RATE AND CONTRACTILITY IN ISOLATED MOUSE ATRIA

First Place, Group B:

Kent Rinehart

Faculty Sponsor: Dr. Bart McKinney

THE "PIE CRUST" METHOD FOR LATERAL RELEASE PROCEDURES: EVALUATION OF LATERAL TRANSLATION, MEDIAL TRANSLATION, AND PATELLAR TILT COMPARED TO TRADITIONAL STANDARD AND EXTENDED LATERAL RELEASE SURGICAL TECHNIQUES IN A CADAVERIC STUDY

Second Place, Group B:

Haley Peters

Faculty Sponsor: Dr. John Bossaer

DRUG-DRUG INTERACTION DATABASES AND NEW ORAL CHEMOTHERAPEUTIC AGENTS

Social and Behavioral Sciences

First Place:

Travis Grindstaff

Faculty Sponsor: Dr. Jim Shine

JOHNSON COUNTY TEEN PREGNANCY PREVENTION

Second Place:

Tatiana Patsimas

Faculty Sponsor: Dr. Karen Schetzina

IDENTIFYING PARENTAL PERSPECTIVES ON HEALTHY EATING AND MOBILE APPLICATION USAGE

Honorable Mention:

Holly Gilliam, stand-in for Heather Flippin

Faculty Sponsor: Dr. Nick Hagemeyer

TENNESSEE COMMUNITY PHARMACISTS' NEONATAL ABSTINENCE SYNDROME (NAS)
PREVENTION PERCEPTIONS AND BEHAVIORS

Medical Residents, Clinical Fellows and Post-Doctoral Fellows

First Place, Group A:

Esha Cannon

Faculty Sponsor: Dr. Kanishka Chakraborty

THINK OUT OF THE BOX-ALL SKIN NODULES ARE NOT SIMPLE CYST

Second Place, Group A:

Puja Sitwala

Faculty Sponsor: Dr. Melanie Bochis

COMPLETE HEART BLOCK: A DANGEROUS COMPLICATION OF HYPERKALEMIA

First Place, Group B:

Vajeaha Tabassum

Faculty Sponsor: Dr. Jaishankar

SPONTANEOUS TUMOR LYSIS SYNDROME IN METASTATIC NONSEMINOMATOUS GERM CELL
TUMOR

Second Place, Group B:

Puja Sitwala

Faculty Sponsor: Dr. Rupal Shah

CALCIPHYLAXIS OR CELLULITIS? A DIAGNOSTIC CHALLENGE

Oral Presentations

Master's Candidates

Arts and Humanities

First Place:

Steven Knapp

Faculty Sponsor: Dr. Tommy Lee
THE BATTLE OF MOORE'S CREEK BRIDGE

Second Place:

Colin Campbell

Faculty Sponsor: Dr. Daryl Carter
WE'RE NOT GONNA TAKE IT: TIPPER GORE'S FIGHT AGAINST ROCK MUSIC

Biomedical and Natural Sciences

First Place:

Shardrack Asare

Faculty Sponsor: Dr. Sandy Eagle
OPTIMIZED ACID/BASE EXTRACTION AND STRUCTURAL CHARACTERIZATION OF BETA-GLUCAN FROM SACCHAROMYCES CEREVISIAE

Second Place:

Isaac Addo

Faculty Sponsor: Dr. Hua Mei
SYNTHESIS OF A 3-DIAZONIUM -4-(TRIFLUOROVINYLOXY)-PERFLUOROBUTANESULFONYLFLUORIDE ZWITTERIONIC MONOMER FOR POLYMER ELECTROLYTE MEMBRANE FUEL CELL

Social and Behavioral Sciences

First Place:

Dannel Petgrave

Faculty Sponsor: Dr. Jodi Polaha
ADHD MANAGEMENT IN PEDIATRIC PRIMARY CARE: TIME IS NOT ON OUR SIDE

Second Place:

Eunice Mogusu

Faculty Sponsor: Dr. Shimin Zheng
EPIDEMIOLOGY OF PRETERM BIRTHS IN THE UNITED STATES

Doctoral Candidates:

Social and Behavioral Sciences

First Place:

Kathleen Klik

Faculty Sponsor: Dr. Stacey Williams

RISK AND PROTECTIVE FACTORS OF INTERNALIZED MENTAL ILLNESS STIGMA

Second Place:

Daniel Peterson

Faculty Sponsor: Dr. Russ Brown

THE ROLE OF THE A7 AND A4B2 NICOTINIC RECEPTORS IN NICOTINE SENSITIZATION AND NEURAL PLASTICITY OF ADOLESCENT RATS NEONATALLY TREATED WITH QUINPIROLE

Medical Residents, Clinical Fellows,
Medical Students and Pharmacy Students

First Place:

Haley Peters

Faculty Sponsor: Dr. Brooks Pond

QUANTITATIVE DETERMINATION OF D- AND L-ENANTIOMERS OF METHYLPHENIDATE IN MATERNAL PLASMA, PLACENTA, AND MATERNAL AND FETAL BRAIN TISSUE BY LIQUID CHROMATOGRAPHY-MASS SPECTROMETRY

Second Place:

Loren Kirk

Faculty Sponsor: Dr. Stacy Brown

STABILITY OF ORAL VANCOMYCIN PRODUCTS FOR BULK PREPARATION AND STORAGE